



NY RISING COMMUNITY RECONSTRUCTION PROGRAM

THE FIVE TOWNS

NY RISING COMMUNITY RECONSTRUCTION PLAN

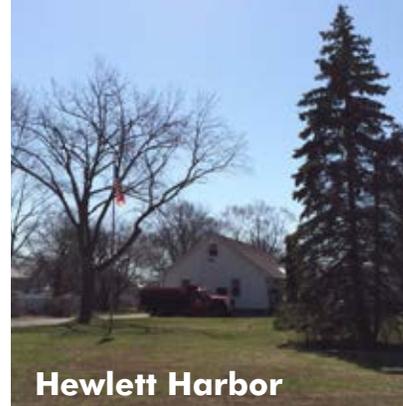
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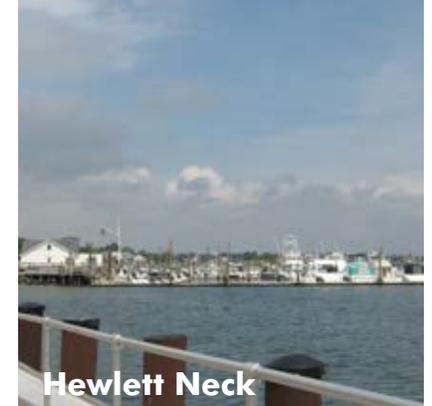
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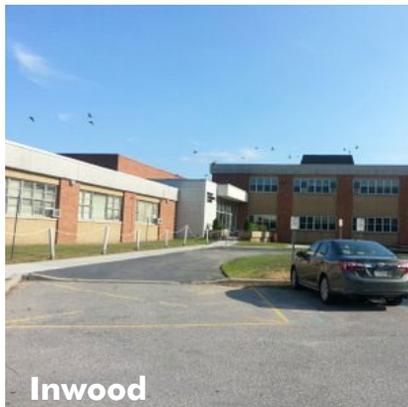
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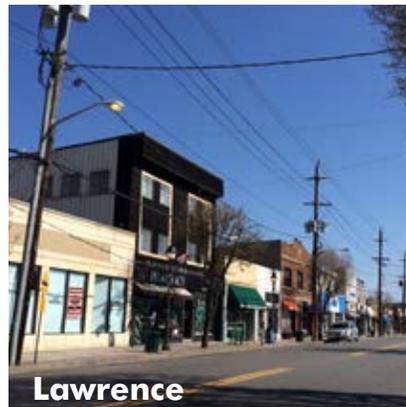
Hewlett Harbor



Hewlett Neck



Inwood



Lawrence



Meadowmere Park



Woodmere

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Attributions

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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,

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

with community members leading the planning process. Across the State, more than 500 New Yorkers represent their communities by serving on Planning Committees. More than 400 Planning Committee Meetings have been held, during which Planning Committee members worked with the State's NYRCR Program team to develop community reconstruction plans and identify opportunities to make their communities more resilient. All meetings were open to the public. An additional 125-plus Public Engagement Events attracted thousands of community members, who provided feedback on the NYRCR planning process and proposals. The NYRCR Program's outreach has included communities that are traditionally underrepresented, such as immigrant populations and students. All planning materials are posted on the NYRCR Program's website (www.stormrecovery.ny.gov/nyrcr), providing several ways for community members and the public to submit feedback on materials in progress.

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

With the January 2014 announcement of the NYRCR Program's expansion to include 22

new localities, the program comprises over 2.7 million New Yorkers and covers nearly 6,500 square miles, which is equivalent to 14% of the overall State population and 12% of the State's overall geography.

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

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

quickly as possible.

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

The NYRCR Plan

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

The projects and actions set forth in this NYRCR Plan are divided into three categories. The order in which the projects and actions are listed in this NYRCR Plan does not necessarily indicate the NYRCR Community's prioritization of these projects and actions. **Proposed Projects** are projects proposed for funding through a NYRCR Community's allocation of CDBG-DR funding. **Featured Projects** are projects and actions that the Planning Committee has identified as important resiliency recommendations and has analyzed in depth, but has not proposed for funding through the NYRCR Program. **Additional**

Resiliency Recommendations are projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects. The Proposed Projects and Featured Projects found in this NYRCR Plan were voted for inclusion by official voting members of the Planning Committee. Those voting members with conflicts of interest recused themselves from voting on any affected projects, as required by the NYRCR Ethics Handbook and Code of Conduct.

The Five Towns NYRCR Community is eligible for up to \$27,600,000 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,

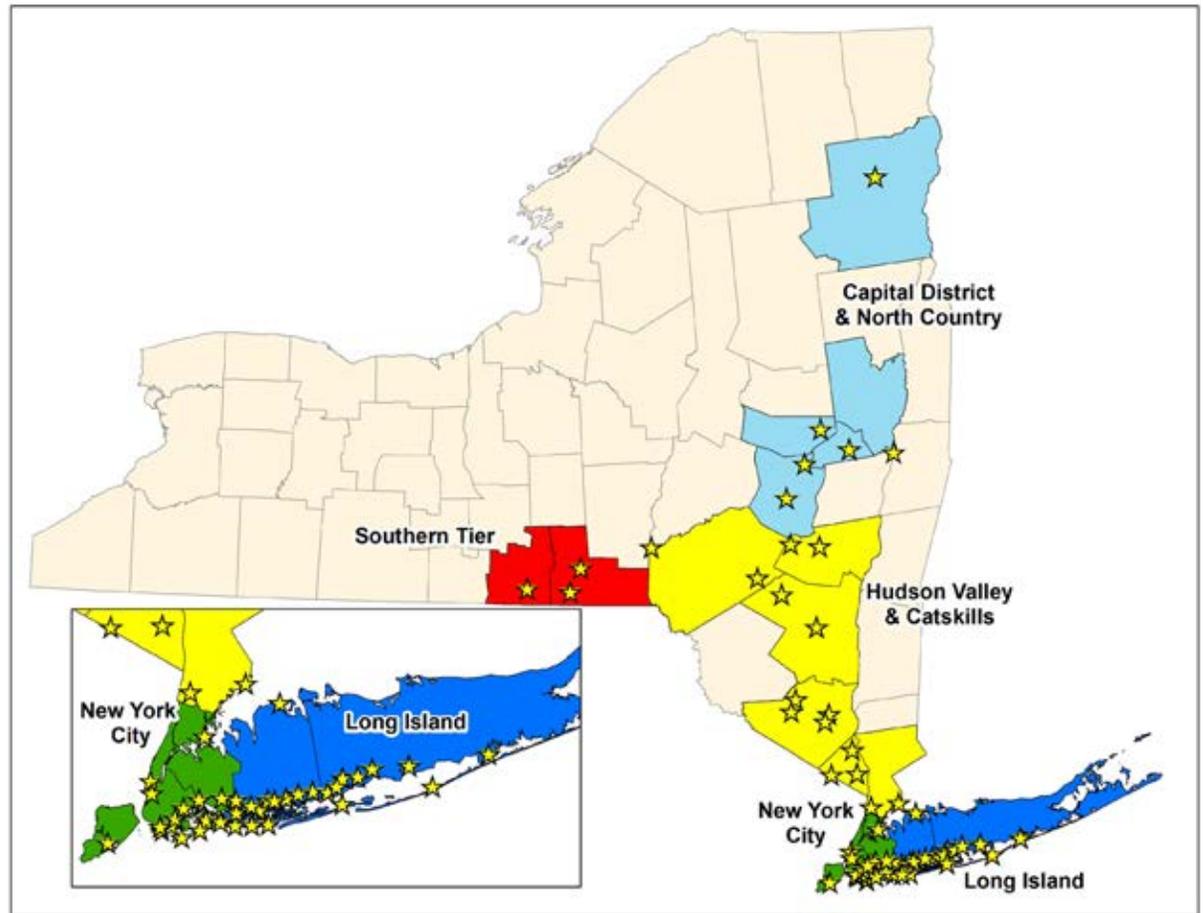
² The following localities' allocations comprise the NYRCR Community's total allocation:

- Village of Cedarhurst - \$3,000,000;
- Hewlett - \$3,000,000;
- Village of Hewlett Harbor - \$3,000,000;
- Village of Hewlett Neck - \$3,000,000;
- Inwood - \$3,000,000;
- Village of Lawrence - \$3,000,000;
- Meadowmere Park - \$3,000,000; and
- Woodmere - \$6,600,000.

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.



Note: Map includes those NYRCR Communities funded through the CDBG-DR program, including the NYRCR Communities announced in January 2014.

Find out more at:

www.stormrecovery.ny.gov/nyrcr

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Executive Summary

The Five Towns NYRCR Community (Community) is home to approximately 49,700 residents and is a grouping of Villages and Hamlets located on the South Shore of Long Island, in western Nassau County. The Community is made up of a total of eight Villages and Hamlets, including the Villages of Cedarhurst, Lawrence, Hewlett Harbor, and Hewlett Neck, and the Hamlets of Hewlett, Inwood, Meadowmere Park, and Woodmere. The Hamlets are unincorporated parts of the Town of Hempstead (Town) and are under the administrative jurisdiction of the Town.

The informal moniker “The Five Towns” came into use during the 1930s and originally referred to Hewlett, Woodmere, Lawrence, Cedarhurst, and Inwood. The name is derived from the five stops along the Long Island Railroad (LIRR) which passes through the Community and also refers to the communities of the founders of the Five Towns Community Chest, which was established in 1932. The Five Towns area was first settled in the 1750s, but the area remained sparsely populated until completion of the South Side Railroad in 1869 (later the Far Rockaway branch of the LIRR). The South Side Railroad opened the area to suburban development and allowed for commuting to New York City. The Community is largely surrounded by water, including Jamaica Bay and Hempstead Bay.

During Superstorm Sandy, the storm surge from the Atlantic Ocean traveled over the Far Rockaway peninsula and through the Jones Inlet, Rockaway Inlet, and Reynolds Channel

into Jamaica Bay and Hempstead Bay. The surge affected the Five Towns Community with tidal flooding and widespread backups within the stormwater system. Documented storm surge varied from six feet to 11 feet in each of the Villages and Hamlets in the Five Towns, inundating low lying areas with tidal water and causing backups in the stormwater system. As a result, rainwater runoff caused overflows of the stormwater system and led to flooding even in areas that were beyond the extent of the storm surge. Stormwater flooding, which has occurred with greater frequency since Superstorm Sandy, has directly affected the quality of life throughout the community and property values have suffered. The 2013 median sales price for homes in the Five Towns Community decreased over 21% from the 2011 Census American Community Survey and prior to Superstorm Sandy.

Superstorm Sandy also underscored the tenuousness of the Community’s connections to the surrounding region. The Bay Park Sewage Treatment Plant (Bay Park STP), one of Nassau County’s most important infrastructure assets, was severely damaged during Superstorm Sandy, which caused the facility to lose power and go offline during the storm. As a result, the sewer systems in the Village of Hewlett Harbor, Woodmere, and Hewlett backed up into the streets and the basements of some homes. Superstorm Sandy also exposed the vulnerability to storm surge of several sections of commercial corridors in the Five Towns Community. Many businesses that flooded

during Superstorm Sandy were only able to reopen after several months.

In September 2013, a committee of residents and civic leaders from the Five Towns (“NYRCR Committee”) convened with the goal of creating a plan to help the Community rebuild from the damage caused by Superstorm Sandy and prepare the area for a more resilient future and with the following vision statement:

The vision for the Five Towns is for a future in which these eight distinct communities will be better prepared, no matter the disaster, and for an improved system of cooperation and collaboration between the Villages and Hamlets to build upon their shared resources.

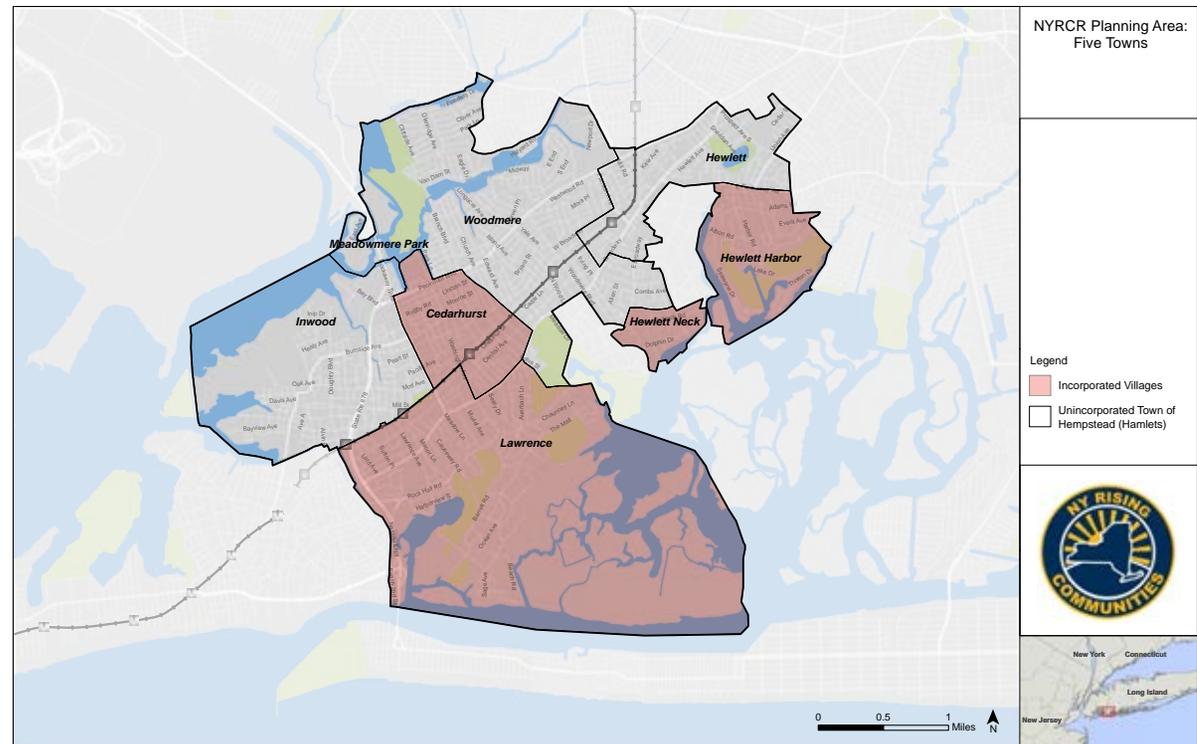
Since that time, the NYRCR Committee has worked closely with a team of professional consultants, representatives of NY Rising, and the New York State Department of State to develop this NY Rising Community Reconstruction (NYRCR) Plan

The NYRCR Plan features a series of projects identified as having the greatest benefit in increasing the Five Towns Community’s resilience to future climate related events. These projects will be implemented with up to \$27,600,000 in Community Development Block Grant-Disaster Recovery (CDBG-DR) funds allocated to the Community through the NYRCR Program. The NYRCR Plan was created through a community-based planning process,

which included a robust public engagement effort involving consensus-building amongst both residents and business owners. Finally, the NYRCR Plan is comprehensive, addressing six recovery support functions: Community Planning and Capacity Building; Economic Development; Health and Social Services; Housing; Infrastructure; and Natural and Cultural Resources.

With a fundamental focus on implementation, the NYRCR planning process incorporated extensive discussions with officials and agencies from local Villages, the Town of Hempstead, Nassau County, and New York State to confirm that relevant agencies have confidence in the project’s ability to be implemented. The NYRCR Committee also coordinated with agencies operating at a regional level, including the U.S. Army Corps of Engineers (USACE), and conducted an ongoing dialogue with parallel resiliency efforts, especially Rebuild by Design. As a result, the projects featured in the NYRCR Plan are supportive and complimentary of these other efforts, rather than duplicative or counterproductive.

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



Map of Incorporated Villages and Unincorporated Hamlets

To that effect, three key strategies emerged from the public engagement process and technical analysis.

1. Increase the resilience to extreme weather in high risk coastal areas by addressing coastal protections and stormwater infrastructure.

The coastline is the first and most critical line of defense in protecting the NYRCR Community from inundation associated with Sandy-like storms. Though Superstorm Sandy was an unprecedented event, the sources and causes of flooding that occurred during Superstorm

Sandy are regularly reflected on a smaller scale during high tide events, rainstorms, and nor’easters. Flooding overwhelms stormwater infrastructure systems not only in the Five Towns Community, but in other communities along the South Shore as well. The shoreline of Hempstead Bay provides incomplete protection against tidal inundation above seven to eight feet.

2. Increase the emergency response capacity of facilities on high ground by building on the strong network of civic, health, and social service organizations in the Five Towns.

Emergency Response Capacity recognizes that there is a corridor along high ground within the Five Towns and many of the civic, health and social service organizations that provided disaster response services after Superstorm Sandy are along this corridor. The goal of this strategy is to preserve and enhance these key assets that are above the FEMA flood zones so that emergency supplies, evacuation centers, power supplies, and emergency management structures are pre-positioned out of danger and can act effectively in a storm. Many of these improvements can be accomplished in the short term.

3. Improve access to evacuation routes from high risk areas by creating a resilient corridor along Rockaway Turnpike and Nassau Expressway.

This strategy is predicated on the need for a carefully developed plan for the Rockaway Turnpike/Nassau Expressway Corridor that addresses coastal protections, evacuation routes, and the impact of future flooding risks on economic assets in the Five Towns. These roads failed to serve as effective routes for evacuation and recovery during Superstorm Sandy because sections of Rockaway Turnpike flooded. In addition, the tidal surge of Superstorm Sandy that flowed into Hook Creek and Motts Creek—the two creeks that cross under Rockaway Turnpike—was the primary cause of flooding in the Five Towns Communities of Cedarhurst, Woodmere, Hewlett, and parts of Inwood. Finally, there are also areas of intense peak hour traffic congestion at intersections such as Rockaway Turnpike and Peninsula Boulevard.

There are 21 **Proposed** and 13 **Featured** projects included in the NYRCR Plan for the Five Towns Community. While these address one or more of the above three key strategies, they are catalogued by each of the individual eight communities. The Planning Committee, understanding that while many site-specific projects provide local protection, they do not address the full extent of coastal protections necessary to protect the region against another Superstorm Sandy-type event. The Committee also recognized that some projects that have been identified by the process do not fit within any one community, but rather provide shared benefit to multiple communities within the Five Towns or the broader region. In the case of these long-term projects and projects with shared or regional benefit, the Five Towns Planning Committee has agreed to make a shared contribution that recognizes the importance of addressing long-term issues at a scale larger than each individual community.

Regional and Shared Projects

1. The South Shoreline Improvement Program Study

[Proposed Project]

A study that would look at methods for making coordinated improvements to achieve a contiguous shoreline in the Town of Hempstead. In seeking to address the complexity of the technical and implementation issues involved in dealing with the shoreline (much of which is privately owned), this project is ambitious in nature. The goal would be to investigate mechanisms for funding, streamlining the permitting process, and creating options for incentivizing bulkhead repairs and living

shoreline improvements. The NYRCR Committee recognizes the importance of this issue to the other communities along the South Shore, and their assumption is that the solutions derived from this Program could serve as a model to address conditions in those communities as well.

2. Rockaway Turnpike/Nassau Expressway Resilience Corridor Study

[Proposed Project]

This study would fund a regional study of flood protection alternatives along Rockaway Turnpike with a scope that would include the following objectives: analyzing construction of floodgates at Hook Creek and Motts Creek and elevation of Rockaway Turnpike and Nassau Expressway; conducting a traffic management study to decrease congestion in evacuation routes; studying opportunities for economic development in retail/commercial zones that would be protected by flood mitigation. The study would culminate with a Conceptual Plan for the Rockaway Turnpike/Nassau Expressway that increases resiliency while spurring economic development and relieving traffic congestion on this regional transportation corridor.

Lawrence High School Hardening and Protection

[Proposed Project]

This will include the evaluation and implementation of solutions to prevent future damage and interruption of service that would build upon the \$8.5M in repairs completed to date. A flood prevention wall would be constructed around Lawrence High School. The purpose of the wall is to provide additional

protection to the building foundation in storm events.

Five Towns Community Center Upgrades

[Phase 1: Proposed Project]

This project would harden the Five Towns Community Center while developing a Disaster Response Plan. This Phase would expand available resources for the community center to serve as a community assistance and warming/cooling center, and purchase of a permanent generator to continue full operations during power outages.

[Phase 2: Featured Project]

This includes additional capital improvements such as upgrades to showers and bathrooms and the installation of laundry facilities. These actions should enable the center to provide even more impactful relief services after a storm.

Microgrid Feasibility Study and Action Plan

[Proposed Project]

This project would include a review of available technologies, funding sources and financing, and regulatory barriers and incentives. A conceptual design for the microgrid or other technology would be completed as part of this project, including the identification and analysis of potential microgrid sites.

Cedarhurst:

1. Cedarhurst Stormwater Infrastructure Upgrades

[Phase 1: Proposed Project]

This project includes a hydrologic and hydraulic (H&H) study on the existing stormwater system. Installation of check valves, wet weather pumps, and water storage tank.

[Phase 2: Featured]

Following the completion of the H&H Study, the recommended improvements would be implemented, including repairs and upgrades to stormwater pipes, drains, and catch basins. The improvements are intended to increase the capacity of the stormwater disposal system in Cedarhurst.

2. Cedarhurst Removable Flood Walls for DPW Facility

[Proposed Project]

This Project would provide removable flood walls to protect the two buildings on the DPW site.

3. Cedarhurst Village Hall Disaster Response Plan

[Proposed Project]

This project includes both the creation of a Disaster Response Plan to increase the Village’s capacity and continuity of operations following storm events, as well as the installation of backup generators to ensure ongoing operations and communications during primary power outages.

5. Cedarhurst Repair of Berm along Municipal Property

[Featured Project]

This project would repair the berm along the western boundary of the municipal property.

Hewlett:

1. Hewlett Stormwater Infrastructure Upgrades

[Phase 1: Proposed Project]

This project includes a hydrologic and hydraulic study on the existing system to determine deficiencies within Hewlett and implementation of upgrades to the stormwater pipes, drains, and catch basins primarily in the area of Kew Road from Stevenson Road to Quay Ave, as well as E. Broadway near Franklin Ave.

[Phase 2: Featured Project]

This project would provide additional upgrades to the stormwater infrastructure in Hewlett in the area of Broadway, from Burton Avenue to Piermont Avenue, including north-south roadways in between, south along Woodside Drive and Cedar Avenue. Phase 2 would improve capacity and system efficiency.

Hewlett Harbor:

1. Hewlett Harbor Stormwater Infrastructure Upgrades

[Phase 1: Proposed Project]

This project involves the implementation of the recommendations of Hewlett Harbor’s ongoing engineering study. This project also includes flood protections at Village Hall which is comprised of re-grading the Village Hall property and directing stormwater into green infrastructure detention areas. The village intends to implement flood mitigation through further green infrastructure practices where feasible, based upon the determinations of the engineering study.

[Phase 2: Featured]

This project would provide additional upgrades to the stormwater infrastructure in Hewlett Harbor, per the forthcoming recommendations of the ongoing engineering study. Phase 2 would improve capacity and system efficiency, while addressing the study's recommendations that cannot be addressed within the allocation for Phase 1.

Hewlett Neck:

1. Hewlett Neck Stormwater Infrastructure Upgrades

[Phase 1: Proposed Project]

This project would improve the stormwater capacity of Woodbine Ditch with enhanced green infrastructure measures, including a bioswale extending from approximately Smith Lane to Woodbine Ditch.

[Phase 2: Featured Project]

This project would provide additional upgrades to the stormwater infrastructure in Neck in the area of Hewlett Neck Road, from Browers Point Branch to Adams Lane, including north-south roadways in between. Phase 2 would improve capacity and system efficiency.

2. Harden Underground Street Light Infrastructure

[Proposed Project]

This project includes the installation of underground electrical lines (in protective casing) and removal of above ground lines, replacing the current street signage with retro-reflective street signs and raising them.

Inwood:

1. Inwood Stormwater Infrastructure Upgrades

[Phase 1: Proposed Project]

This project includes a hydrologic and hydraulic (H&H) study on the existing stormwater system. Check valves and swirl separators would be installed on outfalls to prevent tidal flows from entering the storm sewer system and improve the quality of water entering into the Bay, including runoff from Bayswater Boulevard, a particular area of concern.

[Phase 2: Featured Project]

This project would complete all recommendations unable to be completed in Phase 1, including improvements along Chestnut Road, Davis Avenue, Maple Road and Prospect Place. These upgrades should provide further improvement of system capacity and efficiency.

3. Inwood Buccaneers Facility Repair

[Featured Project]

This project would repair the facility by installing a new HVAC system with elevated utilities to provide heating and cooling for the entire facility (approximately 3,000 sq. ft.), replacing drywall and portions of stud walls that suffered water damage (approximately 800 sq. ft.).

4. Inwood Country Club Dam Repair

[Featured Project]

This project includes the repair of the existing dam that is located within the country club. The breached dam is causing the neighborhood around the country club to flood during high tide and heavy rains.

Lawrence:

1. Lawrence Stormwater Infrastructure Upgrades

[Proposed Project]

This project aims to conduct additional Hydrologic and Hydraulic studies to determine deficiencies and implement the recommended infrastructure improvements, including pipe and catchment upgrades, check valves and swirl separators.

2. Dike at the Isle of Wight Repairs and Elevation

[Proposed Project]

This project involves repairing the Dike at the Isle of Wight and raising it using sheet pile core system. The objective of this project is to repair the pipe in the dike and increase the height of the dike by 4 feet (using sheet pile) to protect the adjacent residential neighborhood from large storm surge events.

3. Mesivta Ateres Yaakov Community Assistance Center

[Featured Project]

This project would include facilities enhancements to make them optimally suited for providing the services typically required following a storm event.

4. Lawrence Cedarhurst Fire Department: Mobile Command Unit

[Featured Project]

This project includes the purchase of a Mobile Communications Unit that would help to improve coordination of operational response

for Nassau County Fire Departments during widespread emergencies.

5. Achiezer Community Resource Center: Mobile Command Unit

[Featured Project]

This project would improve the capacity of Achiezer by purchasing a generator-powered mobile communication center for telephone and satellite communications.

Meadowmere Park:

1. Meadowmere Park Microgrid

[Proposed Project]

This project would provide backup power to a critical facility during periods of primary power outage, and create the first 'node' of a future 'community grid' that would supply backup power to homes in the Meadowmere Park community.

2. Meadowmere Park Bulkhead Repair Program

[Proposed Project]

This project is intended to fill the gap not covered by the NY Rising Housing Recovery Program. It includes repairing and replacing bulkheads as necessary. Bulkheads would be elevated up to 18" above their current elevation, to approximately 7' above the base flood elevation.

3. Meadowmere Park Home Elevation Program

[Proposed Project]

This project is also intended to fill the gap not covered by the NY Rising Housing Recovery Program. The project would provide for elevations of approximately 15 homes.

4. Meadowmere Park Fire Department Building Upgrades

[Proposed Project]

This project would work in partnership with the Meadowmere Park Microgrid project to fund building repairs to the Fire Department to improve the capacity to assist the community during disaster events.

5. Meadowmere Park Footbridge Hardening

[Proposed Project]

This project would harden the existing wooden footbridge while maintaining the footbridge's character and use exclusively for pedestrian access.

Woodmere:

1. Woodmere Stormwater Infrastructure Upgrades

[Phase 1: Proposed Project]

This project includes a hydrologic and hydraulic (H&H) study on the existing stormwater system deficiencies and the subsequent implementation of repair and upgrades to stormwater pipes, drains, and catch basins. Phase 1 would include improvements along Derby, Church, Barnard and Arbuckle Avenues.

2. Woodmere Stormwater Infrastructure Upgrades

[Phase 2: Featured Project]

This project would complete all recommendations unable to be completed in Phase 1, north and south of Mott's Creek. Upgrades along the south side of the Creek include Ibsen Street, Howard Ave, Island Ave, Jefferson Street, King Street, Lowell Street and Moore Street, as well as Lakeside Drive, Rica Lane, Midway, Norman Way, Donald Lane and Saddle Ridge Road. Along the north side of the creek, upgrades include those along Golf Drive and north-south corridors that connect to Golf Drive. These upgrades would provide further improvement of system capacity and efficiency.

The Five Towns: Proposed and Featured Projects

Cedarhurst

- 1 Cedarhurst Stormwater Infrastructure Upgrades: Phase 1 [Proposed]
- 2 Removable Flood Walls for DPW Facility [Proposed]
- 3 Cedarhurst Village Hall Disaster Response Plan [Proposed]
- 4 Cedarhurst Stormwater Infrastructure Upgrades: Phase 2 [Featured]
- 5 Cedarhurst Repair of the berm along Municipal Property [Featured]

Hewlett

- 6 Hewlett Stormwater Infrastructure Upgrades: Phase 1 [Proposed]
- 7 Hewlett Stormwater Infrastructure Upgrades: Phase 2 [Featured]

Hewlett Harbor

- 8 Hewlett Harbor Stormwater Infrastructure Upgrades: Phase 1 [Proposed]
- 9 Hewlett Harbor Stormwater Infrastructure Upgrades: Phase 2 [Featured]

Hewlett Neck

- 10 Hewlett Neck Stormwater Infrastructure Upgrades: Phase 1 [Proposed]
- 11 Harden Underground Street Light Infrastructure [Proposed]
- 12 Hewlett Neck Stormwater Infrastructure Upgrades: Phase 2 [Featured]

Inwood

- 13 Inwood Stormwater Infrastructure Upgrades: Phase 1 [Proposed]
- 14 Inwood Stormwater Infrastructure Upgrades: Phase 2 [Featured]
- 15 Inwood Buccaneers Facility Repairs [Featured]
- 16 Inwood Country Club Dam Repairs [Featured]

Lawrence

- 17 Lawrence Stormwater Infrastructure Upgrades [Proposed]
- 18 Dike at the Isle of Wight Repairs and Elevation [Proposed]
- 19 Mesivta Ateres Yaakov Community Assistance Center [Featured]
- 20 Lawrence Cedarhurst Fire Department: Mobile Command Unit [Featured]
- 21 Achiezer Community Resource Center: Mobile Command Unit [Featured]

Meadowmere Park

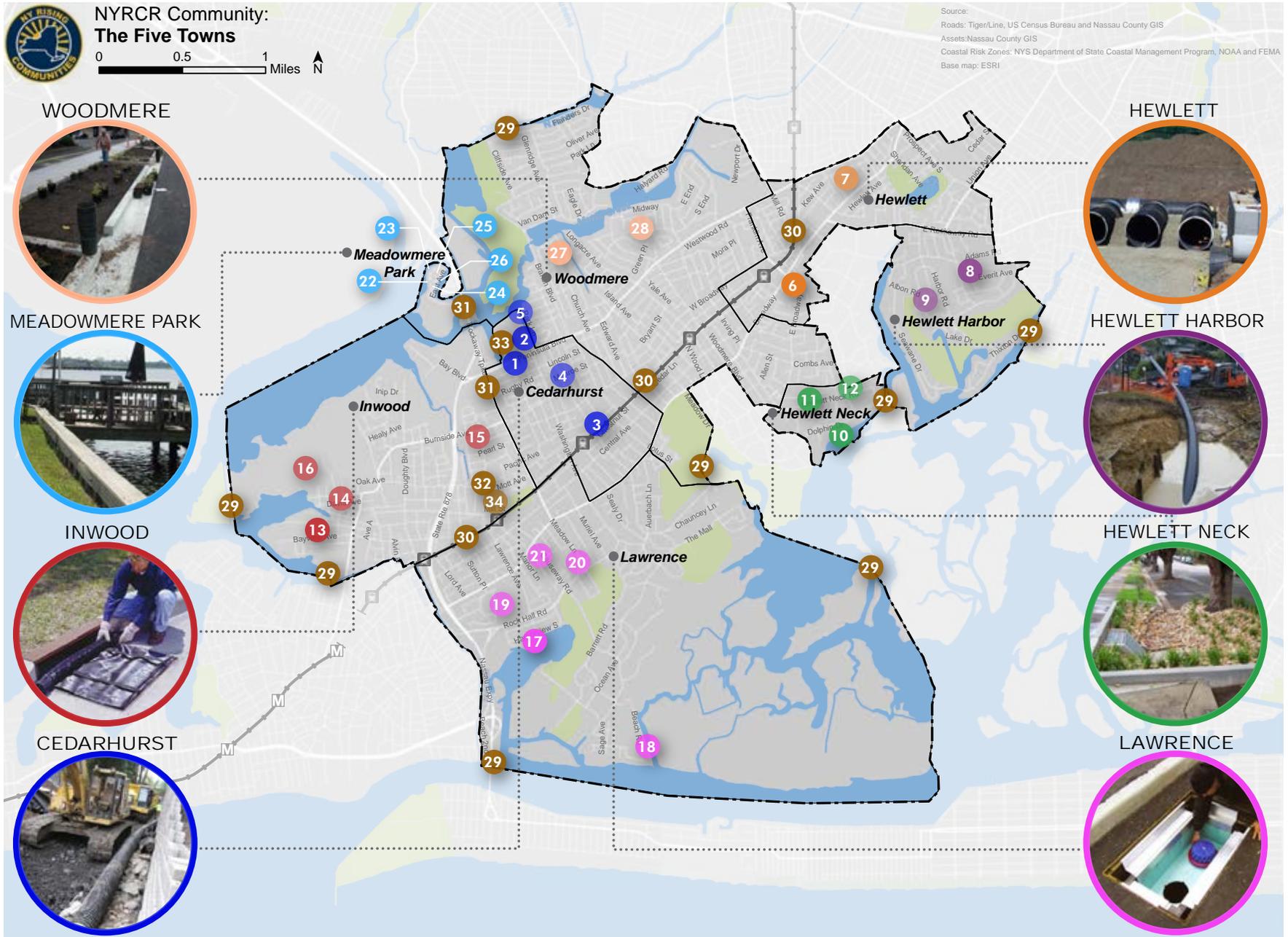
- 22 Meadowmere Park Microgrid [Proposed]
- 23 Meadowmere Park Bulkhead Repair Program [Proposed]
- 24 Meadowmere Park Home Elevation Program [Proposed]
- 25 Meadowmere Park Fire Department Building Upgrades [Proposed]
- 26 Meadowmere Park Footbridge Hardening [Proposed]

Woodmere

- 27 Woodmere Stormwater Infrastructure Upgrades: Phase 1 [Proposed]
- 28 Woodmere Stormwater Infrastructure Upgrades: Phase 2 [Featured]

Regional and Shared Projects

- 29 South Shoreline Improvement Study [Proposed]
- 30 Microgrid Feasibility Study and Action Plan [Proposed]
- 31 Rockaway Turnpike/Nassau Expressway Resilient Corridor Study [Proposed]
- 32 Five Towns Community Center Upgrades: Phase 1 [Proposed]
- 33 Lawrence High School Hardening and Protection [Proposed]
- 34 Five Towns Community Center Upgrades: Phase 2 [Featured]



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Section I: Community Overview

Hook Creek, Meadowmere Park

A. GEOGRAPHIC SCOPE OF NYRCR PLAN

The Five Towns NYRCR Community (Community) is a grouping of Villages and Hamlets located on the South Shore of Long Island, in western Nassau County. The Community is made up of a total of eight Villages and Hamlets, including the Villages of Cedarhurst, Lawrence, Hewlett Harbor, and Hewlett Neck, and the Hamlets of Hewlett, Inwood, Meadowmere Park, and Woodmere. The Hamlets are unincorporated parts of the Town of Hempstead (Town), and are under the administrative jurisdiction of the Town. The Five Towns are centered on the Far Rockaway line of the Long Island Rail Road (LIRR), which travels from the northeast to the southwest through the Community, with stops at Hewlett, Woodmere, Cedarhurst, Lawrence, and Inwood.

The Community is largely surrounded by water, including Jamaica Bay and Hewlett Bay. The western boundary of the Community is the border between Nassau County, Long Island and Queens County, New York City. This boundary includes Far Rockaway to the south and Head of Bay to the north, which flows into Jamaica Bay between Inwood and JFK Airport. To the north, the Community is bounded by the Villages of Valley Stream and Lynbrook. Portions of both Motts Creek and Hook Creek are included in the Community near the northern boundary. Both of these tidal creeks extend from Head of Bay northeast into Cedarhurst, North Woodmere, and Woodmere. The eastern boundary of the Community includes the Village of East Rockaway and Brosewre Bay. The southern boundary is Reynolds Channel,

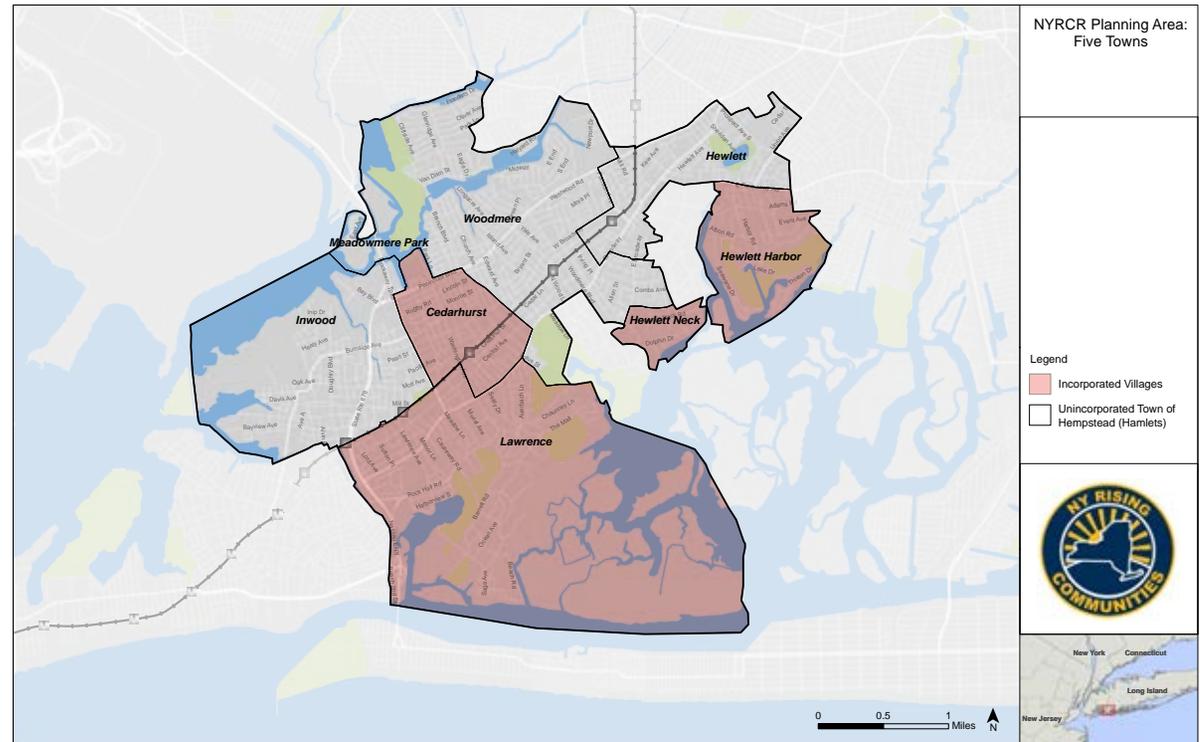


Figure 1: Map of Incorporated Villages and Unincorporated Hamlets

which separates the Village of Lawrence from Atlantic Beach.

The informal moniker “the Five Towns” came into use during the 1930s and originally referred to Hewlett, Woodmere, Lawrence, Cedarhurst, and Inwood. The name is derived from the five stops along the Long Island Railroad, which passes through the Community, and also refers to the communities of the founders of

the Five Towns Community Chest, which was established in 1932.¹ The Five Towns area was first settled in the 1750s,² but the area remained sparsely populated until completion of the South Side Railroad in 1869³ (later the Far Rockaway branch of the LIRR) opened the area to suburban development and allowed for commuting to New York City.



Figure 2: Historical Wetlands

Source: 1903, U.S. Department of the Interior

Many low-lying areas in the Five Towns have historically been salt water marshes, but as development expanded in the twentieth century, many wetland areas were filled in for development. The Five Towns evolved as a resort area for wealthy New Yorkers, and several exclusive country clubs remain, including the Seawane Club, Lawrence Country Club, and Inwood Country Club. While the Five Towns Community is known for its large homes and historic country clubs, the area has diversity that belies this image. The Five Towns is notable for a dramatic income gap, with some of the wealthiest communities in

New York State, as well as several low and moderate income communities. The area has long attracted many Jewish immigrants and is home to a large and thriving Orthodox Jewish Community. According to the 2010 US Census, nearly three quarters of residents in the Five Towns are White, while approximately 13% of the population is Hispanic, 7% is Black, 4% is Asian, and 1% is more than one race.

Housing Profile

Data from the 2007-2011 American Community Survey (ACS) was used to analyze housing conditions in the Five Towns Community. It is

important to note that this data represents housing conditions prior to Superstorm Sandy. A discussion of Superstorm Sandy impacts related to housing will be discussed later in this section. Due to aggregation of data in the ACS, the Meadowmere Park neighborhood has been combined with Woodmere.

As of 2011, there were 16,534 housing units in the Five Towns Community. The largest share, 5,409 or 32.7% were located in Woodmere. This was followed by Inwood with 19.9% (3,285 units); Hewlett with 16.5% (2,724 units); Cedarhurst at 14.2% (2,355 units), and Lawrence with 13.5% or 2,231 units. Hewlett Harbor and Hewlett Neck have only 3.2% of the Community's housing between them with only 388 and 142 units, respectively. Meadowmere Park has a total of 92 homes, which accounts for 0.5% of housing units in the Community.

The ownership rate in the Five Towns as a whole is 78.9%; i.e., nearly four out of five homes are owner-occupied. While each of the Villages and Hamlets within the Five Towns has a majority ownership rate, this ranges from 100% of occupied housing units in Hewlett Neck to only 53.2% of occupied units in Inwood.⁴

For more details on the Community's Housing Profile, including Structure Type, Year Built, Occupancy and Vacancy, and Age of head of household, see Section V: Additional Materials

Economic Profile

Although fluctuating slightly with economic cycles, the number of employed residents in Five Towns has changed remarkably little in the past 10 years, with the number of employed residents

Table 1: Housing Units by Location

| | Total | % of Total |
|--------------------------|--------|------------|
| The Five Towns Community | 16,534 | 100.0% |
| Cedarhurst | 2,355 | 14.2% |
| Hewlett | 2,724 | 16.5% |
| Hewlett Harbor | 388 | 2.3% |
| Hewlett Neck | 142 | 0.9% |
| Inwood | 3,285 | 19.9% |
| Lawrence | 2,231 | 13.5% |
| Meadowmere Park | 92 | 0.5% |
| Woodmere / | 5,319 | 32.1% |

Source: American Community Survey 2007-2011

in 2011 being only 1.0% less than in 2002, the first year for which data were available.⁵ Almost half of employed Five Towns residents work in New York City (9,235 or 48.2%), followed by the Five Towns Community (3,367 or 17.5%). Mineola follows with 1.9%, then Valley Stream and Lynbrook at 1.6% each. The majority (55.2%) of employed residents are between the ages of 30 and 54, while one in four are 55 and older and almost one in five are younger than 30. More than half of employed residents have earnings in the highest category recorded by the LED, \$3,333 or more each month (i.e., \$45,000 per year).

The earnings of workers in Five Towns are slightly higher than those in some of the surrounding communities; however 28.2% of local jobs pay minimum wage or less. The largest share (36.3%) pay between \$1,251 and \$3,333 per month (\$15,000-\$45,000 per year), while

the remaining 35.5% pay \$3,333 per month (\$45,000 per year) or more.

The most common place of residence for workers in the Five Towns is New York City with 6,857 City residents (37.1% of all workers) commuting to the Five Towns each day. The Five Towns Community is the next most common place of residence with 3,367 job holders (18.2% of total) both living and working in the same place. Valley Stream provides 623 workers (3.4%) followed by Oceanside with 463 (2.5%) and Long Beach with 386 (2.1%). All other locations provide fewer than two percent of local workers.

Village and Hamlet Profiles

Village of Cedarhurst

The Village of Cedarhurst was originally settled in the 18th Century and incorporated in 1910.⁶ The population of approximately 6,600 is served by a thriving retail and commercial district along Central Avenue.⁷ Cedarhurst is within the Lawrence Union Free School District, which includes the Lawrence High School along Peninsula Boulevard. The Lawrence-Cedarhurst Fire Department is an 80 member volunteer organization that provides fire protection service for Cedarhurst and other communities in the Five Towns, including the Village of Lawrence. Police services in Cedarhurst are provided by Nassau County. The median home sale price in Cedarhurst was approximately \$500,000 in 2013, which represents an 8.3% decline since 2008.⁸ Median income in Cedarhurst is \$77,783.



Andrew J. Parise Park, Cedarhurst



Keystone Yacht Club, Hewlett Neck

Hewlett

Hewlett is a Hamlet under jurisdictional control of the Town of Hempstead. Its land area is approximately one square mile and the population is just over 6,800.⁹ Hewlett is served by the Hewlett Fire Department, which is a volunteer service that has been in operation since 1891.¹⁰ The Hewlett Fire Department also

serves residents in Hewlett Harbor, Hewlett Bay Park, North Woodmere, and portions of Woodmere and Lynbrook. Police services in Hewlett are provided by Nassau County. School districts that serve Hewlett residents include the Hewlett Woodmere Union Free School District and the Lynbrook Union Free School District. Although Hewlett is primarily residential in nature, there is also a retail/commercial district on Broadway and West Broadway in the Hamlet.

The median home sale price in Hewlett was approximately \$430,000 in 2013, which represents a 15% decline since 2008.¹¹ Median income in Hewlett is \$88,111.

Village of Hewlett Harbor

The Village of Hewlett Harbor was initially settled as a farm by John Hewlett and was converted into a summer residence by John Auerbach in 1914. Auerbach built the Seawane Club, which continues to operate today. Part of the Seawane Club land was developed as single-family homes beginning in the 1920s.¹² According to the 2010 US Census, the population of Hewlett Harbor is 1,263. With the exception of the Seawane Club, there are no commercial uses within the Village of Hewlett Harbor. The median home sale price in Hewlett Harbor was approximately \$1,200,000 in 2013.¹³ Median income in Hewlett Harbor is \$184,375.

Village of Hewlett Neck

Hewlett Neck was settled as part of John Hewlett's 17th century farm. Incorporated in 1927, the Village is now home to a population of 445, according to the 2010 US Census.

The median home sale price in Hewlett Neck was approximately \$1,199,000 in 2013.¹⁴ Hewlett Neck is made up largely of residential properties, with the exception of the Keystone Yacht Club. Median income in Hewlett Neck is \$237,000.

Inwood

The Hamlet of Inwood has a population of nearly 9,800, according to the 2010 US Census. The area was originally settled in 1817 as a fishing community.¹⁵ Previously known as North West Point and later Westville, Inwood is home to the Inwood Country Club and Inwood Park, which sits along Mott's Basin. Land use in Inwood is diverse, including residential neighborhoods, the Inwood Country Club golf course, industrial businesses on Doughty Boulevard, and a retail/commercial district between Nassau Expressway and Rockaway Turnpike.

The median home sale price in Inwood was approximately \$280,000 in 2013, which represents a 34.7% decline since 2008.¹⁶ Median income in Inwood is \$54,654.

Village of Lawrence

The land currently occupied by the Village of Lawrence was converted from farmlands by Alfred, Newbold, and George Lawrence in the 1850s.¹⁷ The Village was incorporated in 1897 to provide services to the growing summer community and the Rockaway Hunt club, which was established in 1884. According to the 2010 US Census, the population of Lawrence is nearly 6,500. The Village of Lawrence is home to a thriving retail corridor along Central

Avenue and an established Orthodox Jewish community.

The median home sale price in Lawrence was approximately \$598,000 in 2013, which represents a 36.1% decline since 2008.¹⁸ Median income in Lawrence is \$144,952.

Meadowmere Park

Meadowmere Park was initially developed in the 1880s as a small bungalow community.¹⁹ Now comprised of 92 homes, most with waterfront access, Meadowmere Park is notable as a community where some families have lived for as many as four generations. There are two points of access to the island, a vehicular bridge along East Avenue and a wooden footbridge that connects Meadowmere Park to Meadowmere, Queens. With the exception of the Meadowmere Park Fire Department, the community is made up entirely of single-family residences.

Woodmere

Woodmere is the largest of the Villages and Hamlets in the Five Towns, with a population of more than 17,000 according to the 2010 US Census. The Hamlet is part of the Hewlett-Woodmere School District and the Lawrence Union Free School District. Woodmere is also served by the Woodmere Volunteer Fire Department, which has been active since 1889.

The median home sale price in Woodmere was approximately \$529,000 in 2013, which represents a 22.4% decline since 2008.²⁰ Median income in Woodmere is \$128,111.

B. DESCRIPTION OF STORM DAMAGE

Although Superstorm Sandy was no longer categorized as a hurricane when it made landfall in the New York Metropolitan Area in October 2012, it was still a large and dangerous storm. The severity of Superstorm Sandy's impact was made more extreme by three uncommon factors:²¹

- The storm's landfall in the New York area coincided with a "spring" tide, which is a high tide that occurs during a full moon;
- The storm was quite large, extending approximately 1,000 miles in diameter, which contributed to an elevated storm surge; and
- Superstorm Sandy followed an unusual path that led to a direct hit on the New York Metropolitan Area, instead of veering eastward into the Atlantic Ocean.

During Superstorm Sandy, the storm surge from the Atlantic Ocean traveled over the Far Rockaway peninsula and through the Jones Inlet, Rockaway Inlet, and Reynolds Channel into Jamaica Bay (In Woodmere, flooding occurred from an approximately five-foot tidal surge that traveled through Jamaica Bay and into Motts Creek, which bisects Woodmere. Low-lying areas were inundated with tidal and stormwater flooding, inundating nearly the majority of the hamlet from its northern border to Motts Creek and from Motts Creek south beyond Peninsula Boulevard, as far as Dickens and Bryant streets. Branch Boulevard, which passes over Motts Creek, buckled from the force of storm surge waters rising from underneath. Flooding occurs

regularly in low-lying areas along Peninsula Boulevard during heavy rains and high tides, as experienced during Superstorm Sandy and Hurricane Irene. (Figure 3). The surge affected the Five Towns Community with tidal flooding and widespread backups within the stormwater system. Documented storm tides varied from six feet to 11 feet in each of the Villages and Hamlets in the Five Towns,²² inundating low lying areas with tidal water and stormwater. As a result, rainwater runoff caused overflows of the stormwater system and led to flooding even in areas that were beyond the range of tidal flooding.

The Bay Park Sewage Treatment Plant (STP) was flooded and severely damaged during Superstorm Sandy, which caused the facility to lose power and go offline during the storm. According to public feedback and local staff, the sewer systems in the Village of Hewlett Harbor, Woodmere, and Hewlett backed up into the streets and the basements of some homes.

According to the National Oceanic and Atmospheric Administration (NOAA), the sustained winds at the time Superstorm Sandy came ashore were estimated at 80 mph. The broad wind field extended for hundreds of miles from the center, bringing damaging wind gusts and coastal surges. Although the primary cause of damage from Superstorm Sandy was storm surge, the storm also resulted in downed trees, damaged roofs, and damage to power lines throughout the Five Towns Community.²³



Distribution after Superstorm Sandy

Source: Five Towns Community Chest

When Hurricane Irene made landfall in New York in August 2011, it was downgraded to a tropical storm; however, it produced heavy damage over much of New York due to flooding, both from heavy rainfall, storm surge in coastal areas, as well as wind gusts in excess of hurricane force. In comparison to Superstorm Sandy, the impacts from Hurricane Irene were largely a result of precipitation and wind. Localized rainfall totals during Irene exceeded 10 inches in New York, with rainfall ranging from five to nine inches in Nassau County,²⁴ while storm tide levels reached 1.3 feet at the Battery.²⁵ High winds and water-logged soils brought down trees and power lines.²⁶ Power outages were widespread in Nassau County, with more than 450,000 Long Island Power Authority Customers losing power across the Island.²⁷ According to FEMA, 470,000 residents were evacuated in Nassau and Suffolk Counties.²⁸

Housing Impacts

Damage in the Five Towns was focused on both the Hewlett Bay and Mill Creek sides of the Community. The waterfront homes of Hewlett Neck, Hewlett Harbor, and Lawrence were damaged by the tidal flooding and debris that came in from the Bay. The inland homes in low-lying areas along Mill Creek in Inwood, Cedarhurst, and Woodmere were severely damaged by inundation that came from tidal flooding of Mill Creek.

Households in the Five Towns received \$17.9 million in Federal Emergency Management Agency (FEMA) aid to homeowners and \$2.5 million to renters (Table 2). In addition, the U.S. Small Business Administration (SBA) provided \$35.5 million in home loans. \$22.7 million or 40.5% of these grants and loans went to households in Woodmere and Meadowmere Park, followed by \$12.9 million (23.0%) to Cedarhurst. Lawrence received \$10.6 million (18.9%), while Inwood received \$7.5 million and Hewlett \$2.3 million (13.4% and 4.2%, respectively).

Business Impacts

According to data from the Small Business Administration²⁹, 182 Five Towns businesses, representing 811 employees applied for Data Credit Management System (DCMS) assistance after Superstorm Sandy. These applications verified Real Property damage of \$4.1 million, Machinery damage of \$2.8 million, Inventory loss of \$2.7 million, and Leaseholder Improvements loss of \$1.5 million. Of these 182 applications, 43 were approved for an amount totaling approximately \$3.4 million—nearly \$8 million less than the verified damage.

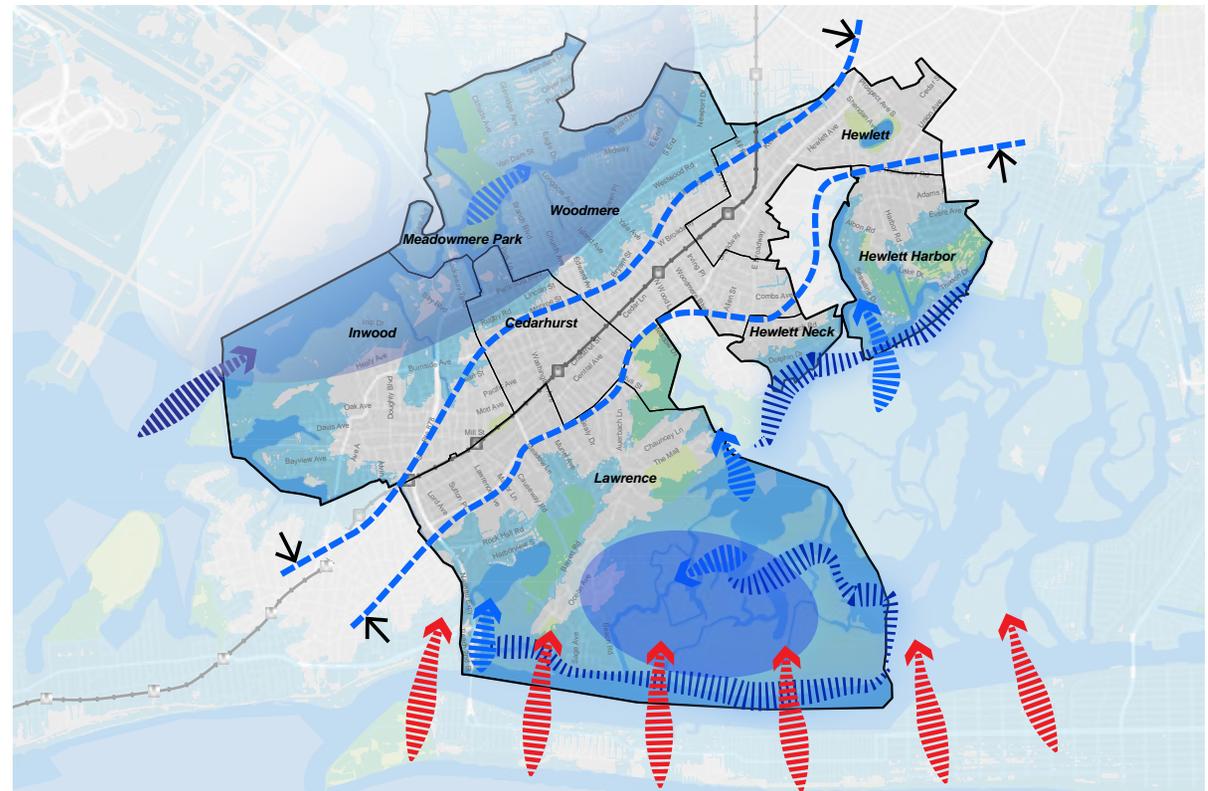


Figure 3: Key Causes of Damage from Superstorm Sandy

The greatest share of damage was in Inwood at \$5.2 million, among 49 applicants. Woodmere (zip code 11581) reported \$3.1 million in damage from 38 applicants, followed by Cedarhurst and Lawrence at just over \$1 million each between 31 and 24 applicants, respectively. The 11598 zip code portion of Woodmere had 26 applicants seeking reimbursement for just over half a million dollars, while the zip code that includes Hewlett, Hewlett Harbor, and Hewlett Neck had 14 applications seeking a total of \$389,777.

Village of Cedarhurst

In the Village of Cedarhurst, a storm surge of approximately five-feet was documented, originating from Motts Creek and flowing from north to south. According to local officials, approximately 300 homes were flooded due to tidal surge and heavy rains, as well as Lawrence High School and the Cedarhurst DPW Facility with inundation travelling south beyond Peninsula Boulevard to approximately Marlborough Road, including north-south roadways in between. Flooding occurs regularly in low-lying areas along Peninsula

Boulevard during heavy rains and high tides, as experienced during Superstorm Sandy and Hurricane Irene.³⁰

Hewlett

Hewlett experienced approximately five feet of tidal surge, which caused the pooling of water in streets and inability of stormwater flow to exit the system. Inundation flowed from Motts Creek to the south, flooding Peninsula Boulevard and parts of Kew Avenue and Waverly Street.³¹

Village of Hewlett Neck

A storm surge of approximately three- to four- feet was documented in Hewlett Neck, which is bordered to the south by Brosewre Bay. According to local officials, Adams Lane and Dolphin Drive experienced the most tidal flooding, and Dolphin Drive was entirely inundated. Catch basins and dry wells are regularly overwhelmed throughout the Village, causing flooding during heavy rains and high tides, as experienced during Superstorm Sandy and Hurricane Irene.³²

Village of Hewlett Harbor

A storm tide of approximately 11-feet was documented in the Village of Hewlett Harbor, which is bordered to the south by Hewlett Bay and Thixton Creek. According to local officials, approximately 140 houses were affected by flooding and critical transportation routes were impassable, including Pepperidge Road, which prevented access to Village Hall; a portion of the Village Hall property in the area of the maintenance garage was also inundated.

Sinkholes have appeared in roadways since Superstorm Sandy.³³

Village of Lawrence

In the Village of Lawrence, according to local officials, a nearly six-foot storm surge was documented and approximately 150 to 200 houses flooded from tidal surge and stormwater backups. The Isle of Wight neighborhood was flooded from a breach in the adjacent dike. Some areas in the southern section of Lawrence were buffered from further damage by adjacent marsh land and the Lawrence Country Club. The area of Marbridge Road and Meadow Lane is regularly affected during heavy rains and high tides, when stormwater cannot exit the system, as occurred during Superstorm Sandy and Hurricane Irene.³⁴

Inwood

Inwood has natural barrier protection from Grass Hassock Marsh, however the tidal surge from Jamaica Bay exceeded the height and limits of this marsh area. Tidal flooding occurred from the Head of Bay (Jamaica Bay), flowing south, and Mott’s Basin, flowing east. Stormwater drains through the low points to the north and west into the Bay. Consequently, stormwater backs up into low-lying areas regularly during heavy rains and high tides, as occurred during Superstorm Sandy and Hurricane Irene. Flooding occurred in the areas of Bayswater Boulevard and Davis Ave, as well as north-south roadways in between. Nassau Expressway was also inundated from Rockaway Turnpike to Burnside Avenue.³⁵

Table 2: FEMA and SBA Household Aid to Five Towns Villages and Hamlets

| Village or Hamlet | FEMA aid to households | FEMA aid to renters | SBA home loan amounts | Total FEMA and SBA Aid to Households |
|----------------------------|------------------------|---------------------|-----------------------|--------------------------------------|
| Inwood | \$2,797,532 | \$1,437,846 | \$3,259,200 | \$7,494,578 |
| Cedarhurst | \$4,295,217 | \$454,019 | \$8,127,900 | \$12,877,136 |
| Hewlett | \$892,104 | \$58,226 | \$1,396,700 | \$2,347,030 |
| Lawrence | \$3,476,721 | \$351,211 | \$6,776,700 | \$10,604,632 |
| Woodmere / Meadowmere Park | \$6,434,572 | \$240,409 | \$15,979,100 | \$22,654,081 |
| Five Towns Total | \$17,896,146 | \$2,541,710 | \$35,539,600 | \$55,977,456 |

Source: Long Island Newsday

Meadowmere Park

The entire community of Meadowmere Park was inundated from tidal waters. The surge passed through Jamaica Bay to Head of Bay, adjacent to John F. Kennedy airport. Meadowmere Park is a low-lying peninsula with no natural barrier protections. During tidal flooding events, stormwater cannot drain properly, as occurred during Superstorm Sandy and Hurricane Irene.³⁶

Woodmere

In Woodmere, flooding occurred from an approximately five-foot tidal surge that traveled through Jamaica Bay and into Motts Creek, which bisects Woodmere. Low-lying areas were inundated with tidal and stormwater flooding, inundating nearly the majority of the hamlet from its northern border to Motts Creek and from Motts Creek south beyond Peninsula Boulevard, as far as Dickens and Bryant streets. Branch Boulevard, which passes over Motts Creek, buckled from the force of storm surge waters rising from underneath. Flooding occurs regularly in low-lying areas along Peninsula Boulevard during heavy rains and high tides, as experienced during Superstorm Sandy and Hurricane Irene.³⁷

Hurricane Irene

When Hurricane Irene made landfall in New York on August 28, 2011, it was downgraded to a tropical storm; however, it produced heavy damage in many areas of the state due to flooding, both from heavy rainfall, storm surge in coastal areas, and wind gusts in excess of hurricane force. The impacts from Hurricane Irene were largely a result of precipitation. Localized rainfall totals during Irene exceeded 10 inches in New York, with rainfall ranging from five to nine inches in Nassau County, while storm tide levels reached 1.3 feet at the Battery. According to FEMA, 470,000 residents were evacuated in Nassau and Suffolk Counties. Power outages were widespread in Nassau County. Many homes in the Community experienced some flooding due to Irene; however, the damage did not approach the scale of destruction experienced during Superstorm Sandy.

C. CRITICAL ISSUES

Superstorm Sandy and Hurricane Irene exposed several challenges within the Community that the NYRCR Plan addresses. These critical issues, which can be categorized by the six Recovery Support Functions (RSFs) described below, were identified throughout the NYRCR Process during Planning Committee Meetings, Public Engagement Events, and meetings with representatives of local jurisdictions. These issues helped to guide the development of the NYRCR Plan and identification of Proposed and Featured Projects to address problems faced by Villages and Hamlets within the Community. Critical issues facing the Five Towns Community are addressed in greater detail in Section II.

I. COMMUNITY PLANNING & CAPACITY BUILDING

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

The Five Towns NYRCR Planning Committee (NYRCR Committee) identified the creation and support of programs that increase communication and coordination among disaster recovery organizations and local non-profits that played a critical role on the

ground providing assistance after Superstorm Sandy and Hurricane Irene.

Critical Issues for Community Planning and Capacity Building

- Greater coordination amongst community-based organizations that provide critical resources in educating residents in preparation of disasters and helping people recover.
- Greater public education and preparedness efforts.

II. ECONOMIC DEVELOPMENT

The NYRCR Committee recognized that increasing the Community's economic resilience depends upon improving the ability of the area's key retail and commercial corridors to recover after major disasters. Economic Development is important to the Five Towns for three key reasons. First, businesses that are able to recover quickly after disasters are more likely to keep their doors open in the future. Second, if businesses are closed for extended periods of time, employees will suffer from lost wages, even as they struggle to recover themselves. Third, businesses in the Five Towns provide important services that residents need so that they can also quickly recover.

The Planning Committee recognized that Economic Development and the resilience of retail and commercial corridors depend upon robust coastal protections and reliable backup power sources.

Critical Issues for Economic Development

- Coastal protections to prevent damage caused by flooding to employment centers and economic assets in low lying neighborhoods in Inwood and Woodmere.
- Additional flood protections for the commercial district along Rockaway Turnpike at the junction with Nassau Expressway.

III. HEALTH & SOCIAL SERVICES

Health and Social Services organizations provide critical resources to the Community, especially socially vulnerable populations. Medical facilities, senior centers, religious institutions, and non-profit organizations provide resources for the entire Community, but are even more important to the well-being and ability to recover from disasters for vulnerable populations, such as people with disabilities, low-income populations, and the elderly.

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

Critical Issues for Health and Social Services

- Additional medical facilities that are located beyond the flood zone and are accessible via transportation networks that are protected from flood risks.
- Repairs and flood protections for non-profit organizations that serve low-income communities and other socially vulnerable populations.
- Flood protections and increased disaster response capacity for municipal facilities such as public schools, village halls, and volunteer fire departments.

IV. HOUSING

The Housing Recovery Support Function refers to individual assets such as senior homes, multifamily housing, and affordable housing facilities, but also refers to residential neighborhoods that are at high or severe risk in the event of future storms like Superstorm Sandy. Neighborhoods in the Community’s high and extreme risk areas continue to be at risk of catastrophic flooding and frequent flooding due to stormwater backups. Homeowners in these same neighborhoods are also facing very significant increases in flood insurance rates, which pose a threat to neighborhood stabilization. The NYRCR Committee recognized the myriad programs that have been established to address the needs of homeowners and developed a strategy to address the needs not dealt with by existing programs.

Critical Issues for Housing

- Significant numbers of homeowners within the extreme and high risk areas do not have mortgages and therefore may not have flood insurance.
- High proportion of homeowners pay more than 30% of their income (i.e., more than is considered affordable) on housing.
- Aging housing stock and limited affordable housing, especially in high risk neighborhoods in Inwood.

V. INFRASTRUCTURE

Infrastructure refers to the strategies that the NYRCR Committee identified for restoration, repair, and management of essential services, such as stormwater systems, transportation networks, and coastal defenses.

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

Critical Issues for Infrastructure

- Strengthened coastal protections, improved stormwater mitigation, expanded sewer networks, and more reliable power grid.
- Strengthened transportation networks within the Community, between the Villages and Hamlets within the Five Towns and the rest of the region.
- Improved maintenance and increased capacity of outfalls into waterways and canals that can be blocked by tidal flow or debris, causing stormwater backups.

VI. NATURAL & CULTURAL RESOURCES

The Natural and Cultural Resource Recovery Support Function addresses the management of natural and cultural resources from a risk reduction and economic development perspective. The NYRCR Committee placed a great deal of emphasis on the role that green infrastructure can play in reducing stormwater flooding. In particular, the Committee identified strategies that incorporate green infrastructure into traditional coastal protections and

stormwater infrastructure as a comprehensive system to mitigate stormwater flooding and coastal erosion.

Critical Issues for Natural and Cultural Resources

- Increased coastal protections throughout the Community, including tidal barriers, bulkheads, and natural shorelines.
- Improvements to wetlands that have been degraded and overdeveloped.

D. COMMUNITY VISION

NYRCR Vision for the Five Towns

While the communities of Cedarhurst, Hewlett, Hewlett Harbor, Hewlett Neck, Inwood, Lawrence, Meadowmere Park, and Woodmere were individually tested by the devastation of Superstorm Sandy, they showed their collective strength in the aftermath as neighbors joined together to help one another recover – proving that the strength of the Five Towns lies in its diversity of culture and geography.

The vision for the Five Towns is for a future in which these eight distinct communities will be better prepared, no matter the disaster, and for an improved system of cooperation and collaboration between the Villages and Hamlets to build upon their shared resources.

The NYRCR Plan helps to create a safer relationship with the waterfront in order to improve quality of life and reduce risk from extreme weather. This plan will set the Five Towns on course to realize this vision by identifying short, medium, and long-term strategies that:

Increase the Resilience of High Risk Areas

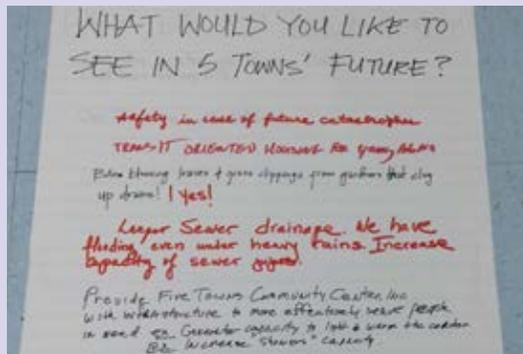
- Provide greater protections from flooding and stormwater for residential neighborhoods and commercial districts; and
- Restore natural resources, including parks and wetlands, to increase their capacity in absorbing flood and rainwater.

Increase Emergency Response Capacity

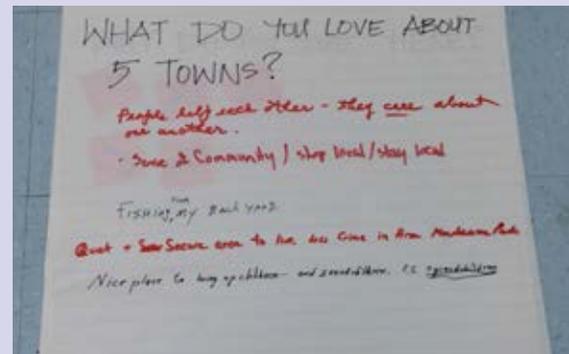
- Create a coordinated disaster response plan that responds to the needs of vulnerable populations; and
- Strengthen community based organizations such as community centers, houses of worship, schools, and youth groups to expand services and enhance recovery efforts after storms.

Improve Access to and from High Risk Areas

- Build more robust networks of communication among these diverse communities;
- Create a stronger transportation network that elevates evacuation routes out of the flood zone and improves traffic flow; and
- Create a more resilient power grid that limits widespread outages and implements district energy solutions.



Vision Exercise



Vision Exercise



The Five Towns Public Engagement Event

E. RELATIONSHIP TO REGIONAL PLANS

I. REGIONAL PERSPECTIVE

The Five Towns are located in south western Long Island, adjacent to New York City and protected from the Atlantic Ocean by the barrier islands of Atlantic Beach and Long Beach. As a result, multiple regional projects that impact Jamaica Bay and other waterways around the Five Towns have been evaluated and assessed to ensure that the NYRCR Plan for the Five Towns Community is not duplicating or conflicting with other efforts.

The most significant current and potential projects that impacted the Proposed and Featured Projects developed through the NYRCR Process include New York City's Special Initiative for Rebuilding and Resiliency (SIRR) proposed flood gates at Marine Parkway in Jamaica Bay³⁸ and the U.S. Army Corps of Engineers (USACE) construction of sand dunes, boardwalks, and/or seawalls in Far Rockaway and along the Atlantic Ocean in the City of Long Beach (Figure 4). In addition, the City of Long Beach Bulkhead Assistance Program presents an important precedent as a model of municipal management of bulkheading of private property. JFK Airport is another key regional asset and stakeholder that will be impacted by the construction of floodgates in Jamaica Bay and improvements of coastal protections on the Rockaway Peninsula and Long Beach Island.

An additional challenge has been coordination amongst multiple overlapping jurisdictions within the Community, including: the various

Villages within the Five Towns; the Town of Hempstead, which administers multiple unincorporated communities within the Five Towns; and Nassau County, which controls some local infrastructure, including County roads. Therefore, it has been critical to the NYRCR process that this plan is inclusive of local, Town, County, State, and Federal agencies that share jurisdictional control and responsibility in the Five Towns.

Reconstruction strategies were evaluated by the Planning Committee on a regional basis, considering current or proposed projects as well as parallel planning efforts. As all of the State's NYRCR Communities have worked through the planning process, collaboration with other NYRCR Committees on Long Island and in New York City have led to coordinated reconstruction strategies that can serve multiple recovery functions.

II. REGIONAL PLANS

There are a significant number of plans, policies, procedures and resources that address the existing conditions, regulatory frameworks, community goals and issues and resiliency opportunities in the Five Towns. These resources have been produced by a variety of stakeholders including public agencies at all levels (Federal, State, County, Town, and Village), regional planning groups, nonprofit organizations, academic institutions, community stakeholders, and private groups. Reconstruction and resiliency programs and projects included in the NYRCR Plan were not formulated in a vacuum

and recognize the planning work completed to date on in the region and are compatible with and complementary to these other efforts.

The Planning Committee recognized some regional challenges that cross the boundaries of NYRCR Community Boundaries and are shared by other NYRCR Communities, including South Valley Stream, East Rockaway/Bay Park, the portion of Meadowmere that lies in Queens County, and Rosedale, which is also in Queens County. In particular, the challenges faced by the Villages and Hamlets within the Five Towns Community and the NYRCR South Valley Stream Community are so similar, that these two areas could be aggregated for the purposes of future study.

Nassau County Stormwater Management Program Plan (2009)

The Nassau County Stormwater Management Program (NCSWMP) includes a listing of Best Management Practices (BMPs) that have been implemented by Nassau County and a coalition of local municipalities in order to achieve the regulatory standard of reducing pollutants in the County's storm water to the maximum extent practicable. Initial measurable goals and an implementation schedule were developed for each of the BMPs in the NCSWMP.

While the NCSWMP plan emphasizes practices to limit discharge of pollutants into Nassau County waterways, additional education and assistance campaigns should also help homeowners, businesses and municipalities

improve stormwater control facilities to prevent flooding. In many locations within the Five Towns, improved maintenance and controls of stormwater drainage equipment could help mitigate or prevent flooding during extreme events such as Superstorm Sandy and during more frequent heavy rain events.

Nassau County Hazard Mitigation Plan (2007, current update in progress).

The Nassau County Hazard Mitigation Plan provides a description of various hazards, identification of assets in hazard areas, estimated damages in assessment areas (including assets exposed to storm surge), development trends in hazard areas and capabilities and resources. Asset information and community specific recommendations are developed for some communities however this information is sparse for the Five Towns. Implementation strategies and mitigation measures must be drawn from recommendations for neighboring communities. This document also lists federal technical assistance and funding programs to assist in long-term recovery.

Jurisdictions within the Five Towns which contributed to the development of the Nassau County Hazard Mitigation Plan include the Town of Hempstead, the Village of Hewlett Harbor, and the Village of Lawrence. When Nassau County formally submits the Hazard Mitigation Plan update, which is scheduled to be released in 2014, jurisdictions within the Five Towns should take an active role in reviewing the draft revisions to ensure that risks exposed by Superstorm Sandy are addressed for the Five Towns communities.



Figure 4: Regional Map

Source: Google Earth

Long Island Regional Economic Development (LIREDC) Council Strategic Plan (2011, update in 2012, 2013)

The Long Island Regional Economic Development Council Strategic Plan (LIREDCSP) is a long-term economic development strategy that outlines a list of priority projects to advance key strategies for innovation, education, economic development, sustainability, and improved infrastructure.

Infrastructure strategies include: Revitalize downtowns and commercial centers; Repair and upgrade aging infrastructure; Create new housing opportunities; and Promote new government policies to foster economic growth. Natural Asset Strategies include: Improve sustainable agriculture enterprises; Improve the Economic Potential and Employment Opportunities of Fisheries and Aquaculture; Enhance Ecotourism Activities and Infrastructure.

While none of the priority projects are located within the Five Towns, jurisdictions and businesses within the Five Towns should advocate for future attention by the LIREDC, especially in order to gain additional support and funding for economic development projects recommended by this NYRCR Plan.

Cleaner Greener Long Island Regional Sustainability Plan (2013)

Cleaner Greener Consortium of Long Island is group of municipalities and non-governmental organizations organized to articulate a community based vision for a more sustainable future. The Cleaner Greener Long Island Regional Sustainability Plan (CGLI) is intended to serve as a common point of reference for local governments, non-governmental organizations, businesses and residents. It includes initiatives for implementation, objectives and performance targets, as well as a wealth of baseline information (in the appendices) that can be incorporated into comprehensive plans, management plans, zoning, and other planning and strategy initiatives.

Goals and strategies were developed for the following subject areas: Economic development and workforce housing; energy; transportation; land use and livable communities, waste management; water management; governance and implementation.

Nassau Urban County Consortium 5 Year Consolidated Plan (Nassau County, 2010)

The Nassau Urban County Consortium 5 Year Consolidated Plan presents a five-year strategy for addressing housing and community revitalization needs within the 34 member Urban County Consortium. It includes a One Year Action Plan for spending approximately \$21,524,865 in Community Development Block Grant, HOME, Emergency Shelter Grant and program income funds. Through these programs, funds will be spent on a wide range of housing and community development activities including new construction and rehabilitation of housing; commercial and economic improvements; public services for senior, youths and low income persons; architectural barrier removal in private homes and in public buildings; homeless shelter operations and renovation; acquisition, demolition and relocation activities of blighted properties in targeted redevelopment areas; infrastructure improvements in low income areas; and other related activities.

Inwood, one of the Five Towns communities is listed as one of the revitalization areas where activities will be carried out. Specifically, Nassau County supports the development of rental housing for extremely low and low income senior citizens and households in Inwood. The Consolidated Plan identifies HOME funds as a source of funding assistance in developing these additional housing units.

While a particular focus of the Consolidated Plan is on housing needs in low-income areas, the plan also identifies revitalization of commercial sections of Inwood, including

streetscape improvements, as an additional point of emphasis. The Consolidated Plan recommends the use of CDBG funds for street improvements, parking, commercial rehabilitation and business expansion which will result in upgrading local business areas.

A more comprehensive list of relevant regulatory and advisory documents is included in Section V.

NYRCR Jamaica Bay Regional Working Group

From Sea Gate on the western edge of the Southern Brooklyn Peninsula, to South Valley Stream at its headwaters in Nassau County, communities in and around Jamaica Bay suffered enormous damage from Superstorm Sandy. The Bay, known as a unique ecosystem in an urban landscape, is famous for its salt marsh islands, intertidal flats, horseshoe crabs, and migratory birds that use the area as a critical refuge during their seasonal travels. Beyond the water, Jamaica Bay is surrounded by woodland and forests that host a wide array of wildlife. This dynamic system has attracted people for generations, and many of its surrounding communities are partially defined by their close proximity to Jamaica Bay's waters. However, this proximity also served as a hazard during Superstorm Sandy. At the height of the storm, the Bay swelled and water surged up through a network of creeks and streams, infiltrating neighborhoods and inundating homes, businesses and roadways.

As described in the *Description of Storm Damages* section of this Plan, Superstorm Sandy had a devastating impact on communities, and

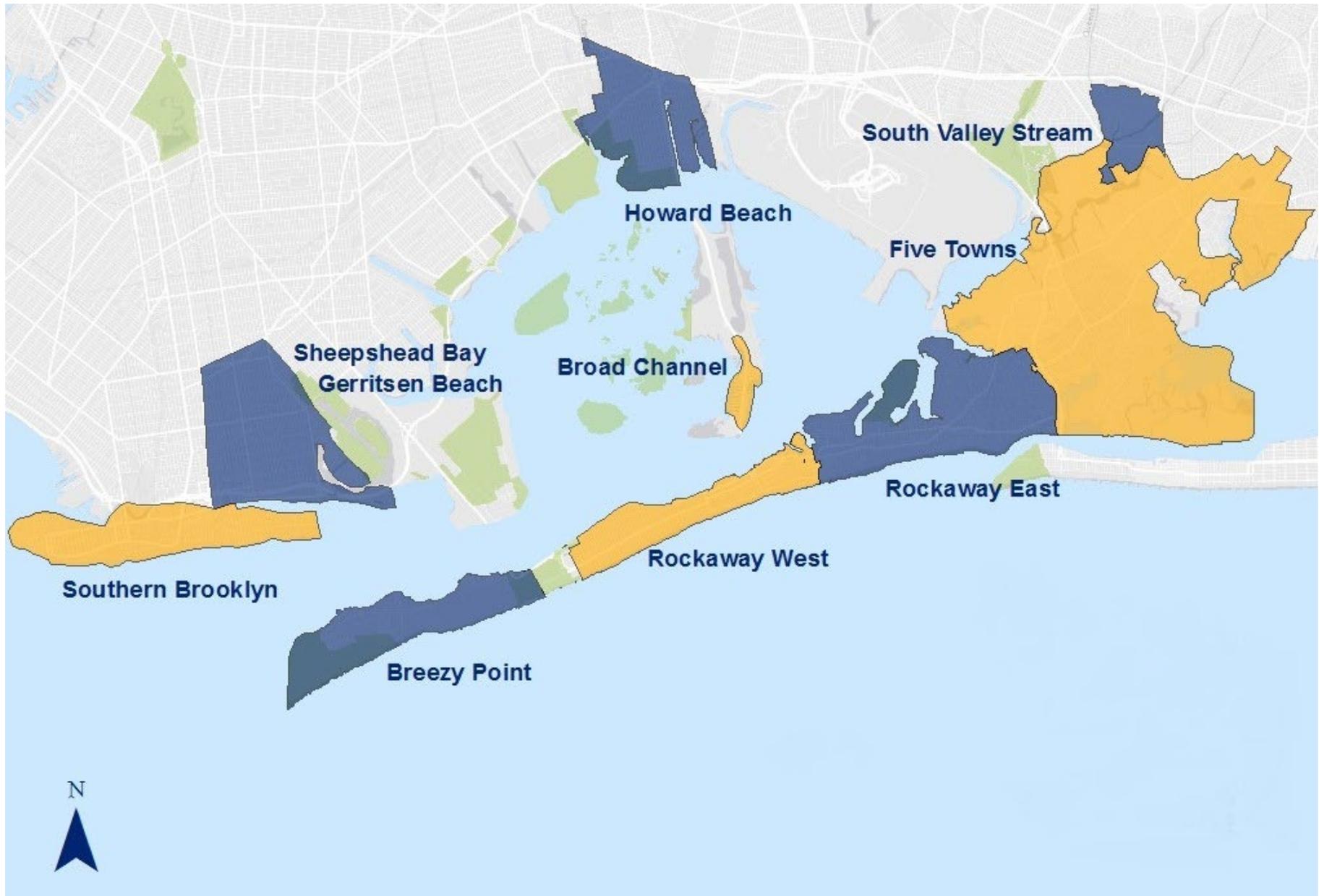


Figure 5: NYRCR Jamaica Bay Regional Working Group

The Five Towns NY Rising Community Reconstruction Plan

individual NYRCR Committees have developed strategies to rebuild and become resilient to future storm risks. At the same time, communities in and around Jamaica Bay realize the need for collaboration. Understanding that projects and other actions in one area can have profound impacts across the estuary, these communities have sought to create a unified, collective voice in support of resiliency efforts throughout the Bay. Mindful of the communities' call for cooperation, the Governor's Office of Storm Recovery created the Jamaica Bay Regional Working Group (JBRWG), a collection of representatives from the NYRCR communities closest to Jamaica Bay, shown in Figure 5. The JBRWG views this final plan as the vehicle for its collective voice in support of ongoing and emerging resiliency efforts by stakeholders in Jamaica Bay.

The JBRWG is comprised of members from the following NYRCR Committees: Breezy Point/Roxbury, Rockaway West, Rockaway East, Broad Channel, New, Old Howard Beach and Hamilton Beach, Gerritsen Beach and Sheepshead Bay, the Southern Brooklyn Peninsula (which includes Brighton Beach, Coney Island, Manhattan Beach, and Sea Gate), and in Nassau County, the Five Towns (which includes Village of Cedarhurst, Hewlett, Village of Lawrence, Woodmere, Village of Hewlett Neck, Village of Hewlett Harbor, Meadowmere and Inwood), and South Valley Stream.

The JBRWG believes that collaboration with agencies active in Jamaica Bay, namely the U.S. Army Corps of Engineers (USACE) and the National Park Service (NPS) is paramount. Through various habitat restoration projects,

in addition to coastal protective measures along the Rockaway Peninsula, USACE has long been a committed partner in the sustainability of Jamaica Bay. Moreover, because of its management of the Gateway National Recreation Area, NPS has an ongoing interest as a responsible steward of its federally protected lands.

The JBRWG supports the following USACE and NPS projects, which would further protect communities in and around Jamaica Bay from future storm hazards:

- Breezy Point/Roxbury Long-Term Comprehensive Edge Protection – This project envisions a system of dunes, berms, marsh restoration, raised roads, floodwalls and baywalls, partially on NPS land, for comprehensive protection of the Breezy Point and Roxbury communities. This would include work at the Cove, as well as the property lines along the cooperative, including Breezy Point Tip.
- Breezy Point Comprehensive Flood Protection System – This proposed dune system would provide sustainable, natural flood and erosion protection utilizing the area's existing natural features. The plan is comprised of an ocean side double dune system and complementary set of bayside flood and erosion protections that are designed to safeguard the community from future storm events. An application for this project was formally submitted by the State to FEMA on March 20, 2014, through FEMA's Hazard Mitigation Grant Program (HMGP).
- Broad Channel Shoreline Protection – A potential project from the Broad Channel NYRCR committee is a "Resiliency Campus," a rebuilding program to enhance the resiliency of several important community centers damaged during Sandy. The NPS property line hugs the campus site, the northwest quadrant of the neighborhood, and interventions here would further protect these community assets.
- Edge Protection for Upper Jamaica Bay – The JBRWG supports the inclusion of protective measures for communities located in upper Jamaica Bay, including Gerritsen Beach, Sheepshead Bay, and Manhattan Beach, in the USACE East Rockaway Inlet to Rockaway Inlet Reformulation Study. This would include protections for Plumb Beach and the water body of Sheepshead Bay, which were points of entry for storm surge during Superstorm Sandy.
- Howard Beach Shoreline Protection – The New York State Department of Environmental Conservation (NYS DEC) is currently working toward designing and implementing protective strategies on NPS property in lower Spring Creek. The Howard Beach NYRCR committee has also proposed work on NPS property at Upper Spring Creek, Charles Memorial Park, and Shellbank and Hawtree Basins.
- Rockaway East and West Bay and Coastal Protection – A system of bay walls, groins, and dunes are being implemented to protect Rockaway West. The JBRWG also

supports additional bayside protections including bulkheads and natural solutions at vulnerable locations in Rockaway East, along the western, northern, and eastern shoreline of Arverne, in Sommerville, and in Bayswater. Additionally, Jacob Riis Park, the westernmost boundary of the Rockaway West Planning Area geographic scope, remains NPS property. The JBRWG supports work at this location, through either dunes along the beachfront or berms within the property, and believes the project would ensure protection of the entire community.

- Surge Barrier at Rockaway Inlet – The JBRWG supports New York City Special Initiative for Rebuilding and Resiliency’s (SIRR) call for the USACE to initiate an expedited study to examine the feasibility of developing a surge barrier and alternative measures at Rockaway Inlet as part of the previously mentioned Rockaway reformulation study.

Lastly, the JBRWG supports the Science and Resiliency Institute at Jamaica Bay, a partnership among academic institutions, government agencies, nongovernmental organizations and community groups dedicated to the promotion and understanding of resilience in Jamaica Bay and its surrounding communities. Institutions taking part include: Columbia University, Rutgers University, SUNY Stonybrook, Stevens Institute of Technology, Cornell University, CUNY, NASA Goddard Institute for Space Studies, the Wildlife Conservation Society, and New York Sea Grant. The Science and Resiliency Institute at Jamaica Bay was created in response to a RFEI (Request for Expression of

Interest) put out by the NPS, City of New York, and Trust for Public Land, with grant funding from the Rockefeller Institute.

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Section II: Assessment of Risk and Needs

Motts Basin, Inwood

A. DESCRIPTION OF COMMUNITY ASSETS AND ASSESSMENT OF RISK

The process of completing the NY Rising Community Reconstruction (NYRCR) Plan for the Five Towns Community is largely framed in terms of community assets and the risks that they face. Assets are a critical component of the NYRCR Plan because these are facilities, institutions, or networks that are essential to day-to-day life, long-term resilience, and rapid disaster recovery. The NYRCR Planning Committee (NYRCR Committee) for the Five Towns identified assets that are critical or locally significant and which provide services for socially vulnerable populations.

In order to create a plan that protects critical assets, the NYRCR Committee also considered the relative risk that these community assets face. The Asset Inventory and Risk Assessment that follows in this section enabled the NYRCR Committee to identify those assets at highest risk for negative impacts from future storm events. Knowing the assets at highest risk helped the NYRCR Committee to understand the needs and opportunities within the Community and empowered the NYRCR Committee to identify Proposed and Featured Projects (See Section IV) that reduce the risk of these assets. The Asset Inventory and Risk Assessment Processes are illustrated in Figure 6.

The Asset Inventory and Risk Assessment were conducted to measure the current risk levels of assets in the Five Towns. As the goal of the Risk Assessment was to determine those assets at highest risk, the Asset Inventory and Risk Assessment was limited to all assets within extreme and high risk areas, as well as critical

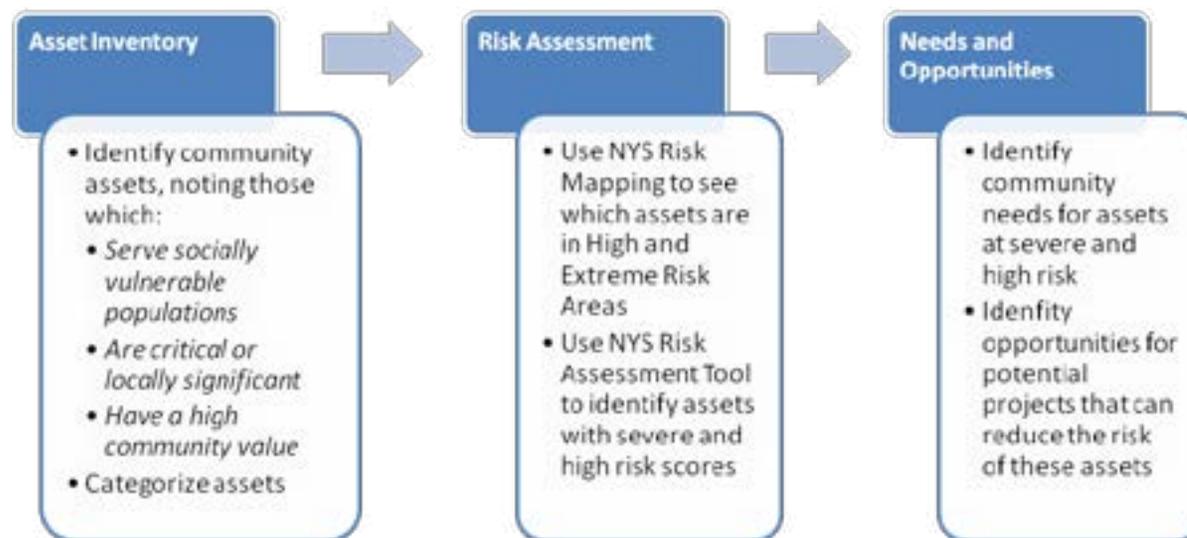


Figure 6: Asset Inventory and Risk Assessment Process

or locally significant assets within the entire Community. This Risk Assessment served as a baseline for determining the risk-reduction benefits of Proposed and Featured Projects that are included in the NYRCR Plan.

I. DESCRIPTION OF COMMUNITY ASSETS

To help make the Five Towns a more resilient community, the NYRCR Committee has identified ways to strengthen and protect its social, economic and natural resource assets that have been, or will be, affected by coastal hazards. Assets are places or facilities where economic, environmental and social functions of the community occur, or are components of critical infrastructure required to support

those functions. Assets are features which the community values, ranging from commercial areas, neighborhoods, schools, and healthcare facilities to infrastructure, natural habitats, and cultural resources. The NYRCR Plan seeks to ensure that new or reconstructed assets are built to withstand the impacts of future storms, while programs and policies are designed to increase the Community's resilience. The NYRCR Committee has identified assets that were either impacted by Superstorm Sandy, are at risk of being impacted by future storms, or provided critical recovery functions for residents and businesses in the inundation zone. Assets were defined in the NYRCR Plan according to the following asset categories:

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

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

- Discussions at Committee Meetings;
- Feedback at Public Engagement Events;
- Meetings in the local communities with committee members, local officials, and community members;
- Site tours; and
- Data analysis.

The following Asset Inventory that follows presents a summary of the assets at risk within the Five Towns Community identified through the above assessment process.

New York State Risk Maps

New York State Department of State (DOS) has developed risk assessment area maps that define areas at risk from all of the following coastal hazards in relation to their topography, including: Federal Emergency Management Agency (FEMA) flood zones, previous storm surge inundation, sea level rise, National Weather Service (NWS) shallow coastal flooding advisory thresholds, and natural shoreline features. The New York State Risk Assessment Maps (Risk Maps) were utilized for the NYRCR

Plan to show the corresponding level of risk (extreme, high, and moderate) for each of the asset categories (Figure 7).

The risk maps demonstrate that nearly all of the Five Towns Community is in a risk zone, except for the spine of the Long Island Railroad (LIRR) through the center of the Five Towns. All of Meadowmere Park and much of Lawrence are located in an extreme risk zone. Nearly all of Woodmere is located in a high risk zone, as well as much of Hewlett Harbor and other significant areas within Inwood, Hewlett Neck, Cedarhurst and Lawrence.



Bulkhead in Hewlett Neck



Metro Marine Express, Inwood



Hook Creek, Meadowmere Park

Extreme Risk Areas

Areas currently at risk of frequent inundation, vulnerable to erosion in the next 40 years, or likely to be inundated in the future due to sea level rise.

- FEMA V zone.
- Shallow Coastal Flooding per NOAA NWS's advisory threshold.
- Natural protective feature areas susceptible to erosion.
- Sea level rise - Added 3 feet to the MHHW shoreline and extended this elevation inland to point of intersection with ground surface.

High Risk Areas

Areas outside the Extreme Risk Area that are currently at infrequent risk of inundation or at future risk from sea level rise.

- Area bounded by the 1% annual flood risk zone (FEMA V and A zones).
- Sea level rise - Added 3 feet to NOAA NWS coastal flooding advisory threshold and extended this elevation inland to point of intersection with ground surface.

Moderate Risk Areas

Areas outside the Extreme and High Risk Areas but at moderate risk of inundation from infrequent events or at risk in the future from sea level rise.

- Area bounded by the 0.2% annual risk (500 year) flood zone, where available.
- Sea level rise - Added 3 feet to the Base Flood Elevation for the current 1%
- Annual risk flood event and extended this elevation inland to point of intersection with ground surface.
- Area bounded by SLOSH category 3 hurricane inundation zone.

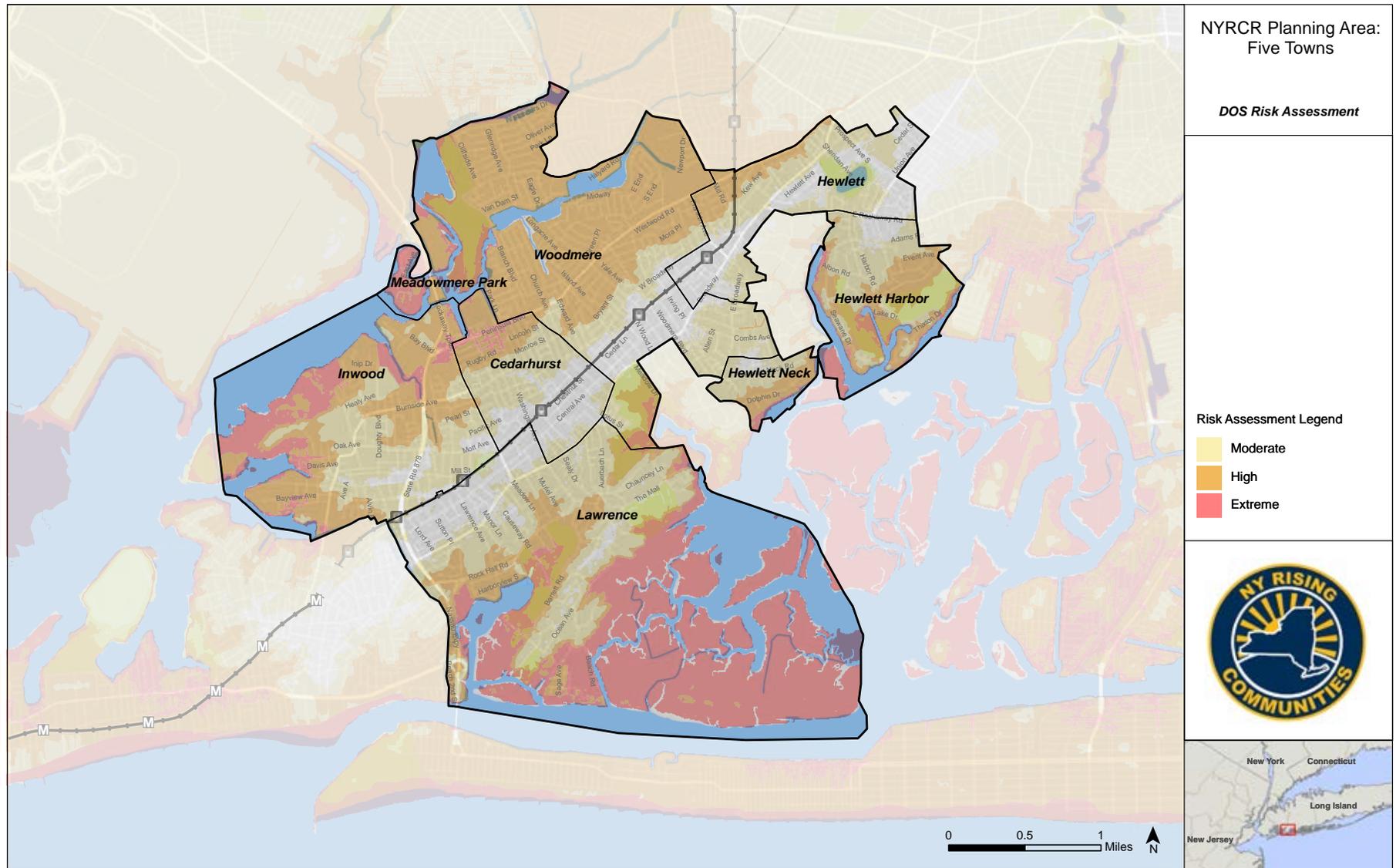


Figure 7: New York State Risk Assessment Map

Economic Assets

Economic Assets in the Five Towns include several commercial districts and corridors along Broadway in Woodmere/ Hewlett and along Central Avenue in Cedarhurst and Lawrence (Figure 8). The commercial district along Rockaway Turnpike in Inwood was heavily flooded by Superstorm Sandy's storm surge, including the TD Bank and Costco. Inundation also extended up Rockaway Turnpike to the Five Towns Shopping Center near Meadowmere Park. Important economic assets in this area include the gas storage and distribution facilities in Inwood and Meadowmere Park, which provide a large number of jobs but are located in low-lying areas that were inundated during Superstorm Sandy.

Several golf courses in the Five Towns were also identified by the community as economic assets. The Lawrence Country Club is owned by the Village of Lawrence and is therefore considered to be an economic asset of the Village, although it is operated on a private membership basis. The Inwood Country Club is also a private club and is a large employer in the area. Both courses were inundated by storm surge during Superstorm Sandy and sustained significant damage.



Keystone Yacht Club, Hewlett Neck



Central Avenue, Cedarhurst



Fuel Distribution, Inwood

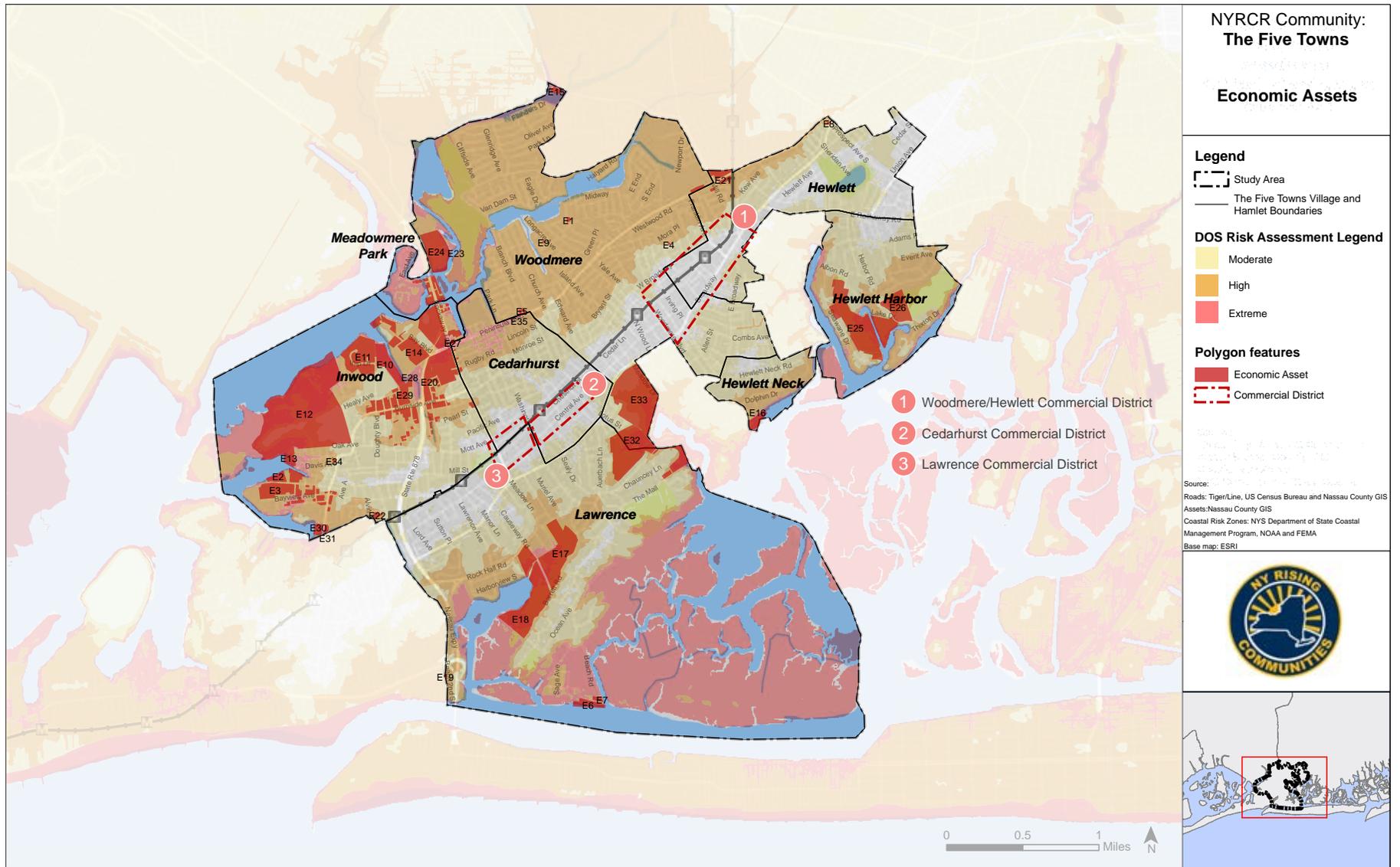


Figure 8: Economic Assets

Health and Social Services Assets

Health and Social Services assets that were either significantly impacted by Superstorm Sandy or served a critical role in recovery include fire departments, schools, and community centers. The Meadowmere Park Fire House served as an unofficial yet critical facility for shelter and recovery after Superstorm Sandy. Lawrence High School in Cedarhurst, which was closed for six months after Superstorm Sandy due to mold and electrical damage from flooding, was also identified as a critical asset by the community. Other identified assets were: Lawrence Junior High School; #2 School, #4 School, and Middle School in the Village of Lawrence; and School #5 in the Village of Cedarhurst (Figure 9).

The Five Towns Community Center on Lawrence Avenue at Mott Avenue also served as an unofficial yet critical distribution point and shelter for relief services after the storm. Publicly owned assets include village halls in Hewlett Neck, Hewlett Harbor, Lawrence, and Cedarhurst, which served as an impromptu command center. The only regional hospital in the Five Towns area is St. John's Episcopal Hospital in Far Rockaway.



Meadowmere Park Fire House



DRS Yeshiva High School, Woodmere



Five Towns Community Center, Inwood

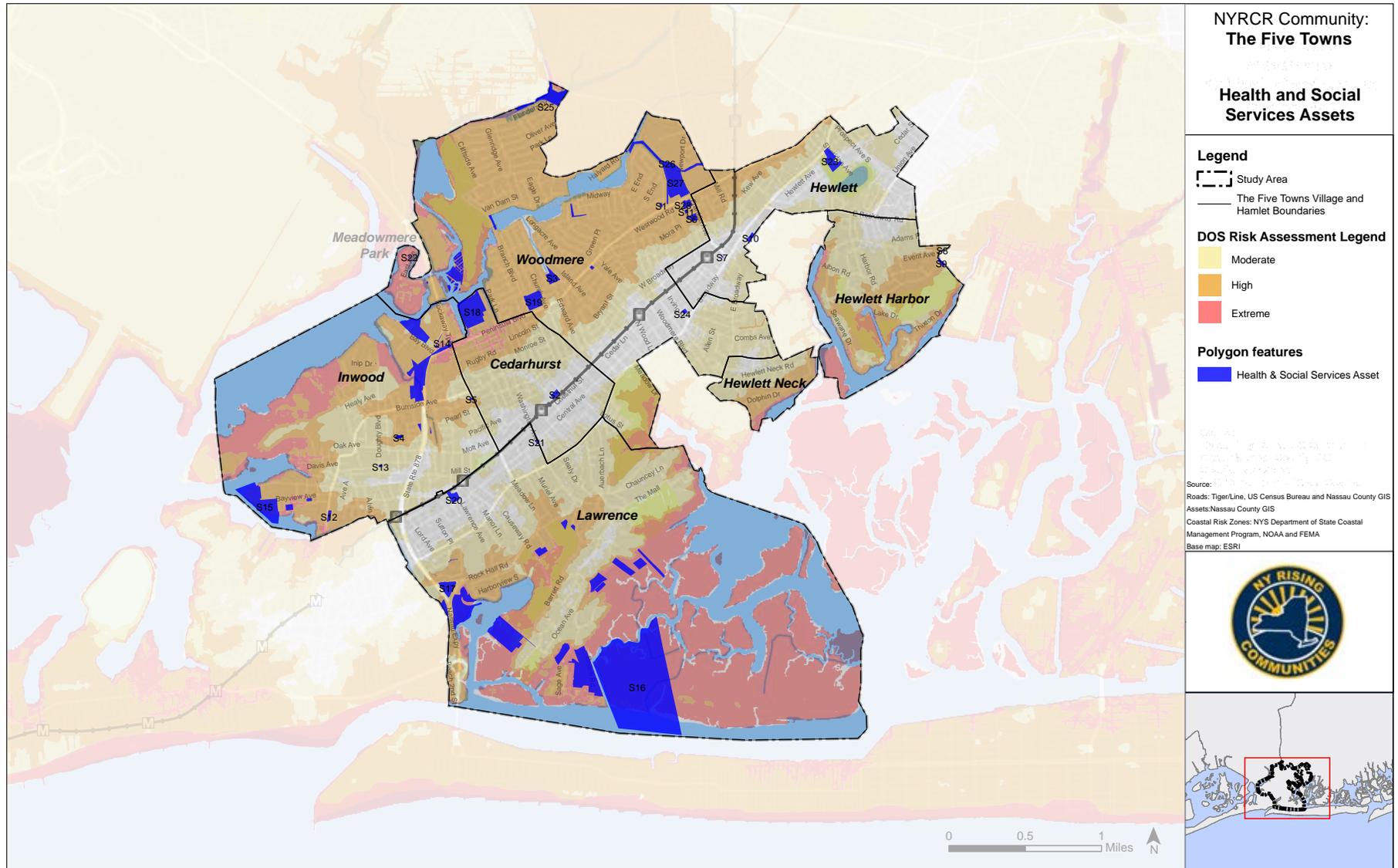


Figure 9: Health and Social Services Assets

Housing Assets

The Five Towns communities are primarily grouped around the Long Island Rail Road (LIRR) line that runs through the area (Figure 10). Clusters of multi-family properties are grouped around the five stops along the LIRR. These examples of transit-supported development present opportunities for low-risk housing, as many of these areas are located at high ground and out of the high and extreme risk zones.



East Chateau Co-ops, Woodmere



Hook Creek, Meadowmere Park



Pepperidge Road, Hewlett Harbor

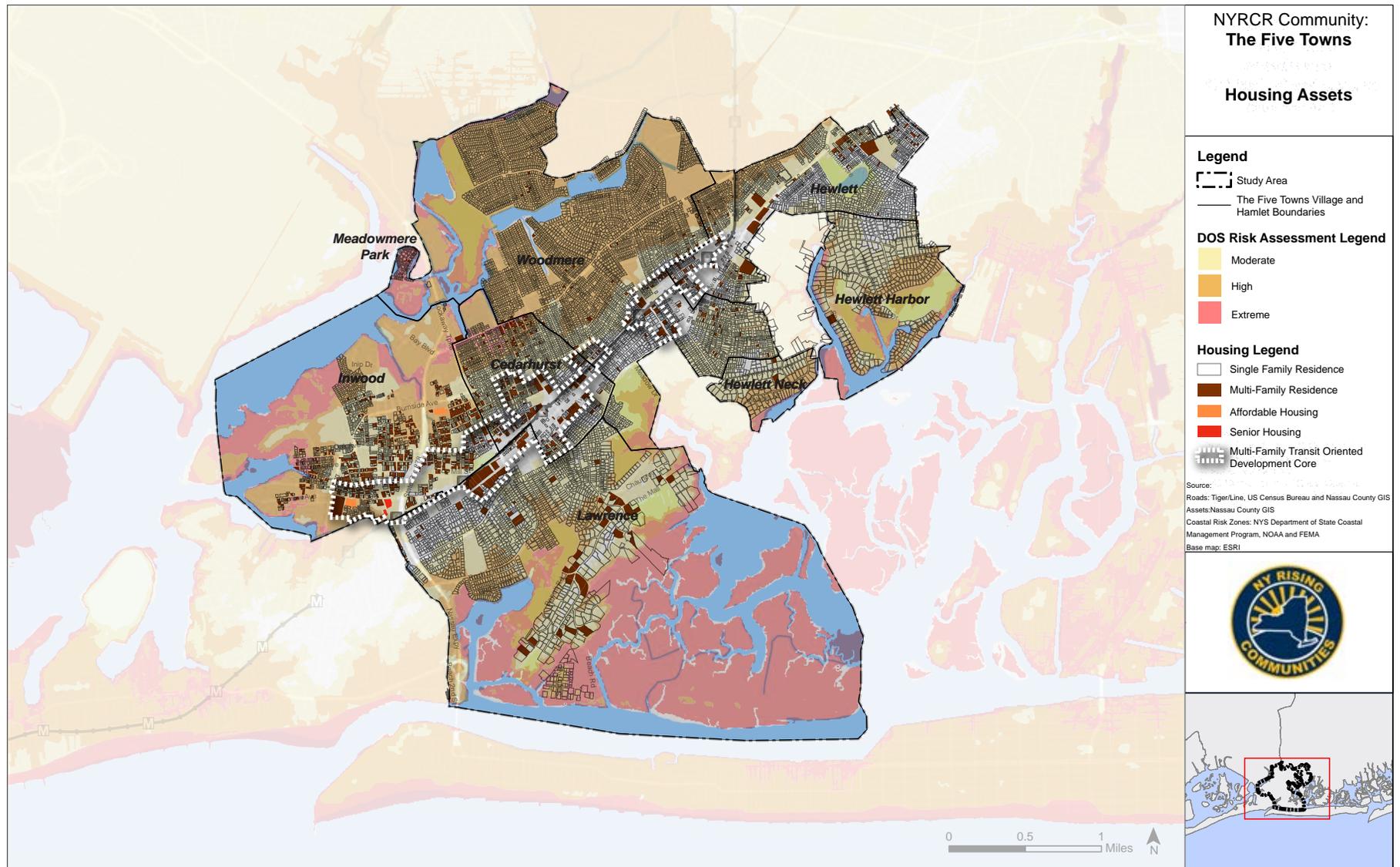


Figure 10: Housing Assets

Infrastructure Systems Assets

Infrastructure Systems Assets include transportation such as roadways and transit, stormwater, wastewater and water supply infrastructure, gas stations, and solid waste and recycling facilities. Identified infrastructure assets are shown in Figure 11. The NYRCR Plan considers systems located within and outside of the Five Towns Community to the extent that impairment of those assets due to flooding would affect community assets or functions.

The stormwater system was consistently identified as an important infrastructure asset during the NYRCR Process. Stormwater systems in the Five Towns are also most in need of study to determine requirements for improvements and repair that would restore the functionality of existing catch basins and outfalls.

The Bay Park Sewage Treatment Plant (STP) is the primary sewage treatment plant for the area; however the Cedarhurst STP, which has long been planned to be decommissioned, is currently providing backup handling capacity for Bay Park STP, which was severely damaged by Superstorm Sandy, until the Bay Park STP facility is back at full capacity.

The LIRR is a key transportation infrastructure asset, with five stations within the Community. Key roadways include Peninsula Boulevard, Broadway, and Rockaway Turnpike. Transportation access during and after Superstorm Sandy was limited via Peninsula Boulevard due to flooding and congestion on Rockaway Turnpike was exacerbated by traffic from Queens residents attempting to get gas. The only official Nassau County Hurricane

Evacuation route in the Five Towns runs along Nassau Expressway to Peninsula Boulevard.

Power infrastructure in the Community was widely impacted by Superstorm Sandy. While the electrical grid is owned by the Long Island Power Authority (LIPA) throughout the Community, the characteristics of this infrastructure vary from place to place and were affected by Superstorm Sandy accordingly. The electrical network in the Village of Hewlett Neck includes both underground wiring and overhead wiring; the underground network has been more problematic due to the impacts of flooding. Four substations that serve Cedarhurst were flooded during Superstorm Sandy. At the end of Doughty Boulevard, there are several liquid fuel distribution facilities. These facilities are low-lying, along the waterfront, and were flooded during Superstorm Sandy.

Flood and erosion defense works are not considered assets for the purpose of this asset inventory and risk assessment. Bulkheads, seawalls, and rip rap are not assets, but rather flood defenses that affect the exposure of an asset to storms or other hazards.



Meadowmere Park Footbridge



Dike at the Isle of Wight, Lawrence



Cedarhurst LIRR Station

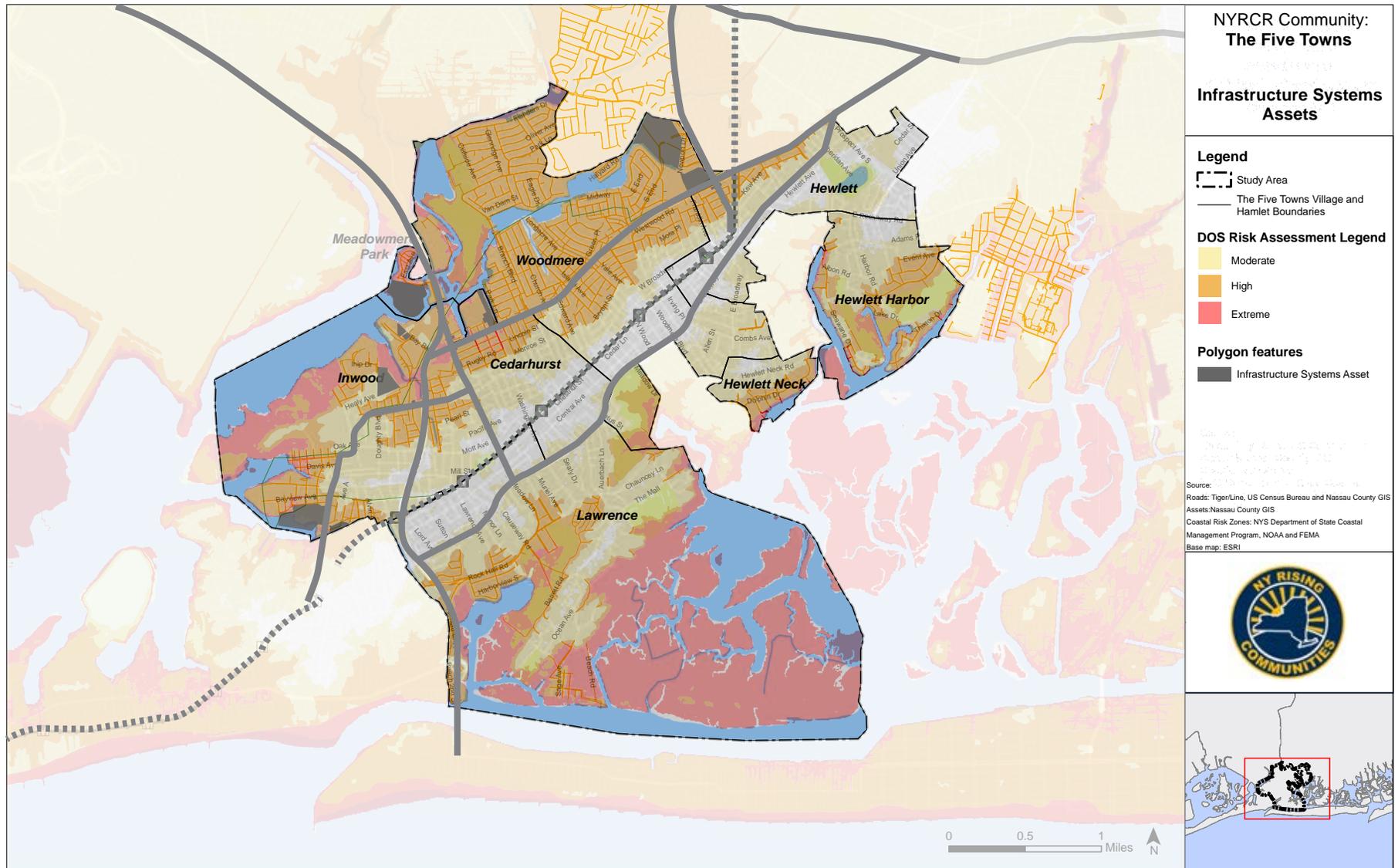


Figure 11: Infrastructure Assets

Natural and Cultural Resource Assets

Natural and Cultural Resources vary from natural and ecological habitats, wetlands and marshes, parks, recreation and open space, to museums, libraries, historic landmarks, and religious establishments. Identified natural and cultural resources assets are shown in Figure 12.

The Five Towns Community is surrounded by water that provides critical habitat, including Hook Creek, Crooked Creek, Motts Creek, Bannister Bay, Hewlett Bay, Brosewre Bay, Bannister Bay, Grant Pond, and Willow Pond. Parks in the area that have been identified by the community as assets include Cedarhurst Park, Inwood Park, and a vacant parcel in Meadowmere Park that was formerly maintained as a park by the Town of Hempstead.

In the Village of Lawrence, key natural water resources include Brosewre Bay, Bannister Bay, and Crooked Creek. Cultural resources include the Lawrence Yacht and Country Club, the Woodmere Country Club, and the Rockaway Hunting Club. In general, cultural resource assets in the Village of Lawrence are located outside of the Superstorm Sandy inundation area. Cultural resources in the Village include Rock Hall Museum (also a New York State historic landmark), Beth Shalom Synagogue, and Peninsula Public Library.

Woodbine Ditch has been identified as a key natural resource asset in the Village of Hewlett Neck. In the Village of Hewlett Harbor, natural and cultural resource assets include Hewlett Bay, Seawane Country Club, and Willow Pond. Natural resource assets in Hewlett include



Motts Basin, Inwood

Grant Park, Grand Pond, and Doxey Brook. St. Joseph's Catholic Church and the Hewlett-Woodmere Public Library are cultural assets in Hewlett

In the Village of Cedarhurst, Johnny Jack Park and Cedarhurst Park were both identified as important natural resource assets. Several cultural resources in Cedarhurst were identified during the NYRCR Process, such as Temple Beth El, Congregation Beth Medrash, and the Lutheran Church of Incarnation.

Woodmere's important Natural Resource Assets include Hook Creek, Clear Stream, Motts Creek, Cedar Point Lake, Fosters Brook, and Doxey Brook. Additional natural resource assets include North Woodmere Park and Woodmere Dock. In Woodmere, cultural assets include the Sephardic Temple, Young Israel of Woodmere, and DRS Yeshiva High School for Boys.

Key high risk area natural and cultural resources within the Superstorm Sandy inundation zone in Meadowmere Park include Memorial Park and Town of Hempstead parkland.

Several natural and cultural resource assets have been identified in Inwood, including Inwood Park, Inwood Marina, and Inwood Country Club. Additional natural resource assets include Bayswater Park and Terrace Gardens Park. Cultural resources in Inwood include Gethesmane Church and Maranatha French-Speaking Assembly of God Church. The Five Towns Community Center, Our Lady of Good Counsel Church, and First Calvary Baptist Church are also cultural resources identified during the NYRCR Process.

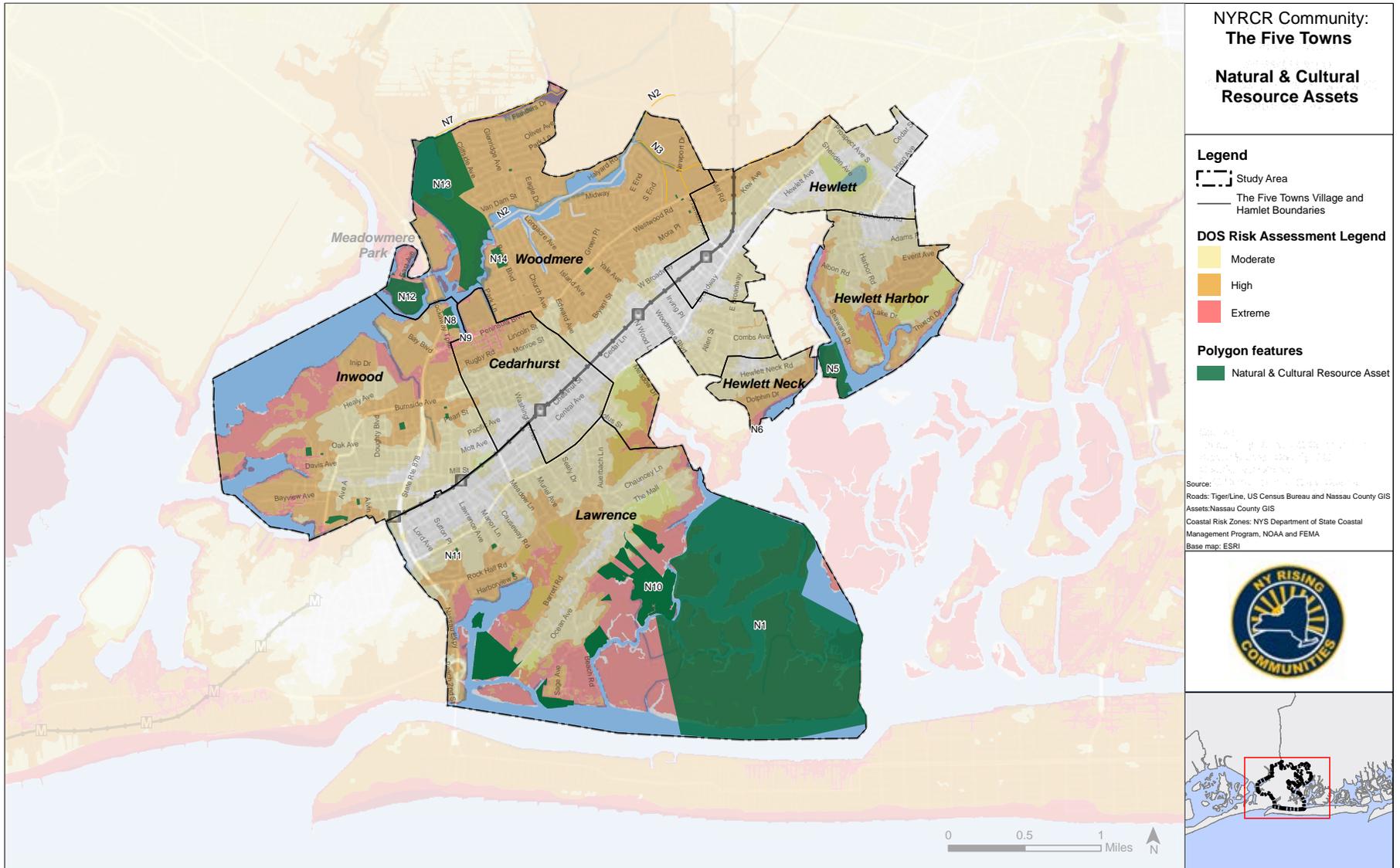


Figure 12: Natural and Cultural Resources Assets

Assets that Serve Socially Vulnerable Populations

Assets that Serve Socially Vulnerable Populations include facilities that provide services for people with disabilities, low-income populations, the elderly, young children, and homeless populations. As noted in Section I, the Five Towns Community is characterized by a dramatic income gap and diverse communities. In part, this diversity also brings with it some populations that have more difficulty in evacuating to safety and in recovering after a storm, which are therefore at greater risk in the event of extreme weather (Figure 13).

Facilities that serve socially vulnerable populations include Inwood's Mary's Manor, which cares for senior citizens. The Hebrew Academy for Special Children (HASC), located in Hewlett, is in the high risk zone. HASC provides supportive services to children with special needs, another population which is especially vulnerable during disasters.

For the purposes of the NYRCR Plan, low-income households are loosely defined as those with an annual salary of less than \$35,000.³⁹ The greatest number of low-income households is concentrated in Inwood, which is the only Village or Hamlet in the Community that contains Census block groups in which more than 30% of households are low-income. Cedarhurst also has a relatively large share of low-income households; more than half of the block groups in the Village have greater than 25% of households earning less than \$35,000 per year. Pockets of low-income areas are also found north and northeast, in Woodmere and Hewlett. In contrast, the Villages of Lawrence,

Hewlett Neck, and Hewlett Harbor have very low shares of low-income households. In these more prosperous areas, low-income households comprise less than 10% of the overall number of households in the majority of block groups.⁴⁰

Elderly populations are dispersed throughout the Five Towns, but tend to be concentrated in the central and eastern portions of the Community. For instance, elderly populations comprise more than 20% of four of Hewlett's five block groups. Similarly, roughly 16% of the population in the Village of Hewlett Harbor are elderly; and over 20% of the Village of Hewlett Neck is composed of an aging population.⁴¹ Not surprisingly, both the Bristol Assisted Living facility and Mary's Manor are located in areas with a high share of the elderly population.

Areas with a relatively high share of young children under the age of nine are primarily concentrated in the western central section of the Five Towns. Inwood, the Village of Cedarhurst, and Woodmere contain block groups where more than 20% of the population is under the age of nine, as does the western part of the Village of Lawrence.⁴²

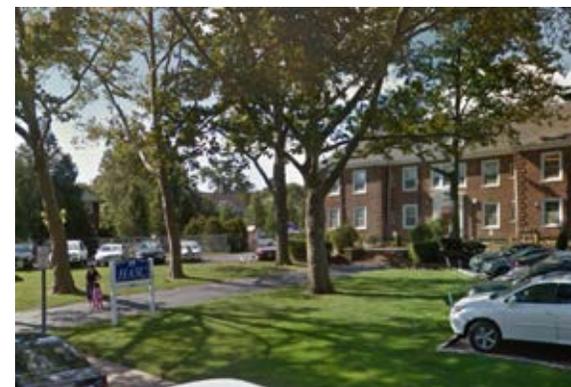
Households without access to a vehicle are scattered throughout the Five Towns, often coinciding with areas of elderly and low-income populations. Woodmere, Hewlett, Inwood and the Village of Lawrence each have areas where more than 25% of households lack access to a vehicle.⁴³

Households that do not speak English are almost exclusively found in the western portion of Inwood. Inwood has areas where over 12% to almost 35% of households do not speak

English, including Mary's Manor. Virtually all of the other Villages and Hamlets in the Five Towns Community are comprised of block groups where less than 1% of households speak no English.⁴⁴



Mary's Manor, Inwood



Hebrew Academy for Special Children, Woodmere

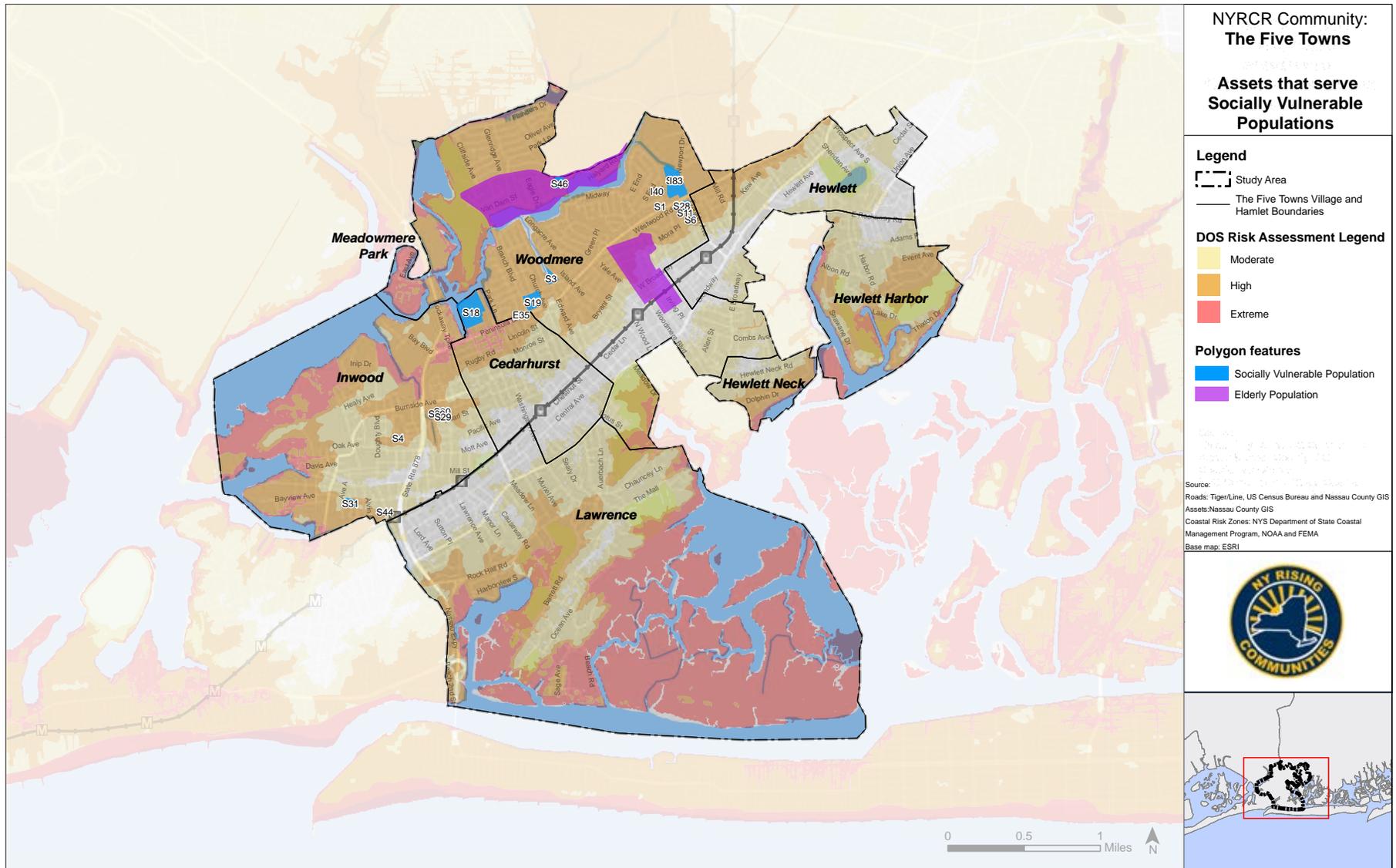


Figure 13: Assets that Serve Socially Vulnerable Populations

Critical and Locally Significant Assets

Special consideration was given by the Committee to identifying critical or locally significant assets whose loss or impairment would compromise essential services for the communities of the Five Towns. According to the Federal Emergency Management Agency (FEMA), critical facilities are essential to the health and welfare of the whole population and are especially important following hazard events.⁴⁵ Examples of Critical Facilities include emergency service facilities such as hospitals and other medical facilities, jails and juvenile detention centers, police and fire stations, emergency operations centers, public works facilities, generating plants and other principal point of utility lines, evacuation shelters, schools, and other uses that house special needs populations.

FEMA-defined critical facilities may not include the full range of assets considered critical by the Community. Therefore, the NYRCR Plan also identifies locally significant facilities that would be considered critical by other Federal agencies, State and local officials, and the NYRCR Committee.

Assets with High Community Value

The preparation of the NYRCR Plan has been a participatory planning process gaining input from the Committee and the public. Therefore, community value weighs highly in determining what assets the NYRCR Plan seeks to protect. Within the Risk Assessment Tool, “community value” refers to the value of the asset to the community expressed as high, medium, or low. The following assets have a high community value:

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

II. ASSESSMENT OF RISK TO ASSETS AND SYSTEMS

Understanding Risks

As defined by New York State Department of State (DOS) for the NYRCR Program, “risk” is the chance that an asset will be damaged or destroyed by future storm events. Assessing the level of risk and relative importance of assets within the Five Towns has enabled the NYRCR Committee to identify Proposed and Featured Projects and reconstruction strategies that can protect specific assets by reducing their risk.

Quantifying Risks: Coastal Hazard and Risk Assessment Tool

The risk to each asset has been quantified using the Coastal Hazard and Risk Assessment Tool developed by New York State DOS that takes into account hazard, exposure, and vulnerability. This resulting risk assessment provides a baseline score for each group of assets. Understanding the assets with the highest risk enabled the NYRCR Committee to identify Proposed and Featured Projects that can protect these assets. The reduction in risk score caused by implementing a potential project is a key determinant of the risk-reduction benefit generated by that project.

The Coastal Hazard and Risk Assessment Tool was used to assess both critical or locally significant assets within the NYRCR Community, as well as all assets located within the mapped extreme and high risk areas.

Hazard

Hazard measures the likelihood and magnitude of future storms. Hazards are storms that are typical for the region, not unlikely or unpredictable events. The Five Towns face four general types of hazards:

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

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

1. Low intensity event: >90% probability of occurring
2. Moderate intensity event: 66-90%
3. High intensity event: 33-66%
4. Very high intensity event: 10-33%
5. Extreme intensity event: 1-10%

The NYRCR Program selected a 100 year storm as the sample event for calculating risk scores. Other events could also be selected, which

would yield a different range of scores. This could be useful for future planning initiatives.

Exposure

Exposure is an expression of the local topographic and shoreline conditions that tend to increase or decrease the impact of coastal hazards on risk to assets. The topography and local geographic conditions of the Five Towns Community render it considerably exposed to the effects of these hazards; however localized exposure varies among the Villages and Hamlets. Low-lying areas in Inwood, Meadowmere Park, and Woodmere as well as the low-lying wetlands in Lawrence are most exposed by their low elevation.

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

- Erosion Rate;
- Beach Width;
- Shore Defenses;
- Vegetation;
- Dunes or Bluffs; and
- Soils.

For a definition of these landscape attributes, see Section V: Additional Materials.

The resulting exposure score for each group of assets considers the risk area in which the asset is located and the landscape attributes that

influence the assets' potential for storm impacts. Assets that are more exposed to hazards are at greater risk than those that are less exposed.

Vulnerability

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

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

The Five Towns Community is significantly vulnerable to the loss of community assets due to the several low-lying areas that are not above base flood elevation. Most vulnerable are those assets that may experience loss of service or function within the extreme or high risk zone, including the fuel distribution facilities in Inwood, key economic assets in Woodmere, and the entire residential neighborhood of Meadowmere Park. The average vulnerability score within the Five Towns is 4, with most assets (84% of asset inventory) experiencing a service loss of approximately or greater than one month.

Risk scores

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

Risk = Hazard x Exposure x Vulnerability

Risk scores can range from 1.5, the lowest score reflecting negligible or 'residual' risk, to 75, the highest score reflecting severe risk. These ranges are broken down as follows:

Residual: (Risk Score <6)

Residual risk scores result from both low exposure and vulnerability, however if assets are critical or have a very high community value, actions may be warranted to reduce their risk.

Moderate: (Risk Score 6 - 23)

A moderate risk score represents that the assets may suffer moderate to serious storm impacts, but that adaptation may be of a lower priority because either exposure or vulnerability are low.

High: (Risk Score 24 - 53)

Risk scores in the high range are indicative of conditions that could lead to significant negative impacts from a storm, and actions should be taken to reduce the assets' vulnerability and restore the assets' coastal protections.

Severe : (Risk Score >53)

A severe risk score represents that the assets are in a dangerous situation and that both exposure and vulnerability should be reduced.

Risk scores help identify assets with increased potential for storm damage and serve as one of many factors in determining the Proposed and Featured Projects that the Committee evaluated for inclusion in the NYRCR Plan; see Section IV: Implementation—Project Profiles for further discussion on Project Evaluation. In addition to the risk score, other contributing factors in determining which assets should be addressed and how immediately they should be addressed include:

- The assets' contribution to life safety,
- If the asset(s) are critical or locally significant,
- The assets' community value,
- Environmental services provided by the assets,
- Economic contribution of the assets,
- Availability or alternative assets or facilities, and
- The capacity of the assets to adapt.

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

Economic Assets

While the retail spine of the Five Towns is on high ground, almost three-quarters of the assessed value of commercial land (73.0%) is found in Moderate, High, and Extreme Risk Zones. The largest share, 42.4% is found in high risk areas, whereas 21.6% is found in Moderate Risk Zones, and 9.0% in Extreme Risk Zones. Distributed among the communities that make up the Five Towns, Inwood, home to big box stores as well as warehousing facilities and a country club, has the highest share of commercial land use at 46.2%, almost all of which (99.5 %) is in Moderate, High, or Extreme Risk zones. This is followed by Woodmere at 17.2% (74.1 % in risk zones), Hewlett at 15.3% (47.3% in risk zones) and Cedarhurst at 15.0% (27.9% in risk zones).⁴⁶ Figure 14 and Table 3 illustrate the risk of each group of Economic Assets included in the Asset Inventory and Risk Assessment.

Segments of the Bayview Avenue economic corridor fall into the extreme risk area on the Risk Maps and receive the highest risk score of all Economic Assets within the Five Towns. The Rockaway Turnpike, Inip Drive/Doughty Boulevard, and Sheridan Boulevard/Burnside Avenue economic corridors each lie partially within extreme risk areas.

The majority of economic assets included in the Asset Inventory are at high risk (80%), including the Woodmere Club / Rockaway Hunting Club, Cedarhurst Yacht Club, and the South Sheridan Boulevard economic corridor.

Additional economic corridors at high risk include Johnson Road / Rason Road, Nassau Expressway, Peninsula Boulevard / Mill Road,

Branch Boulevard / Oakland Avenue, and Prospect Street. The Cedarhurst Yacht Club and economic assets surrounding the Inwood Country Club are also at high risk. The remaining Economic Assets at high risk include several individual assets such as the Key Foods Shopping Center on Rosedale Road, Wolfe Animal Hospital, US Cargo, Inc. and others.

Table 3: Economic Assets: Risk Level

| Asset ID | Asset Name | Risk Level | Asset ID | Asset Name | Risk Level |
|----------|---|------------|----------|--|------------|
| E2 | Bayview Ave - Extreme | Severe | E15 | Key Foods Shopping Center | High |
| E10 | Inip Dr/Doughty Blvd - Extreme | Severe | E27 | Seven Eleven, Peninsula Boulevard | High |
| E16 | Keystone Yacht Club | Severe | E33 | The Woodmere Club/Rockaway Hunting Club - High | High |
| E17 | Lawrence Country Club - Extreme | Severe | E3 | Bayview Ave - High | High |
| E23 | Rockaway Turnpike - Extreme | Severe | E4 | Bell Hop Cleaners | High |
| E25 | Seawane Club - Extreme | Severe | E5 | Branch Blvd/Oakland Ave - High | High |
| E28 | Sheridan Blvd/Burnside Ave - Extreme | Severe | E8 | Chase Bank, Peninsula Boulevard | High |
| E6 | Cedarhurst Yacht Club | High | E20 | Nassau Expy - High | High |
| E30 | South Sheridan Blvd | High | E21 | Peninsula Blvd/Mill Rd - High | High |
| E32 | The Woodmere Club/Rockaway Hunting Club - Extreme | Severe | E22 | Prospect St - High | High |
| E7 | Cedarhurst Yacht Club | High | E29 | Sheridan Blvd/Burnside Ave - High | High |
| E12 | Inwood Country Club | High | E31 | South Sheridan Blvd - High | High |
| E13 | Inwood Marina | High | E34 | US Cargo, Inc | High |
| E18 | Lawrence Country Club - High | High | E35 | Wolfe Animal Hospital | High |
| E24 | Rockaway Turnpike - High | High | E19 | Long Beach Taxi Service | High |
| E26 | Seawane Club - High | High | | | |
| E1 | Apotex USA Incorporated | High | | | |
| E9 | Cruise One | High | | | |
| E11 | Inip Dr/Doughty Blvd - High | High | | | |
| E14 | Johnson Rd/Rason Rd - High | High | | | |

Legend: Risk Levels

- Residual
- Moderate
- High
- Severe

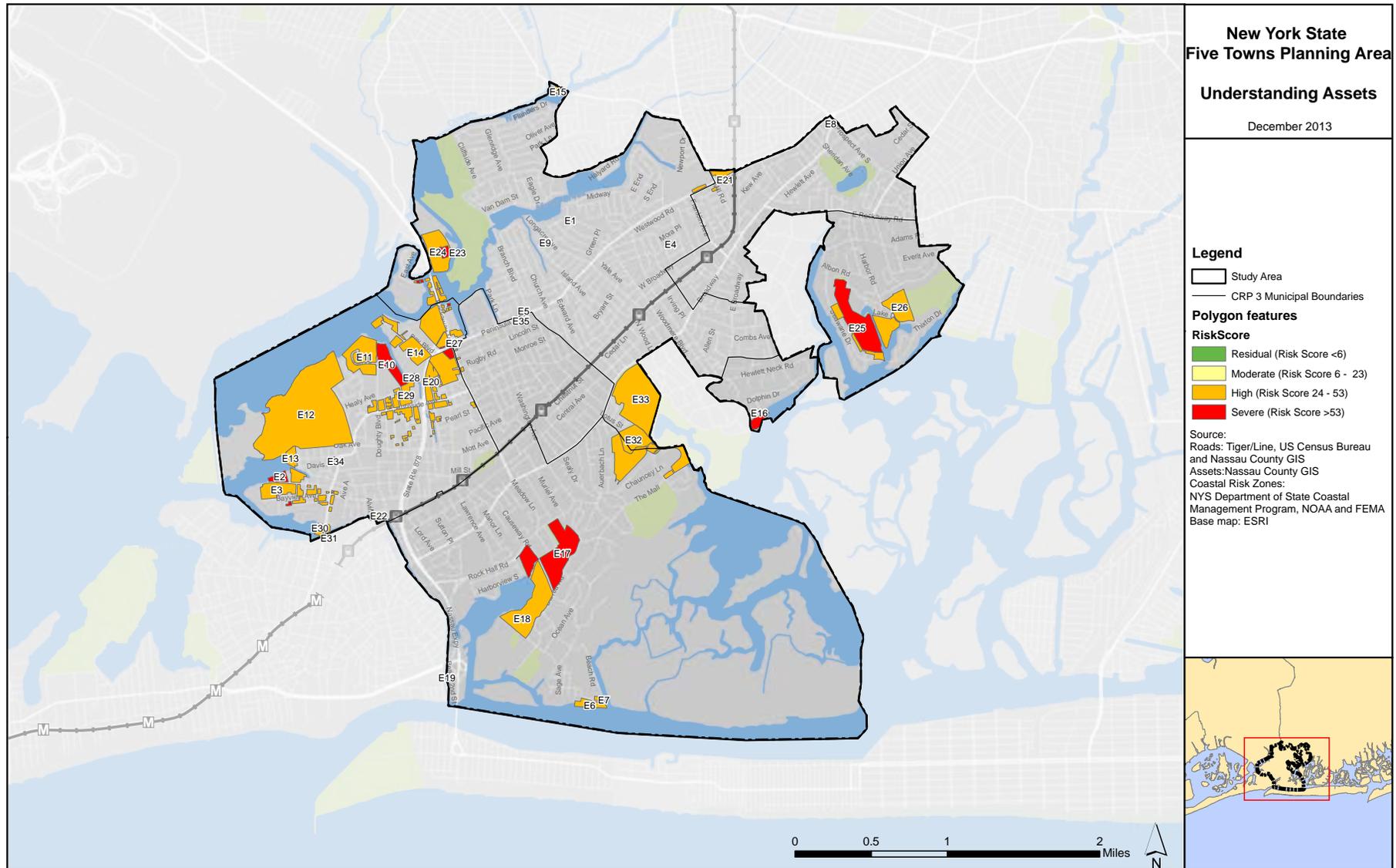


Figure 14: Risk Assessment of Economic Assets

Health and Social Services

Most health and social services assets inventoried are at high risk for impacts from future storm events (71%) while only two groups of assets within this category are at severe risk and six face residual risk. Figure 15 and Table 4 illustrate the risk of Health and Social Services Assets included in the Asset Inventory and Risk Assessment.

The groups of Health and Social Services Assets that lie in extreme risk areas within Lawrence and Woodmere are most exposed to coastal hazards and are therefore are at severe risk for impacts from future storm events. The Health and Social Services Assets in Inwood, Lawrence, Meadowmere Park, and Woodmere are in the Extreme Risk Zone and receive high risk scores.

Several assets noted as locally significant with a high community value also have high risk scores, including the AHRC and Yeshiva of South Shore, as well as the following schools: Yeshiva High School, Lawrence High School, Lawrence School Number 6, the Franklin School, and the Woodmere Middle School. Childcare centers such as the Hollander Early Childhood center and Five Towns Childcare Center also receive high risk scores.

The Five Towns Medical Center and Hewlett Harbor Village Hall are both considered FEMA critical facilities which are in high risk areas. The Inwood Fire Department and Fourth Precinct of the Nassau County Police Department are both critical facilities that are vulnerable to storm events despite being located in moderate risk areas.

Health and Social Services Assets that are considered to be critical facilities by FEMA include the Cedarhurst Village Hall, Hewlett Fire Department, Hewlett Neck Village Hall, Lawrence Village Hall, Lawrence-Cedarhurst Fire Department, and Woodmere Fire Department. These facilities do not lie within NYS Risk Zones and have residual risk scores;

however they provide critical support functions to the Five Towns Community.

Table 4: Health and Social Services Assets: Risk Level

| Asset ID | Asset Name | Risk Level | Asset ID | Asset Name | Risk Level |
|----------|---|------------|----------|--|------------|
| S16 | Lawrence Health and Social Services Assets - Extreme | Severe | S9 | Hewlett Harbor Village Hall | High |
| S25 | Woodmere Health and Social Services Assets - Extreme | Severe | S11 | Hollander Early Childhood Center | High |
| S14 | Inwood Health and Social Services Assets_Extreme | High | S12 | Hunter Ambulance | High |
| S22 | Meadowmere Park Fire House | High | S27 | Woodmere Middle School | High |
| S26 | Woodmere Health and Social Services Assets_High | High | S28 | Yeshiva Of South Shore | High |
| S1 | A H R C | High | S13 | Inwood Fire Department | Moderate |
| S3 | DRS Yeshiva High School | High | S23 | Nassau County Police Dept 4th Precinct | Moderate |
| S15 | Inwood Health and Social Services Assets_High | High | S2 | Cedarhurst Village Hall | Residual |
| S17 | Lawrence Health and Social Services Assets_High | High | S7 | Hewlett Fire Department | Residual |
| S18 | Lawrence High School | High | S10 | Hewlett Neck Village Hall | Residual |
| S19 | Lawrence Number 6 School | High | S20 | Lawrence Village Hall | Residual |
| S4 | Five Towns Child Care Center | High | S21 | Lawrence-Cedarhurst Fire Department | Residual |
| S5 | Five Towns Medical Center | High | S24 | Woodmere Fire Department | Residual |
| S6 | Franklin School and Athletic Field | High | | | |
| S8 | Hewlett Harbor Health and Social Services Assets_High | High | | | |

Legend: Risk Levels

- Residual
- Moderate
- High
- Severe

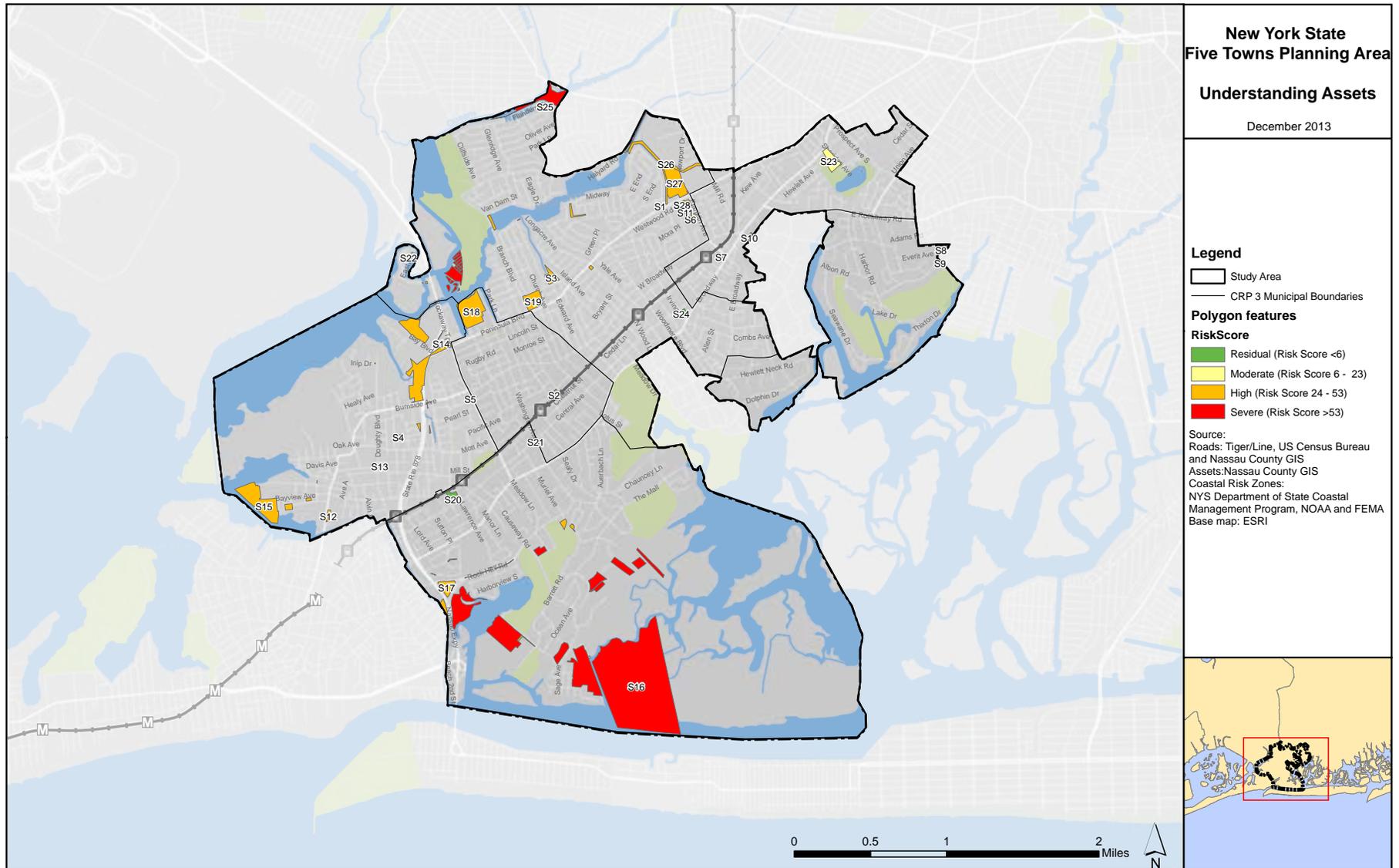


Figure 15: Risk Assessment of Health and Social Services Assets

Housing

The Five Towns Community is largely characterized by single-family residential neighborhoods, including many areas that are in extreme and high risk zones.⁴⁷ These neighborhoods that are at risk of experiencing future flooding from extreme weather include Meadowmere Park, large sections of Woodmere, Cedarhurst, and Inwood, and sections of Lawrence, Hewlett, Hewlett Neck, and Hewlett Harbor. Figure 16 and Table 5 illustrate the risk of Housing Assets included in the Asset Inventory and Risk Assessment, grouped by location, NYS Risk Zone and similar exposure characteristics.

Groups of housing assets within Cedarhurst, Hewlett Harbor, Hewlett Neck, Inwood, Lawrence, Meadowmere Park, and Woodmere all lie within Extreme Risk Zone, however only those within Hewlett Neck receive a severe risk score. The remaining housing groups receive high risk scores. Groups of housing assets lie in high risk areas within Cedarhurst, Hewlett, Hewlett Harbor, Hewlett Neck, Inwood, Lawrence, and Woodmere.

Individual housing assets include senior and affordable housing facilities in Inwood and Woodmere. The the Bristol Assisted Living and affordable housing units along Merlis Street, Randall Avenue, and Bayview Avenue each received high risk scores.

Table 5: Housing Assets: Risk Level

| Asset ID | Asset Name | Risk Level |
|----------|---|------------|
| H6 | Hewlett Harbor - Extreme | Severe |
| H9 | Hewlett Neck - Extreme | Severe |
| H4 | Cedarhurst - Extreme | High |
| H14 | Lawrence - Extreme | High |
| H17 | Meadowmere Park - Extreme | High |
| H12 | Inwood - Extreme | High |
| H18 | The Bristol Assisted Living | High |
| H10 | Hewlett Neck - High | High |
| H15 | Lawrence - High | High |
| H19 | Woodmere - High | High |
| H1 | Affordable Housing - Merlis St | High |
| H2 | Affordable Housing - Randall Ave | High |
| H3 | Afordable Housing - Bayview Ave | High |
| H5 | Cedarhurst - High | High |
| H7 | Hewlett Harbor - High | High |
| H8 | Hewlett - High | High |
| H11 | Inwood Gardens Apartments Senior Housing | High |
| H13 | Inwood - High | High |
| H16 | Mary's Manor | Moderate |

Legend: Risk Levels

- Residual
- Moderate
- High
- Severe

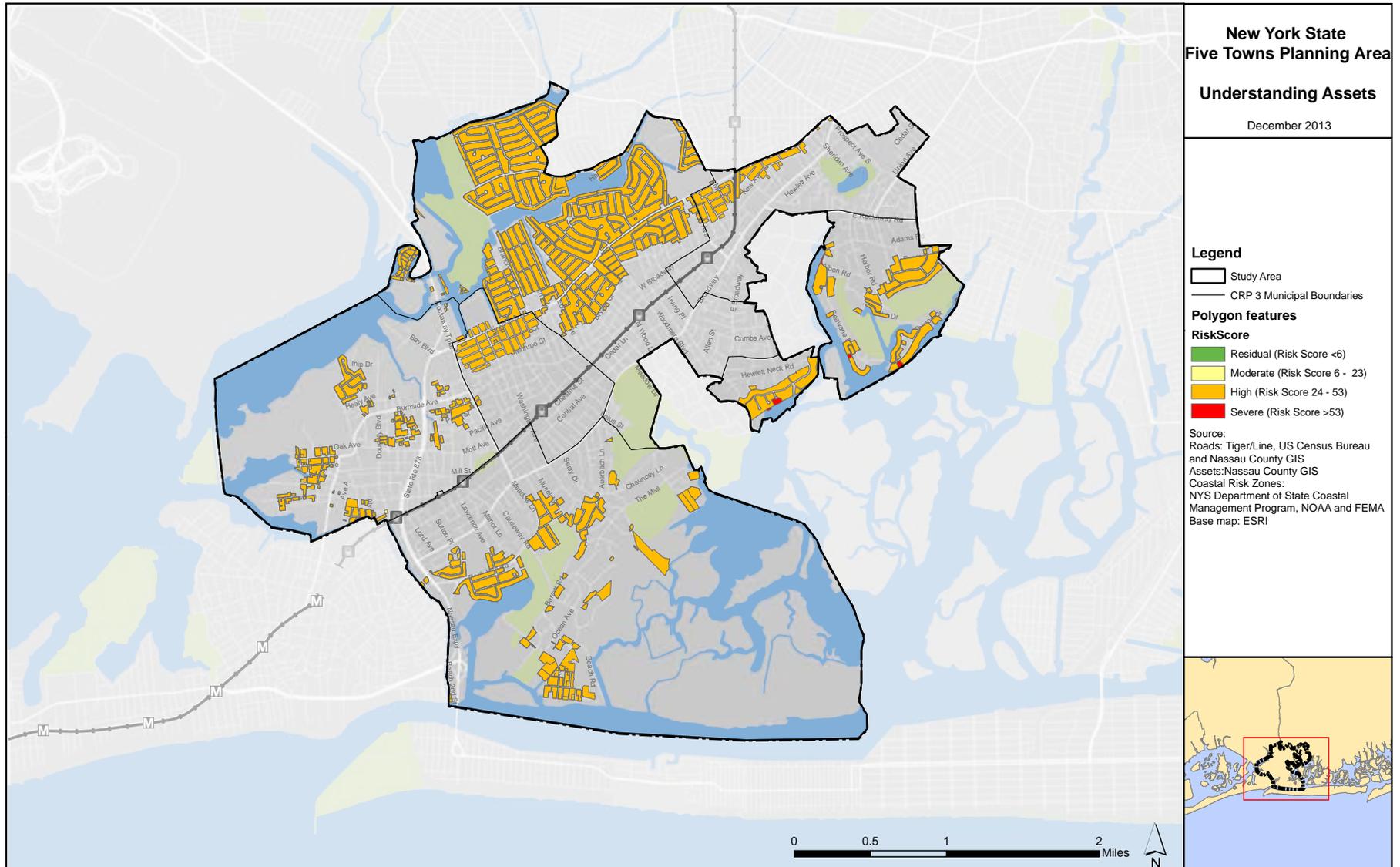


Figure 16: Risk Assessment of Housing Assets

Infrastructure Systems

As noted above, each Infrastructure System Asset was analyzed as a group within the Asset Inventory and Risk Assessment Tool, and key segments of these infrastructure systems that were noted as locally significant by the Committee (e.g., Peninsula Boulevard and Rockaway Turnpike) were analyzed separately. Figure 17 and Table 6 illustrate the risk scores of Infrastructure Systems Assets included in the Asset Inventory and Risk Assessment.

Fuel shortages were highly detrimental to the Five Towns Community after Superstorm Sandy, with major disruptions in the upstream supply chain and local impacts on fuel distribution centers and individual gas stations. The fuel distribution facilities in Inwood are a critical component of the area's economy, providing jobs to local residents and contributing to the tax base. These facilities also create an environmental risk evident during Superstorm Sandy when storm surge inundated the facilities and contaminated local neighborhoods with fuel. Despite existing levees, these assets are collectively at severe risk for impact from future storm events.

Several components of the Long Island Power Authority (LIPA) power supply network are at severe risk for future inundation. Six LIPA power stations are located in the extreme risk area and receive severe risk scores. Nearly thirty LIPA power stations exist in the Five Towns Area with high risk scores as well as a LIPA facility at Peninsula Boulevard.

The stormwater infrastructure system is considered a locally significant asset and stormwater outfalls in the Extreme Risk Zone received extreme risk scores. Two drinking water supply pump stations are at high risk. Additional components of the stormwater system in high risk areas receive high risk scores including stormwater outfalls, pipes and pump stations such as the Doxey Brook Stormwater Pump station.

Risk levels in the Five Towns are compounded by impeded emergency access and evacuation routes along key corridors caused by flooded roadways. Segments of Nassau Expressway and Rockaway Turnpike that lie in the Extreme Risk Zone are at high risk for future inundation. Several bridges and segments of roadways within the Extreme and High Risk Zones receive high risk scores, such as the Meadowmere Park Footbridge, Dock Street Pedestrian Bridge, Branch Boulevard Bridge, and the LIRR Peninsula Boulevard Bridge. Other LIRR assets are at high risk in the Five Towns, including the Far Rockaway LIRR line and the Inwood LIRR Station, which received a high risk score despite being located in a Moderate Risk Zone.

Brownfield/remediation sites in the Five Towns area present a risk to human health in the case of a disaster, as did residential heating oil tanks during Superstorm Sandy. Eight remediation sites with high risk scores were identified in the Five Towns, many of which are located along Peninsula Boulevard.

The Cedarhurst Sewage and Water Pollution Control Plant, the Inwood Sewage Treatment Plant and the Village of Lawrence Wastewater Treatment Plant are critical infrastructure

assets which lie in High Risk Zones yet receive moderate risk scores. The Town of Hempstead Sanitation Facility also received a moderate risk score. Other infrastructure systems assets with moderate risk scores include underground pipes as segments of the sanitary sewer system and select bridges on Peninsula Boulevard.

Natural and Cultural Resources

Natural and Cultural Resources are divided nearly in half among extreme and high risk areas, as well as among severe and high risk scores. Figure 18 and Table 7 illustrate the risk scores of Natural and Cultural Resources Assets included in the Asset Inventory and Risk Assessment.

Assets at severe risk include those groups of Natural and Cultural Resource Assets within Hewlett Neck and Lawrence that lie within Extreme Risk Zones. Coastal water bodies are also at severe risk, including Hewlett Bay, Hook Creek, Lagoon Bay, and Brosewre Bay. Parks that received severe risk scores include Johnny Jack Park and the Town of Hempstead-owned parkland in Meadowmere Park

Groups of Natural and Cultural Resource Assets within Woodmere that are located in an extreme risk area received a high risk score. Groups of Natural and Cultural Resource Assets within Inwood and Lawrence are at high risk, as are Cedar Point Lake, Doxey Brook, and Fosters Brook Lower.

Socially Vulnerable Populations

No assets that serve socially vulnerable populations received a severe risk score; however, several Assets that Serve Socially Vulnerable Populations are at high risk for future storm impacts. These include facilities that serve the elderly such as the Bristol Assisted Living, Inwood Gardens, and Mary's Manor. Among schools, childcare centers, and other assets that serve children, Yeshiva High School, Lawrence School Number 6, and Lawrence High School are all at high risk. Affordable housing properties located in the high risk zone in Inwood, including those at Randall Avenue, Bayview Avenue and Merlis Street are also at high risk.

Table 6: Infrastructure Assets: Risk Level

| Asset ID | Asset Name | Risk Level | Asset ID | Asset Name | Risk Level | Asset ID | Asset Name | Risk Level |
|----------|------------------------------------|------------|----------|--------------------------------------|------------|----------|------------------------------------|------------|
| 121 | Fuel Storage & Distribution | Severe | 117 | Doxey Brook Stormwater Pump St. | High | 172 | Stormwater Outfall_High | High |
| 133 | LIPA Power Stations_Extreme | Severe | 123 | Grove Cleaners Remediation Site | High | 173 | Sunoco Gas Station, Peninsula Blvd | High |
| 144 | Motiva Enterprise | Severe | 137 | LIRR Peninsula Boulevard Bridge | High | 174 | Sunoco Gas Station, Sheridan Blvd | High |
| 148 | Nassau Expy_Extreme | Severe | 141 | Mobil Gas Station at Burnside Ave | High | 176 | U-Haul | High |
| 150 | Peninsula Blvd_Extreme | Severe | 145 | Motts Creek Footbridge | High | 138 | McNeil Ave Fuel Storage | High |
| 159 | Rockaway Tpke_Extreme | Severe | 146 | Nassau County Inwood STP | High | 120 | Far Rockaway LIRR Line | High |
| 169 | Stormwater Drainage System | Severe | 152 | Peninsula Boulevard Bridge | High | 178 | Water Supply Infrastructure 1 | High |
| 116 | Dock Street Pedestrian Bridge | High | 153 | Peninsula Boulevard, Remediation | High | 16 | Atlantic Beach Toll Plaza Bridge | High |
| 119 | East Avenue Bridge | High | 154 | Pep Boys Supercenter #349 | High | 122 | Global Companies-Inwood Term. | High |
| 139 | Meadowmere Footbridge | High | 170 | Stormwater Drainage System_High | High | 128 | Inwood LIRR Station | High |
| 143 | Mobil Gas Station at Rockaway Tpke | High | 175 | TOH (Inwood) Sanitation District 1 | High | 135 | LIPA Power Stations_Moderate | High |
| 156 | Roadway Assets_Extreme | High | 181 | Woodbine Ditch | High | 162 | Seagirt Boulevard Bridge | High |
| 158 | Rockaway Blvd Bridge, Hook Creek | High | 183 | Woomere Middle School Footbridge | High | 126 | Hewlett LIRR Station | Moderate |
| 164 | Sewer System_Extreme | High | 149 | Nassau Expy_High | High | 129 | Lawrence LIRR Station | Moderate |
| 168 | Shell Gas Station at Rosedale Rd | High | 160 | Rockaway Tpke_High | High | 131 | LIPA Power Lines | Moderate |
| 171 | Stormwater Outfall_Extreme | High | 11 | 175 Roger Avenue LLC Remediation | High | 132 | LIPA Power Stations | Moderate |
| 180 | Water Supply Infrastructure 3 | High | 17 | Bel-Mar Oil Company Incorporated | High | 136 | LIPA Transformer at Fulton Street | Moderate |
| 15 | Amoco Oil | High | 112 | City Gas Station at Sheridan Blvd | High | 147 | Nassau Expressway Bridge | Moderate |
| 110 | Carbo Industries | High | 118 | Eagle Oil | High | 161 | Rockaway Turnpike Bridge | Moderate |
| 111 | Cedarhurst Sewage Treatment Plant | High | 124 | Gulf Gas Station at Mill Road | High | 163 | Seawane Drive Bridge | Moderate |
| 127 | Inwood Gas Holder | High | 125 | Hess Gas Station at Burnside Ave, | High | 182 | Woodmere LIRR Station | Moderate |
| 177 | Vill. of Lawrence STP | High | | Inwood | High | | | |
| 179 | Water Supply Infrastructure 2 | High | 130 | LIPA Facility at Peninsula Boulevard | High | | | |
| 12 | 2nd Street Beach Bridge | High | 134 | LIPA Power Stations_High | High | | | |
| 13 | 525 - 535 Burnside Av, Remediation | High | 140 | Middle School Footbridge | High | | | |
| 14 | American Drive In Cleaners | High | 142 | Mobil Gas Station at Peninsula Blvd | High | | | |
| 18 | BP Gas Station at Plaza Road | High | 151 | Peninsula Blvd_High | High | | | |
| 19 | Branch Boulevard Bridge | High | 155 | Plant 5, Long Island American Water | High | | | |
| 113 | Clearwire Spectrum Holdings III | High | 157 | Roadway Assets_High | High | | | |
| 114 | Clearwire Spectrum Holdings III | High | 165 | Sewer System_High | High | | | |
| 115 | Concord Oil Co | High | 166 | Shell Gas Station at Mill Rd | High | | | |
| | | | 167 | Shell Gas Station at Rockaway Tpke | High | | | |

Legend: Risk Levels

- Residual
- Moderate
- High
- Severe

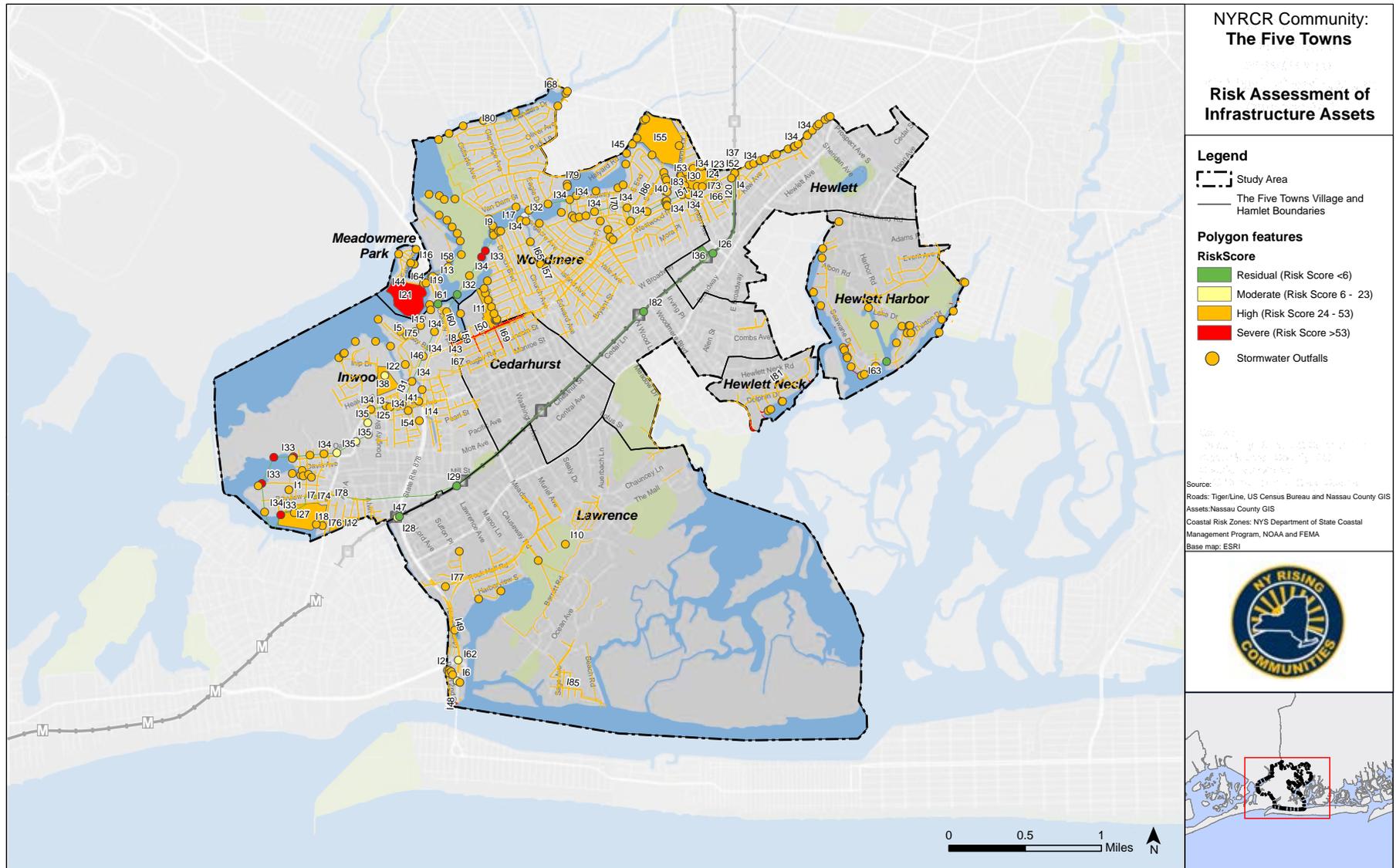


Figure 17: Risk Assessment of Infrastructure Assets



Doxey Brook Park



Grass Hassock Marsh

Table 7: Natural and Cultural Resource Assets: Risk Level

| Asset ID | Asset Name | Risk Level |
|----------|--|------------|
| N1 | Browsewre Bay | Severe |
| N5 | Hewlett Bay | Severe |
| N6 | Hewlett Neck Natural and Cultural Resources Assets_Extreme | Severe |
| N7 | Hook Creek & Lagoon | Severe |
| N9 | Johnny Jack Park | Severe |
| N10 | Lawrence Natural and Cultural Resources Assets_Extreme | Severe |
| N12 | Town of Hempstead Owned Park | Severe |
| N13 | Woodmere Natural and Cultural Resources Assets_Extreme | High |
| N3 | Doxey Brook | High |
| N4 | Fosters Brook Lower | High |
| N11 | Lawrence Natural and Cultural Resources Assets_High | High |
| N8 | Inwood Natural and Cultural Resources Assets_High | High |
| N14 | Woodmere Natural and Cultural Resources Assets_High | High |
| N2 | Cedar Point Lake | Residual |

Legend: Risk Levels

- Residual
- Moderate
- High
- Severe

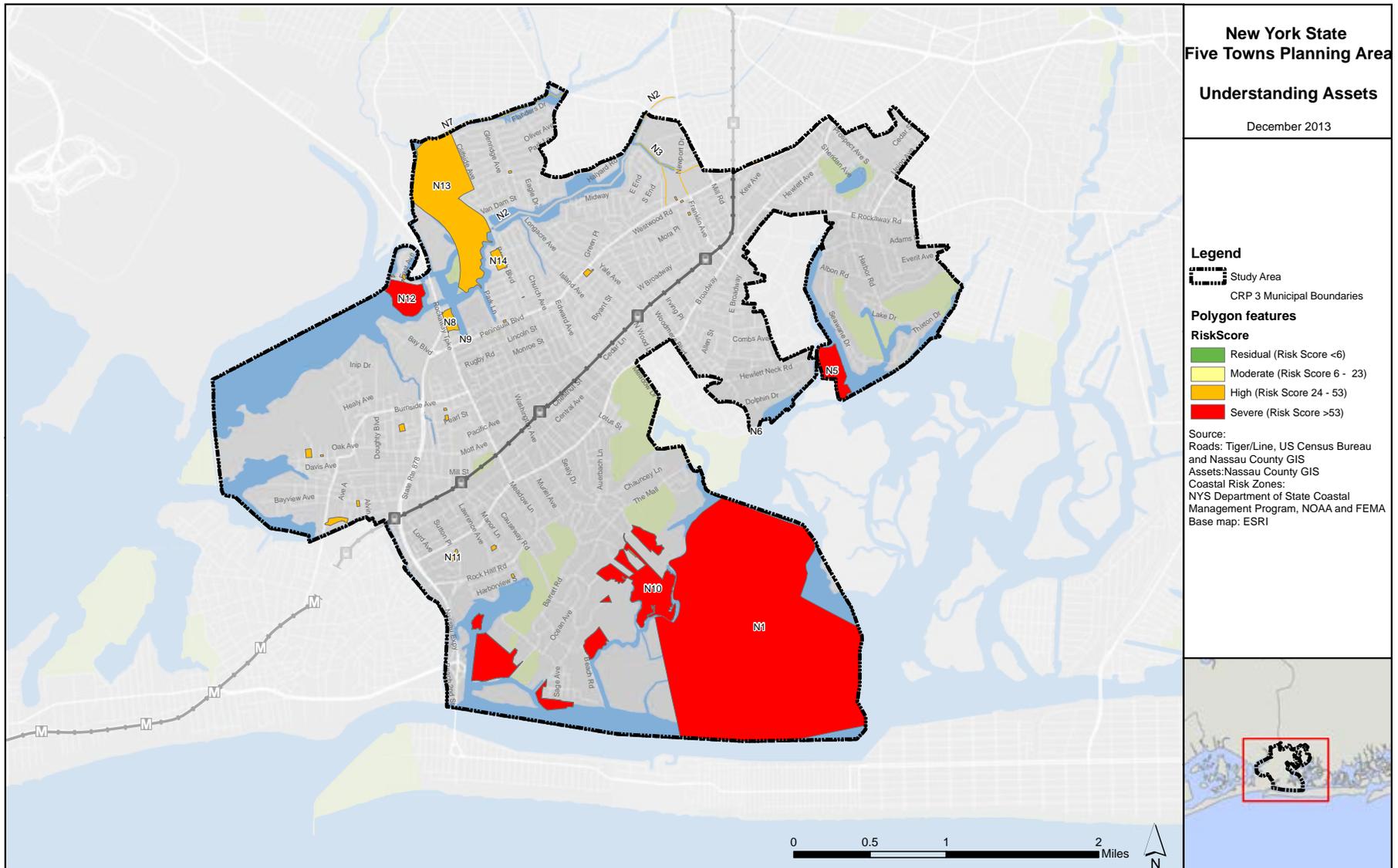


Figure 18: Risk Assessment of Natural & Cultural Resource Assets

B. ASSESSMENT OF NEEDS AND OPPORTUNITIES

The objective of the Assessment of Needs and Opportunities is to evaluate potential for increased resilience in the short-, medium-, and long-term in the Five Towns. This Assessment of Needs and Opportunities has been refined through analysis of the assets and risks within the Community, analysis of demographic and economic data, and through input from the NYRCR Committee and the public.

For each of the six Recovery Support Functions, the following Assessment of Needs and Opportunities has identified areas in which the Five Towns could improve its resilience to major storms and other disasters. This analysis supplements input that the NYRCR Committee has received at Committee Meetings and Public Engagement Events and has helped to guide the NYRCR Committee in identifying Proposed and Featured Projects that will contribute to resilience in the Five Towns.

I. COMMUNITY PLANNING AND CAPACITY BUILDING

The Assessment of Needs and Opportunities for Community Planning and Capacity Building examines existing public education initiatives, recommendations from previous plans created for the Five Towns Community, and policies and programs related to resilience and emergency preparedness at the Village, Town of Hempstead, and Nassau County levels. In order to assess needs for Community Planning and Capacity Building, the Community was studied for its ability to:

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

Public education and awareness as it relates to emergency preparedness emerged as a critical need due to the presence of disbursed vulnerable populations and by the fact that so many residents did not evacuate prior to Superstorm Sandy making landfall. Existing regional plans that include Villages and Hamlets in the Five Towns were studied for their specific focus on resilience to major storms. Finally, this Needs Assessment reviews Nassau County and Town of Hempstead programs and land use policy that impact resilience on the Community.

Community Planning and Capacity Building Needs

Guidelines outlined in existing plans

As described in the Relationship to Regional Plans, several previous planning documents call attention to Critical Issues that needs to be addressed in order to make the Five Towns more resilient to climate related events. Regional plans at the County level and that include all of Long Island focus on stormwater management, hazard mitigation, economic development, sustainability, and housing affordability. All of these issues impact resilience in the Five Towns Community and were considered by the NYRCR Committee. In particular, Nassau County and regional plans that could impact the Five Towns Community include:

- Nassau County Stormwater Management Program Plan (2009);
- Nassau County Hazard Mitigation Plan (2007, current update in progress);
- Long Island Regional Economic Development (LIREDC) Council Strategic Plan (2011, update in 2012, 2013);
- Cleaner Greener Long Island Regional Sustainability Plan (2013); and
- Nassau Urban County Consortium 5 Year Consolidated Plan (Nassau County, 2010).

In order to assure that these regional plans provide sufficient benefit to residents and businesses in the Five Towns, there is a need within the Community for Villages and the

Town of Hempstead to advocate for the implementation of regional best practices at the local level. In some cases, these regional plans identify strategies that could apply within the Five Towns, such as the Nassau County Stormwater Management Program Plan. In other cases, Villages or Hamlets within the Five Towns are specifically referenced for improvements, such as inclusion of Inwood in the Nassau Urban County Consortium 5 Year Consolidated Plan.

Village, Nassau County and Town of Hempstead Policy/Programs

Nassau County Office of Emergency Management

Nassau County provides multilingual hurricane readiness materials to help educate residents on how to prepare for major storms and operates an automated notification service to alert residents who have registered of emergency situations. The County also coordinates Community Emergency Response (CERT) Teams and works with the Nassau County American Red Cross to operate hurricane shelters and warming and cooling centers. The County also assists Villages in the creation of official disaster recovery plans.

Town of Hempstead Office of Emergency Management

The Town of Hempstead provides printed materials and an online guide for major storm preparation through the Town’s Public Safety Department. The Town also operates a reverse 911 line, called Swift911, which uses phone directories and contact information provided through the Town’s website to notify residents of emergency situations.

In addition to these programs operated by Nassau County and the Town of Hempstead, additional programs are needed to target vulnerable populations, especially independent living elderly residents.

Community Planning and Capacity Building Opportunities

Public education and preparedness

The Five Towns Community includes a diverse range of vulnerable populations, indicating a need for far-reaching public education plans to prepare residents and businesses for severe storms.

- In Inwood, nearly half of households earn less than 50% of the median income.⁴⁸ There are also low-income populations in Cedarhurst and Hewlett, although at far lower concentrations (37% below 50% of median income in Cedarhurst, and 26% below 50% of median income in Hewlett).
- Elderly residents are largely dispersed throughout the Community; however, there are some concentrations in multi-family residential buildings clustered along the LIRR line. Communities with high numbers of elderly residents include the Garden Town Apartments and Fairfield Courtyard in Hewlett, Mary’s Manor in Inwood, and the Carlyle Apartments in Cedarhurst. While these multi-family facilities were not impacted by Superstorm Sandy’s surge, the Bristol, an assisted living facility in Woodmere, was flooded during Superstorm Sandy and is located in the High Risk zone.
- The Hebrew Academy for Special Children in Woodmere provides supportive services to special needs children throughout Nassau County. This facility did not flood during Superstorm Sandy, but is located on the cusp of the Moderate and High Risk Zones.

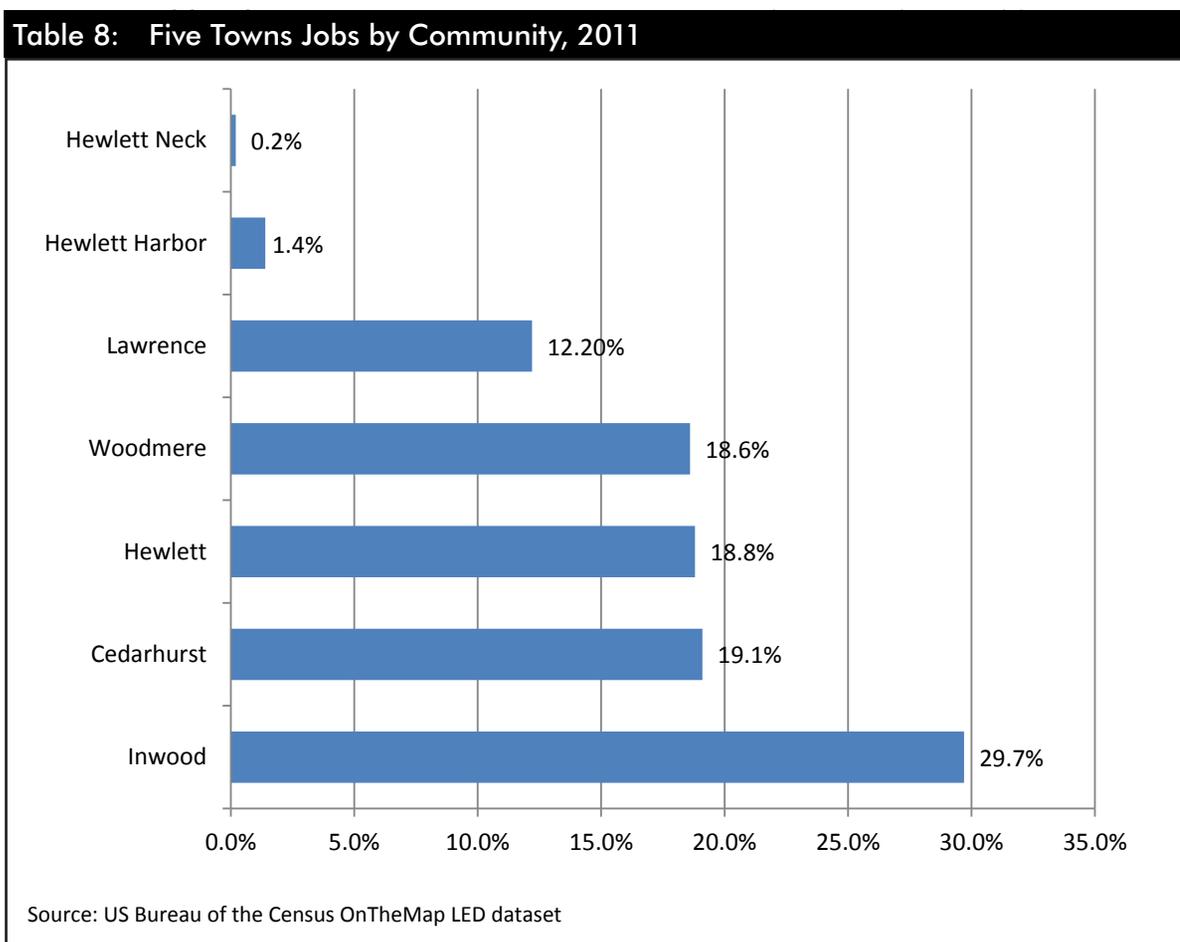
II. ECONOMIC DEVELOPMENT

The Economic Development assessment provides an overview of the ability of the Five Towns economy to bounce back from extreme weather events and other disasters. Economic resilience is important because the ability of residents to acquire goods and services and return to work are all critical to storm recovery.

Note: Much of the following data was compiled using the US Census Longitudinal Employer Household Dataset (LEHD). This data source, while aggregated from Census Block level data, has a high margin of error for individual Census Tracts. Data for the Five Towns as a whole is coterminous with the Five Towns Community; however, in order to maintain the integrity of the data, the Census Bureau generally includes Meadowmere Park with Woodmere in their analyses. The same has been done in the NYRCR Plan.

Economic Development Needs

As shown in Table 8, the largest share of jobs in the Five Towns is located in Inwood (29.7%). This is followed by Cedarhurst, Hewlett, and Woodmere at 19.1%, 18.8% and 18.6%, respectively. Lawrence is home to 12.2% of Five Towns jobs while Hewlett Harbor and Hewlett Neck employ only 1.4% and 0.2% respectively. Employment centers in Inwood are a critical resource that provides jobs for local residents who may otherwise be forced into low-wage employment. These centers experienced severe flooding during Superstorm Sandy. This risk could lead to future interruptions in employment for many local residents.



The majority of commercial parcels (66.2%) and value (72.9%) are in areas at risk of flooding (Figure 19). Four percent of all commercial parcels and 9.1% of total commercial assessed value are located in Extreme risk areas. 29.7% of parcels and 42.6% of total assessed value are in High risk areas; while 32.5% of parcels and 21.2% of all value are in Moderate risk areas. Flood protections are required for commercial districts that are located within Risk Zones.

Sandy also require assistance both for recovery and to increase resilience to future climate related events.

The commercial properties in the Extreme risk area include 8% of all industrial properties and 12.2% of the Community's industrial property value. The Extreme risk area also contains 4.7% of all retail parcels (10.4% of assessed value) as well as 0.4% of all mixed use parcels (0.4

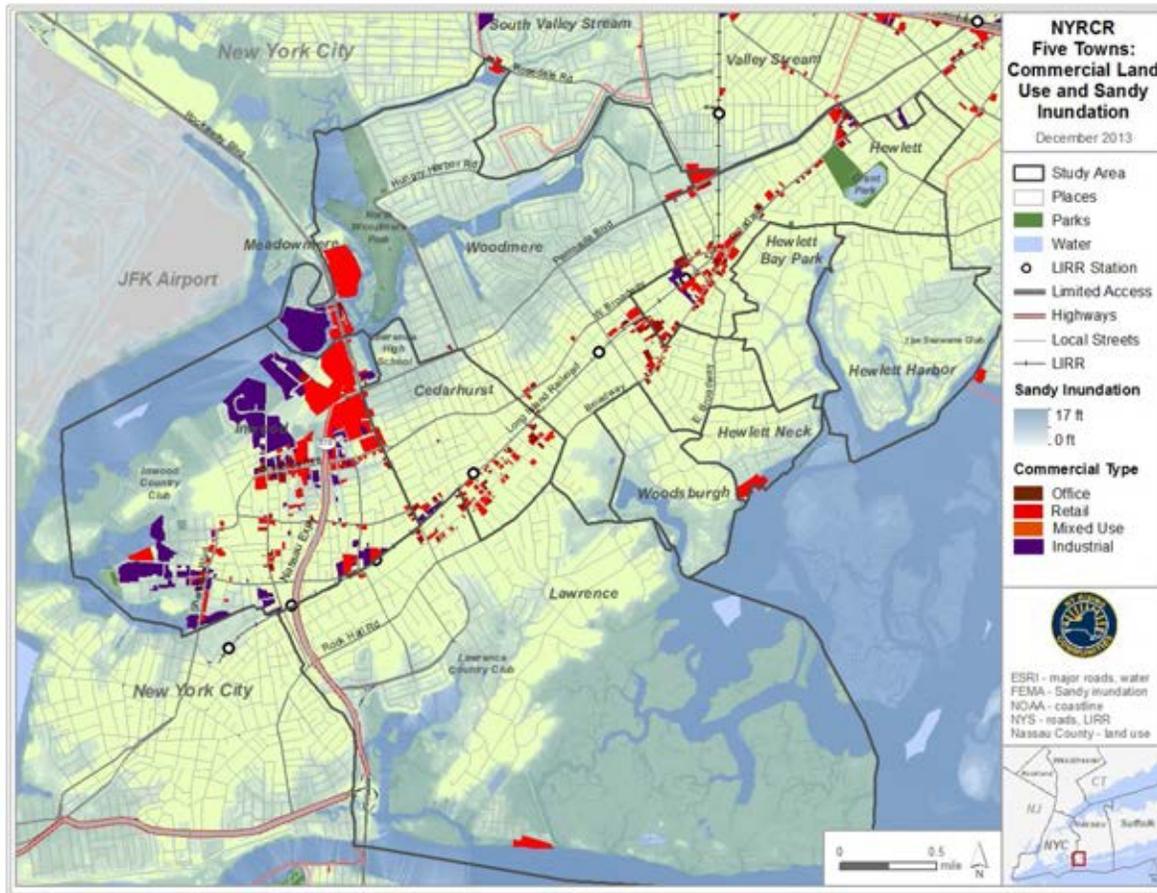


Figure 19: Commercial Land Use

% of assessed value). One tenth of vacant commercial parcels are found in the extreme risk area as well however these parcels have 47.9% of assessed value for that property type in the Five Towns.

The greatest share of industrial properties, 58.0% of all parcels and 65.4% of value, is located in the High Risk area (primarily of

Inwood). The high risk area is also home to 41.8% of vacant properties, 27.3% of Retail properties, 20.1% of mixed use properties and 9.3% of office properties.

The moderate risk area has the largest share of the mixed use and office properties of any of the Risk Zones, however, even this does not include a majority. In both of these uses, the majority of

properties and assessed value is found in areas not classified as being at risk for flooding.

Major Employers

Most of the businesses in the Community are small businesses. The Long Island Business News index was searched for Nassau County employers with more than 100 employees. Of the 251 companies retrieved by the search, only three were located in Five Towns: The Lawrence Union Free School District in Lawrence, The Hewlett-Woodmere Union Free School District in Woodmere, and the Woodmere Rehabilitation and Health Care Center in Woodmere. While the prevalence of small businesses contributes to the vibrancy and diversity of the local economy, this may also represent an additional economic challenge in recovering from Superstorm Sandy and future weather events since small businesses often have limited resources for recovery.

Retail

The major retail corridors in the Five Towns include Downtown Hewlett, the Central Avenue corridor in Lawrence and Cedarhurst, and the regional shopping center in Inwood. Of these, the Inwood area was the only one of the three that had significant damage from flood waters during Superstorm Sandy. However, most of the businesses in the Five Towns suffered from extended loss of power. Retail is a draw to the Five Towns area—while the retail expenditures of local households totals \$844.6 million, local retail sales total \$1.1 billion. The overall surplus is \$244.0 million, all of which stems from the retail trade because there is a deficit in the food and drink sectors with local potential exceeding sales by \$13.8 million. See Section V for more information on retail leakage or surplus by

major sales category for the Community. Risk to retail services that are located within the high and extreme flood risk zones increases the importance of providing flood protections to retail districts at risk and additional support to retail services on high ground.

Economic Development Opportunities

- Mitigation measures for large employers: Flood protections for the regional shopping center in Inwood could protect businesses that are currently located in the Extreme Risk Zone.
- Fulfill unmet demand on infill sites: Five Towns is already a shopping attraction, the retail gaps analysis shows unmet commercial demand for restaurants, food and beverage stores, as well as motor vehicle and parts, building materials and garden equipment supplies and sporting goods, hobby, book and music stores.
- Make existing corridors more attractive to shoppers: Design improvements to retail corridors would make traditional spines more attractive to new stores.



Lawrence High School, Cedarhurst

III. HEALTH AND SOCIAL SERVICES

For this Assessment of Needs and Opportunities, Health and Social Services assets and assets that support socially vulnerable populations were reviewed for the extent that their services were impacted by Superstorm Sandy and what these assets need to provide improved services in the event of future storms.

Health and Social Services needs

Lawrence High School

Lawrence High School was closed for approximately six months due to damage caused by Superstorm Sandy. The storm resulted in significant water damage, including corroded electrical wiring and mold. The school's 975 students were temporarily relocated to the middle school, which forced 400 middle school

students to be transferred to local elementary schools.

Lawrence High School requires flood protections that reduce the risk for additional significant flooding in the future. Depending on specific site conditions, these protections could include a levee to protect the building from flooding or drainage to prevent sinkholes from developing in the grounds surrounding the school building.

Inwood Buccaneers Youth Athletic Facility

The Inwood Buccaneers facility was flooded with approximately three feet of water during Superstorm Sandy, causing extensive damage. Although some repairs have begun, the facility has additional needs, including ongoing mold remediation and replacement mechanical equipment.



Lawrence Cedarhurst Fire Department

Municipal Facilities

Hewlett Harbor village hall experienced extensive flooding due to Superstorm Sandy's surge, however it also frequently floods due to poor drainage on Pepperidge Road. Improved drainage and additional flood protections for the building structure are both important for the Village.

Lawrence Cedarhurst Fire Department

The Lawrence Cedarhurst Fire Department (LCFD) is a volunteer department with 75 members. The department serves the Villages of Lawrence and Cedarhurst, as well as two unincorporated areas known as North Lawrence and East Lawrence. The department is a not-for-profit corporation that is contracted by the Town of Hempstead and the Villages of

Lawrence and Cedarhurst. The organization has been member-operated since its founding in the 1880s. The department averages approximately 1,000 calls per year, including fires and water rescues.

LCFD's funding comes from contracts with the Town of Hempstead and Villages of Lawrence and Cedarhurst, as well as grants and additional fundraising, although the department has found it difficult to secure funding from grant programs. LCFD has a relatively flat budget, meaning that when they need capital improvements to their facility or large purchases such as new trucks, they need to save funds and fundraise over many years. LCFD has mutual aid agreements with other volunteer and municipal fire departments within the Five Towns fire battalion and with the City of Long Beach. Typically, LCFD is

dispatched by the City of Long Beach, however they were forced to self-dispatch for 28 days after Superstorm Sandy due to a lapse in power and communication networks.

LCFD is currently undergoing a capital improvement to their building which is expected to cost approximately \$2 million. These improvements are focused on a central command station which will be used by the department to coordinate with other rescue agencies in the Five Towns area.

In the aftermath of Superstorm Sandy, LCFD performed water rescues throughout the night due to extensive flooding. In the 11 days after the storm, the department received 400 calls for both fire and water rescue (an average of nearly 40 per day, versus their typical average of three per day). During many water rescues, equipment was contaminated by raw sewage and fuel oil. Most of the department's radios are water resistant, but were not designed for extensive submersion and were therefore damaged or destroyed. One fire truck was destroyed during a water rescue when flood waters rapidly rose around the truck.

LCFD's most pressing need is a mobile command post which would include signal repeaters, extra radios, and a live video feed. While LCFD hopes to add this resource to their department, the unit would be dispatched on a mutual aid basis to other fire districts within the Five Towns battalion.

In addition to the mobile command post, LCFD also needs backup equipment, especially suits and waterproof radios, to prepare for water

rescues that contaminated suits and damaged radios during Superstorm Sandy.

Medical Facilities

The Five Towns area has limited facilities providing medical services for residents in the area. The nearest hospital is St. John's Episcopal in Far Rockaway. In the past, an outpatient medical facility operated at the Five Towns Community Center, but it has since closed. Residents in the Five Towns need additional medical facilities that are not in the flood zone and are accessible via transportation networks that are protected from flood risks. The opportunity to reestablish this outpatient medical facility in the Five Towns Community Center would provide greater access to medical care within the area.

Health and Social Services Opportunities

Despite the challenges that the Five Towns face in making health and social services assets more resilient, there are also many opportunities to build upon. There are several active networks of community based organizations that could support a greater degree of coordination in order to provide improved services during extreme weather events. The model for this type of initiative is the coordinated response that health and social services organizations facilitated in the immediate aftermath of Superstorm Sandy. With little planning or advance coordination, organizations within the Orthodox community, local fire departments, Village administrations, and the Five Towns Community Chest and Five Towns Community Center all expanded their services to provide critical recovery services.

These existing networks of social services organizations have paved the way for greater coordination in advance of future disasters. Residents and businesses in the Five Towns will be more resilient by creating emergency response plans for village halls and the Five Towns Community Center, enhancing the resources of mutual aid agreements by fire departments and ambulance services, and strengthening connections between neighborhood organizations, religious organizations and local government in the incorporated Villages.

IV. HOUSING

According to the 2010 U.S. Census and DOS Risk Maps (Figure 20), roughly 75% of housing units in the Five Towns Community are located in Extreme, High, or Moderate flood risk zones. Only 1.7% of housing units (285 units) are in the Extreme Risk zone, however more than one third (35.3%, or 5,891 units) is in the High Risk area. An additional 37.4% (6,237 units) is in the moderate risk area.

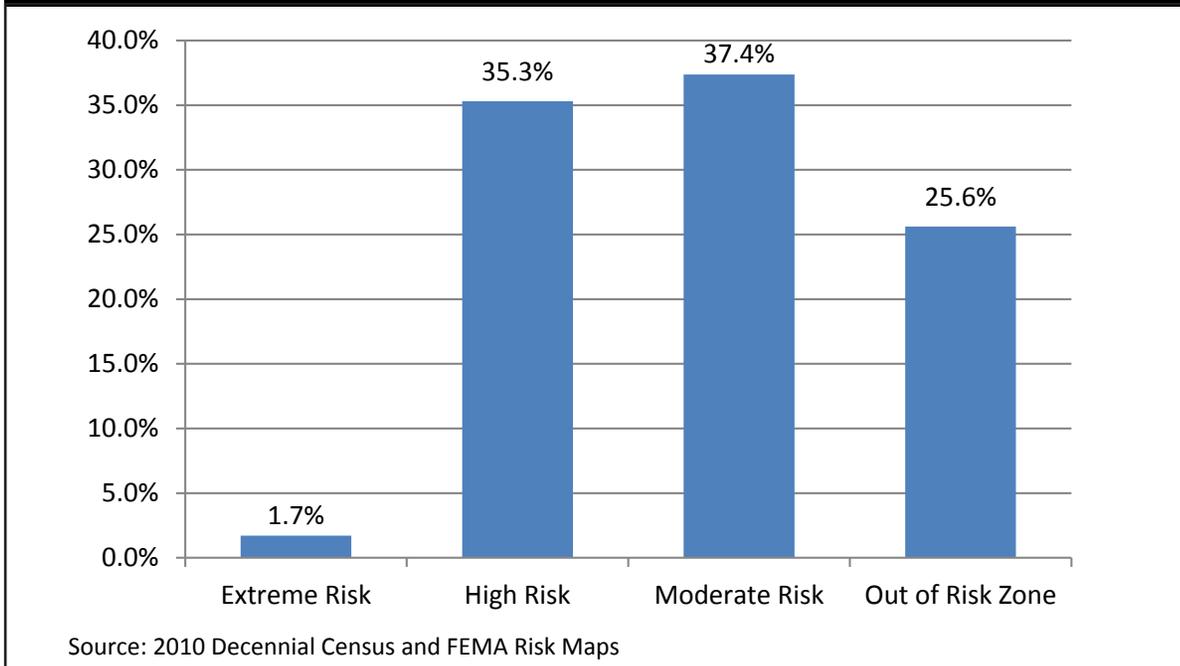
When risk areas are examined on a location by location basis, Woodmere and Meadowmere Park are the areas with the greatest share of housing at risk with a full 64.4% of housing units in Extreme or High risk areas compared to the Five Towns average of 36.5%, as shown in the chart below.

Hewlett Neck has the next greatest share of housing at extreme and high risk with 57.9%. Hewlett Harbor follows with 39.4%. Inwood also has more than one third (34.2%) of its housing stock at extreme or high risk, followed by Lawrence at 23.3%, and finally Hewlett at 11.2%.

Housing Needs

The concentrations of rental housing follow the multi-family structure areas along the LIRR spine. Only in Inwood were large shares of rental households in the inundation area after Superstorm Sandy. Renters are particularly vulnerable in the aftermath of severe storms such as Superstorm Sandy, especially in moderate-income communities like Inwood. Renters have less control over repairs and low-income households may lack the resources necessary

Figure 20: Distribution of Five Towns Housing Units by Flood Risk Zone



to relocate, either temporarily or permanently. In addition, some disaster recovery assistance programs for homeowners are not applicable to properties that generate rental income. These factors make recovery more difficult for low-income renters.

Housing value

The impacts of Superstorm Sandy are evidenced in the change in housing value in recent years. The average median housing value in the Five Towns was \$633,744 according to the 2011 Census American Community Survey as determined by an averaging of the constituent Census Tracts.

Hewlett Neck, Hewlett Harbor and Lawrence have the largest shares of housing with values greater than \$500,000. Woodmere and Lawrence are also in that range, however Lawrence high value housing is more likely to be valued at more than \$1 million, while Woodmere’s is more likely to be in the \$500,000 to \$999,999 range. Owners in these ranges are more likely to have had flood insurance and/or the means to effect repairs right away.

Of more concern to this project are the housing units on the other end of the spectrum. Inwood has the smallest share of high-value housing, with the majority of units valued between \$300,000 and \$499,000. Hewlett has the

greatest share of housing valued at less than \$300,000, followed by Cedarhurst and Inwood.

As described in Section I, housing values have declined in recent years in the Five Towns Community. While these data are not solely a reflection of the impacts of Superstorm Sandy, greater stability in the housing market is necessary in order to maintain stable neighborhoods and encourage homeowners to make their homes more resilient.

Sales price

Home sale prices in the past five years have been affected by economic fluctuations, the bursting of the housing bubble, as well as the impacts of Hurricane Irene and Superstorm Sandy. Based on this dataset, Woodmere and Cedarhurst are the more stable housing markets—showing fewer dramatic fluctuations.

The median sales price has decreased in the last five years in every one of the five listed communities. The change in sales price over the five years ranges from a decrease of 8.3% in Cedarhurst to a decrease of 36.1% in Lawrence. The percentage decline in median sales price from 2012 to 2013 provides an estimate of the impacts of Superstorm Sandy in median sales price. The areas showing the greatest declines in sales price were the hardest hit areas of Inwood (-30.7%) and Lawrence (-30.1%). Woodmere also saw a decrease in median sales price at -7.4%. In contrast, the median sales price increased by 1.7% in Hewlett and 11.7% in Woodmere.

The Nassau County Consolidated Plan 2010-2014 identified shortages in housing availability for seniors and young families due to high housing costs, which include taxes and utilities.⁴⁹ Housing needs have been further exacerbated by the impacts of Superstorm Sandy.

- 29.2% of homeowners in the extreme risk and high risk areas (those that likely suffered the most damage from inundation) do not have mortgages and thus were not required to have flood insurance. This increases the risk of abandonment and potential impacts on home values of these 1,726 homes, especially if FEMA, SBA or NY Rising Housing Recovery assistance were not received.
- Before Superstorm Sandy, almost 7,000 or 45.3% of Five Towns households were spending more than they could afford on housing, which is especially true of elderly and young households.

Housing Opportunities

The Community is made up primarily of single family residential households, but there are also multi-family properties distributed in certain communities. Hewlett has the majority of multi-family properties, with 55.6% of the 359 properties. Lawrence has the next greatest share with 24.3%, followed by Cedarhurst with 12.3%. Inwood and Woodmere each have 3.6% of the multi-family properties, while Hewlett Harbor and Hewlett Neck have none. The majority of multi-family housing is located along the LIRR line, in high ground areas that were not inundated during Superstorm Sandy.



Lawrence Dike at the Isle of Wight

Although there are 656 vacant residential parcels in the Five Towns according to the Nassau County Assessment data, the most likely place for any future housing development would be in areas not considered to be at risk or only at moderate risk of flooding according to the FEMA Risk assessments. As is shown, only 89 vacant residential properties are located in areas that are “Not at Risk”, while an additional 231 parcels are located in areas of “Moderate” Risk.

Although Superstorm Sandy has brought issues of housing affordability and risks posed to low-income neighborhoods to light, opportunities do exist to make Housing in the Five Towns more resilient.

- While the lower income communities of the Five Towns have greater need for housing assistance, they may also be eligible for additional sources of funding.
- Along with the mapped vacant residential soft sites outside of the Extreme and High Risk areas, there may be additional opportunities for infill Transit Supported Development near the LIRR stations.
- New flood remediation requirements could be imposed on new buyers so the onus is not on homeowners on fixed incomes.

V. INFRASTRUCTURE

Infrastructure upgrades were identified as the primary need in each of the communities within the Five Towns. These upgrades could strengthen coastal protections, improve storm water capacity, expand sewer networks and build a more reliable power grid and transportation network system. These infrastructure needs have a broad impact on the Five Towns Community and the surrounding areas.

Infrastructure needs

Critical Infrastructure

Critical infrastructure in the Five Towns such as the Meadowmere Park Fire Department, Lawrence High School, Five Towns Community Center, and local Village Halls experienced damage during Superstorm Sandy and require various upgrades to prepare for future severe storms. These needs include backup power, flood protections, and resources to produce disaster response plans and provide disaster training.

Stormwater drainage

Throughout the NYRCR Process, the stormwater system was consistently noted as the infrastructure system most in need of repair. While stormwater systems throughout the Five Towns were compromised during Superstorm Sandy, which exacerbated upland flooding, these systems also experience system backups during frequent rainstorms and high tides. Stormwater systems throughout the Five Towns require hydrologic and hydraulic studies to

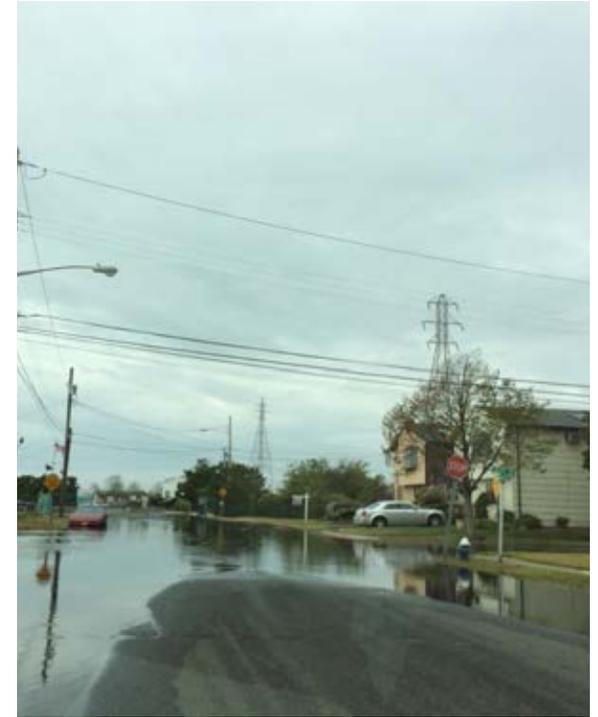


Flooding on Bayswater Blvd, Inwood determine the specific nature and extent of the sources of stormwater backups.

Utility infrastructure

After Superstorm Sandy, the Five Towns area experienced widespread power outages. As a result of these outages, the Community faced a lack of heat, interrupted communications capabilities, hardship for local small businesses, and inadequate capacity to operate medical facilities.

The electrical network throughout the Five Towns was compromised. Four substations located in Cedarhurst were flooded during



Flooding on Bayswater Blvd, Inwood Superstorm Sandy and remain at risk in the event of future tidal flooding. Backup power sources are required to provide a more resilient electrical network that serves critical facilities in the event of future outages. The Five Towns is also home to several liquid fuel distribution facilities, which serve fueling stations throughout the region. These facilities, especially along Doughty Boulevard in Inwood, are in low-lying waterfront areas that require additional coastal protections.

Wastewater Facilities

Several areas within the Five Towns experienced sewage backups, including within residential homes, when the Bay Park Sewage Treatment Plant (STP) went offline during Superstorm Sandy. Sewers backed up into streets and low-lying areas within the Village of Hewlett Harbor. The Villages of Lawrence and Cedarhurst currently operate their own pump stations that pump directly to the Bay Park STP. After Superstorm Sandy, these Villages treated their own sewage until the Bay Park STP facility came back online. The Cedarhurst facility is scheduled to be decommissioned as soon as repairs to the Bay Park STP are completed. Residential areas in Hewlett and Woodmere also experience sewage backup into streets and homes.

Infrastructure Opportunities

Superstorm Sandy highlighted the fact that infrastructure systems in the Five Town Community require upgrades to become more resilient in the face of future extreme weather.

Opportunities exist to enhance resilience of grey and green infrastructure systems; utilize large institutional facilities, municipal buildings, and open space to house microgrids and renewable energy; create coordinated disaster response plans that respond to the needs of vulnerable populations; strengthen community based organizations such as community centers, houses of worship, schools, and youth groups to expand services and enhance recovery efforts after storms; build more robust networks of communication between these diverse communities; create a stronger transportation

network that elevates evacuation routes out of the flood zone and improves traffic flow; and create a more resilient power grid that limits widespread outages and implements district energy solutions.

Opportunities to improve the resilience of the stormwater drainage network would emerge from a series of hydrologic and hydraulic studies to determine the source and amount of runoff that the system currently experiences. Installation of green infrastructure would help reduce the amount of stormwater runoff that the system must carry. Installation of check valves on stormwater outfalls and catch basins throughout the system would provide additional capacity and prevent backflow during high tides.

The location of several critical facilities on high ground that did not flood during Superstorm Sandy provides an opportunity to increase the Community's resilience to future disasters and power outages by creating a microgrid network that would provide adequate electricity to critical facilities such as command centers, shelters, gas station, and medical facilities.

Opportunities also exist to improve coastal protection measures that would help to reduce erosion and protect the Community from extreme tidal flooding. The Five Towns has extensive waterfront, including both living shoreline and areas with bulkheads. After studying the condition of the coastline, the Community could benefit from a strategy that incentivizes replacement and restoration of these erosion protection measures. At a regional scale, the Five Towns Planning Committee identified that opportunities to address catastrophic storm

surge require extensive coordination beyond local jurisdictions. The Committee saw an opportunity to consider placement of possible tidal surge barriers within the Community along Rockaway Turnpike and at Reynolds Channel, along Marine Parkway in the Rockaway Inlet.

VI. NATURAL AND CULTURAL RESOURCES

The Five Towns Community is surrounded by water on all sides, including bays and creeks. These water bodies historically remain calm with minor erosion along the edges of the bay and creeks. The Community has had an increase in development over the last 50 years which has depleted the natural coastal barriers along the shorelines.

Natural and Cultural Resources Needs

Critical Natural and Cultural Resource needs identified during the NYRCR Process for the Five Towns included the lack of natural tidal barriers in some areas and the need to address unimproved shoreline conditions throughout the community, especially privately owned bulkheads and living shorelines on private property. Privately owned bulkheads in several communities, including Cedarhurst, Meadowmere Park, and Inwood, are in poor condition, requiring repair, elevation, or both. Damaged bulkheads of inconsistent heights pose a risk to entire neighborhoods, not just individual homes, because flood waters can extend beyond the initial area of breached shoreline to damage adjacent homes. A community-wide solution is needed to resolve the need for consistent shoreline improvements throughout the Five Towns.

Natural and Cultural Resource Opportunities

Opportunities exist within the Five Towns Community to provide greater protections from flooding for residential neighborhoods and commercial districts. The objective of the needs and opportunities assessment is to evaluate potential for increased resilience in Five Towns.

The Community's resilience to severe storms can be increased by restoring natural resources, such as parks, wetlands, and marshes to increase their capacity in absorbing flood and rainwater. Restoring degraded marshes in the waterways

surrounding the community, including Hewlett Bay and Brosewre Bay, Valley Stream, Motts Creek, and the Head of Jamaica Bay will help mitigate the impacts of tidal and stormwater flooding. Wetlands are vital to the health of waterways and surrounding communities' Wetlands feed downstream waters, trap floodwaters, recharge groundwater supplies, remove pollution, and provide fish and wildlife habitat. Wetlands are also economic drivers because of their key role in fishing, hunting, agriculture, and recreation. The remaining wetlands that surround the Community are severely degraded and disappearing.

Although wetlands would not act as a buffer to extreme storm surge, they can filter stormwater, decrease the release of pollutants into waterways, and help reduce wave action from small storms. Coastal protection measures can also be implemented in addition to or integrated with wetland restoration. For example, the Lawrence Dike at the Isle of Wight provides flood protection for a residential neighborhood while allowing flow between the bay and adjacent wetlands.

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Section III: Reconstruction and Resiliency Strategies

Reconstruction and Resiliency Strategies

Based on input from the Planning Committee, feedback from Public Engagement Events, and initial research, the following key concepts and reconstruction strategies represent a framework that will guide development and evaluation of potential projects.

The concept diagram in Figure 21 provides an overall framework for the three key strategies that guided the development of Proposed Projects, Featured Projects, and Additional Resiliency Recommendations listed in the following sections. As the concept diagram shows, the NY Rising Community Reconstruction (NYRCR) Plan for the Five Towns looks to a three-tiered approach that addresses coastal protections, response capacity of critical facilities on high ground, and the importance of the Rockaway Turnpike/Nassau Expressway corridor.

The key strategies that guided the NYRCR Plan for the Five Towns are:

Strategy 1: Increase the resilience to extreme weather in high risk coastal areas by addressing coastal protections and stormwater infrastructure.

Strategy 2: Increase the emergency response capacity of facilities on high ground by building on the strong network of civic, health and social service organizations in the Five Towns.

Strategy 3: Improve access to evacuation routes from high risk areas by creating a resilient corridor along Rockaway Turnpike and Nassau Expressway.

The role that these strategies played in the development of this NYRCR Plan, the benefits that they will provide to the Five Towns, and the projects that the Planning Committee has identified to achieve these strategies are described in more detail in A. Reconstruction and resiliency strategies below. The list of Proposed and Featured Projects described in below represents a compilation of ideas to increase the resilience of the Five Towns that have come out of the NYRCR planning process. Based on the framework provided by these three strategies projects evolved addressing the needs of and risk to the six recovery support functions. Proposed Projects and Featured Projects have been assessed for their ability to mitigate future risk, vetted by the Planning Committee and the public, and categorized by their capacity to address strategies within one or more of the strategies described above.

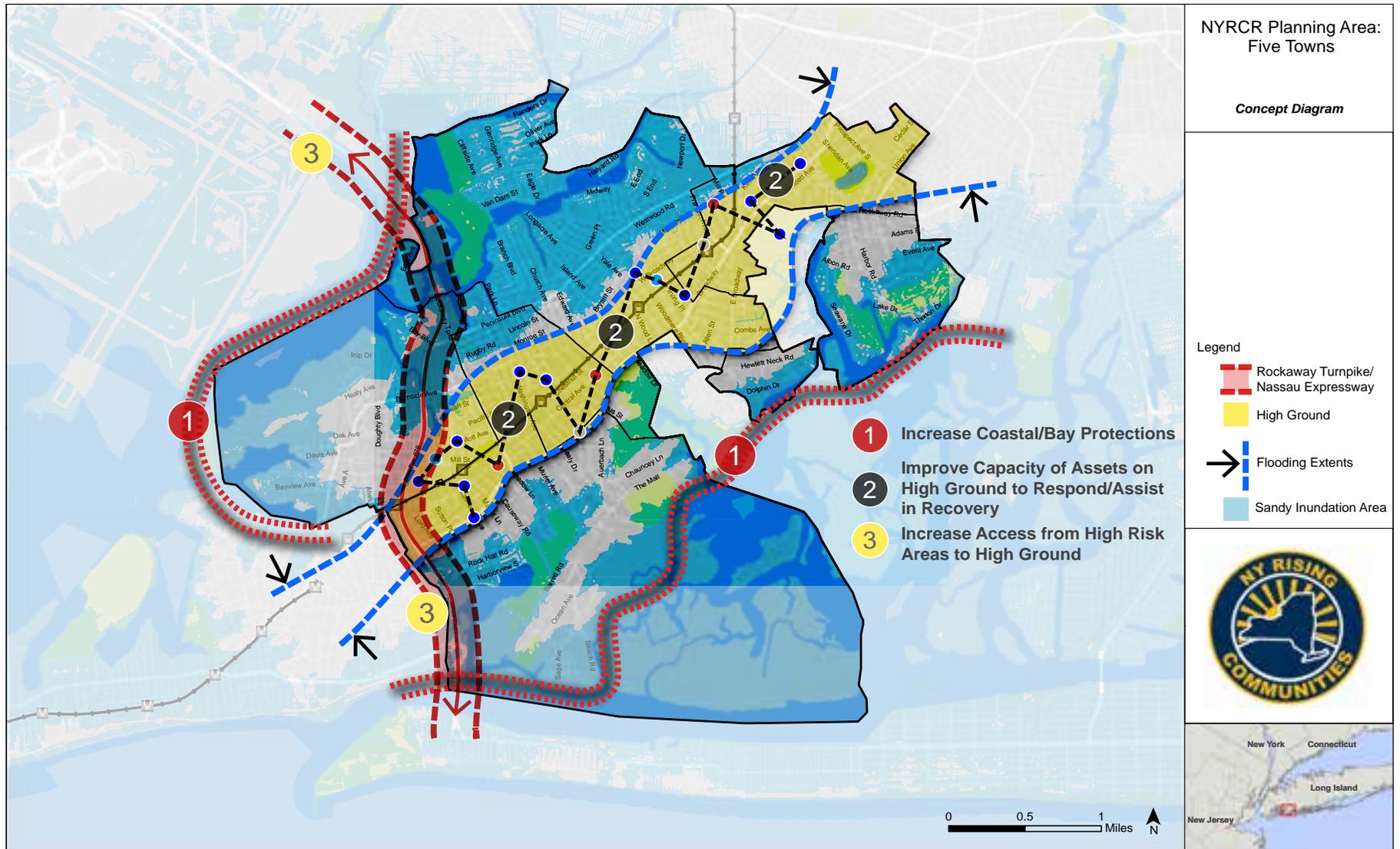


Figure 21: Concept Diagram

Strategy 1: Increase the resilience to extreme weather in high risk coastal areas by addressing coastal protections and stormwater infrastructure.

Strategy 1: Coastal Protections and Stormwater Infrastructure directly addresses the impacts that communities in the Five Towns experienced due to Superstorm Sandy, the potential risks that could be posed by future storms, and the frequent stormwater flooding that occurs in the region. Strategy 1 addresses the recovery support functions of Infrastructure and Natural and Cultural Resources.

Risks addressed by this strategy include the catastrophic storm surge that occurred during Superstorm Sandy, extreme stormwater flooding that occurred during Tropical Storm Irene, and more frequent flooding that occurs from both sources during much smaller rain and high tide events.

This strategy addresses risk by identifying and resolving a critical source of flooding that occurred during Superstorm Sandy but also occurs to a lesser extent on a frequent basis within the Five Towns Community. The flooding that occurred during Superstorm Sandy in the Five Towns resulted from two sources: storm surge and backups in stormwater systems. These sources of flooding also occur more frequently during much smaller events, ranging from

tropical storms, nor'easters, and even everyday high tides. Mitigating frequent flooding due to extreme high tides and stormwater backups will serve everyday benefits while also limiting the risk posed by severe flooding due to inadequate coastal defenses and stormwater infrastructure. These sources of flooding are systemic throughout the Five Towns and have exacerbated risk during extreme events.

This strategy therefore has significant co-benefits – not only will it limit extreme flooding during heavy rains and storm surge events, but it will also prevent flooding during more frequent events that currently impact communities within the Five Towns on a regular basis.

This strategy addresses two important needs: it provides needed information on a critical network of existing infrastructure, and it also implements necessary repairs and upgrades to prevent future risk. Data and documentation of existing stormwater infrastructure is largely incomplete throughout the Five Towns Community. This deficiency is true of the Villages as well as the unincorporated areas within the Town of Hempstead. In many cases, stormwater pipes are not fully mapped. The location of stormwater outfalls is known, however information on the existence and condition of check valves is incomplete. Hydraulic and hydrologic studies will serve as an initial step towards determining the specific needs for stormwater infrastructure upgrades.

Upgrades to stormwater infrastructure and coastal protections are critical needs to make the Five Towns more resilient. Strategy 1 represents a three-tiered approach in protecting the Five Towns from future risks. First, stormwater infrastructure upgrades can be implemented in the short-term and provide protections against flooding that occurs on a frequent basis, in some areas on a monthly basis. Second, coastal protections such as bulkhead repairs and living shorelines can be implemented in the medium-term and provide protections against flooding up to seven-feet above MHHW, or approximately a 10-year storm. Third, coastal protections such as road elevations and flood gates can be implemented in the long-term and provide protections against catastrophic flooding, such as what the Five Towns experienced during Superstorm Sandy. These measures require extensive interagency coordination and have very high costs. However, the NYRCR Plan for the Five Towns includes studies to assist local jurisdictions and New York State in identifying strategies that will make the Five Towns resilient in the face of future extreme storms.

Proposed and Featured Projects that address Strategy 1 are described in Table 9.

Table 9: Strategy 1—Increase the resilience to extreme weather in high risk coastal areas by addressing coastal protections and stormwater infrastructure.

| Village or Hamlet | Project Name | Short Description | Project Category | Estimated Cost | Regional (Y/N) |
|-------------------|---|---|------------------|----------------|----------------|
| Cedarhurst | Cedarhurst Stormwater Infrastructure Upgrades: Phase 1 | Hydrologic and hydraulic study on the existing stormwater system. Installation of check valves, wet weather pumps, water storage tank. | Proposed | \$2,000,000 | N |
| Cedarhurst | Removable Flood Walls for DPW Facility | Purchase of removable flood walls to protect the two buildings on the Cedarhurst DPW site. | Proposed | \$500,000 | N |
| Cedarhurst | Cedarhurst Stormwater Infrastructure Upgrades: Phase 2 | Increase stormwater system capacity in the area surrounding Peninsula Blvd from Rockaway Tpk to Bayview Ave. | Featured | \$7,800,000 | N |
| Cedarhurst | Cedarhurst Repair of the berm along Municipal Property | Repair of earthen berm along east side of Municipal Property. | Featured | \$710,000 | N |
| Hewlett | Hewlett Stormwater Infrastructure Upgrades | Hydrologic and hydraulic study on the existing stormwater system. Installation of check valves, upgrades to stormwater pipes, drains, and catch basins. | Proposed | \$2,300,000 | N |
| Hewlett | Hewlett Stormwater Infrastructure Upgrades: Phase 2 | Increase stormwater system capacity in the area of Broadway from Burton Ave to Piermont Ave. | Featured | \$7,600,000 | N |
| Hewlett Harbor | Hewlett Harbor Stormwater Infrastructure Upgrades along Pepperidge Road | Hydrologic and hydraulic study on the existing stormwater system. Increase stormwater system capacity in the area of Pepperidge Rd from Auerbach Ave to Waverly Ave. Flood protections and green infrastructure at Village Hall. | Proposed | \$3,000,000 | N |
| Hewlett Harbor | Hewlett Harbor Stormwater Infrastructure Upgrades: Phase 2 | Increase stormwater system capacity | Featured | \$3,800,000 | N |
| Hewlett Neck | Hewlett Neck Stormwater Infrastructure Upgrades: Phase 1 | Hydrologic and hydraulic study on the existing stormwater system. Increase stormwater system capacity in the area of Dolphin Dr from Woodmere Blvd to Adams Ln. Cleaning and installation of dry wells. Increase stormwater capacity of Woodbine Ditch with green infrastructure. | Proposed | \$2,600,000 | N |
| Hewlett Neck | Harden Underground Street Light Infrastructure | Installation of underground electrical lines for street lights and removal of above ground lines. Replacement of current street signage with elevated retro-reflective street signs. | Proposed | \$340,000 | N |

Table 9: Strategy 1—Increase the resilience to extreme weather in high risk coastal areas by addressing coastal protections and stormwater infrastructure.

| Village or Hamlet | Project Name | Short Description | Project Category | Estimated Cost | Regional (Y/N) |
|--------------------|---|---|------------------|----------------|----------------|
| Hewlett Neck | Hewlett Neck Stormwater Infrastructure Upgrades: Phase 2 | Increase stormwater system capacity in the area of Hewlett Neck Rd. from Browers Point Branch to Adams Ln. | Featured | \$2,700,000 | N |
| Inwood | Inwood Stormwater Infrastructure Upgrades: Phase 1 | Hydrologic and hydraulic study on the existing stormwater system. Increase stormwater system capacity in the area of Bayswater Blvd and Walnut Rd. | Proposed | \$2,650,000 | N |
| Inwood | Inwood Stormwater Infrastructure Upgrades: Phase 2 | Increase stormwater system capacity in the area surrounding Hewlett Neck Road, from Browers Point Branch to Adams Lane. | Featured | \$4,500,000 | N |
| Inwood | Repair Inwood Country Club Dam | Rebuild and elevate existing concrete dam. | Featured | \$1,000,000 | N |
| Lawrence | Lawrence Stormwater Infrastructure Upgrades | Hydrologic and hydraulic study on the existing stormwater system. Increase stormwater system capacity in the area of Meadow Ln, Harborview, and Lakeside Dr South. Installation of backup generators at Village Hall. | Proposed | \$1,500,000 | N |
| Lawrence | Lawrence Dike at the Isle of Wight: Repairs and Elevation | Repair and elevation of the dike using sheet pile core system. | Proposed | \$2,300,000 | N |
| Meadowmere Park | Meadowmere Park Bulkhead Restoration Program | Provide gap funding to provide assistance to homeowners who are ineligible for bulkhead repairs through the NY Rising Housing Recovery Program. | Proposed | \$1,000,000 | N |
| Meadowmere Park | Meadowmere Park Home Elevation Program | Provide gap funding to provide assistance to homeowners who are ineligible for home elevation through the NY Rising Housing Recovery Program. | Proposed | \$1,000,000 | N |
| Woodmere | Woodmere Stormwater Infrastructure Upgrades: Phase 1 | Hydrologic and hydraulic study on the existing stormwater system. Increase stormwater system capacity in the area of Derby Ave. to Arbuckle Ave. | Proposed | \$6,000,000 | N |
| Woodmere | Woodmere Stormwater Infrastructure Upgrades: Phase 2 | Increase stormwater system capacity in the area surrounding Peninsula Boulevard from Howard Ave. to Longacre Ave. | Featured | \$15,000,000 | N |
| Regional or Shared | South Shoreline Improvement Program Study | Study methods for facilitating coordinated shoreline improvements to achieve a contiguous shoreline, including funding mechanisms, streamlining permitting, and incentivizing bulkhead repairs and living shoreline improvements. | Proposed | \$400,000 | Y |
| Regional or Shared | Lawrence High School Hardening and Protection | Construction of a flood wall to protect the building foundation from future storm surge. | Proposed | \$1,600,000 | Y |

Strategy 2: Increase the emergency response capacity of facilities on high ground by building on the strong network of civic, health and social service organizations in the Five Towns.

Strategy 2: Emergency Response Capacity recognizes that there is a corridor along high ground within the Five Towns and many of the civic, health and social service organizations that provided disaster response services after Superstorm Sandy are along this corridor. The premise of this strategy is to preserve and enhance these key assets that are above the Federal Emergency Management Agency (FEMA) flood zones so that emergency supplies, evacuation centers, power supplies, and emergency management structures are pre-positioned out of danger and can act effectively in a storm. Many of these improvements can be accomplished in the short term. Strategy 2 addresses the recovery support functions of Community Planning and Capacity Building, Health and Social Services, and Infrastructure.

Many Health and Social Services organizations, ranging from fire departments to community centers to religions organizations, provided critical disaster recovery services in the immediate aftermath of Superstorm Sandy. While these organizations proved to be invaluable resources for many residents within the Five Towns, the projects within Strategy 2 address the need for greater preparation and coordination of these organizations. By providing additional resources, improving communications, and ensuring consistent

power supplies during emergencies, these organizations will be better positioned to assist in rapid recovery efforts in the Five Towns.

Strategy 2 makes use of the resources and experience of existing community assets, including the Lawrence Cedarhurst Fire Department, Meadowmere Park Fire Department, the Five Towns Community Center, Mesivta Ateres Yaakov, and Village Halls throughout the Five Towns. All of these assets contributed to recovery efforts after Superstorm Sandy. In particular, Strategy 2 helps to prepare community assets that are located along high ground for future extreme flooding events that require a coordinated response effort. An effective coordinated effort requires ongoing communication between organizations within the Five Towns, but also relies upon creating formal connections between local organizations and Nassau County Office of Emergency Management (OEM), New York State Office of Emergency Management, and the (FEMA).

Proposed and Featured Projects that address Strategy 2 are described in Table 10.

The Five Towns NY Rising Community Reconstruction Plan

Table 10: Strategy 2—Increase the emergency response capacity of facilities on high ground by building on the strong network of civic, health and social service organizations in the Five Towns.

| Village or Hamlet | Project Name | Short Description | Project Category | Estimated Cost | Regional (Y/N) |
|--------------------|--|---|------------------|----------------|----------------|
| Cedarhurst | Cedarhurst Village Hall Disaster Response Plan | Creation of a disaster response plan for Cedarhurst Village Hall. Installation of backup generators | Proposed | \$70,000 | N |
| Inwood | Inwood Buccaneers Facility Repairs | Mold remediation and replacement of mechanical equipment. | Featured | \$200,000 | N |
| Lawrence | Coordinated Mobile Response Unit - Lawrence Cedarhurst Fire Dept | Purchase a Mobile Response Unit for the Lawrence Cedarhurst Fire Department | Featured | \$325,000 | N |
| Lawrence | Coordinated Mobile Response Unit - Achiezer Community Resource Center | Purchase a Mobile Response Unit for the Achiezer Community Resource Center | Featured | \$325,000 | N |
| Lawrence | Mesivta Ateres Yaakov: Disaster Relief Center | Enhance new gymnasium construction to provide backup power, private meeting spaces, reliable communications, and storage for emergency equipment and supplies. | Featured | \$500,000 | N |
| Meadowmere Park | Meadowmere Park Microgrid | Establish a microgrid node to provide backup power supply for the Meadowmere Park Fire House and a charging station for residents. | Proposed | \$500,000 | N |
| Meadowmere Park | Meadowmere Park Fire Department - Building Upgrades | Installation of permanent generator for increased backup power capacity (cost included in Meadowmere Park Microgrid). Improvements and hardening of the facility to ensure that it can function as a Community Assistance Center. | Proposed | \$50,000 | N |
| Regional or Shared | Five Towns Community Center Repairs and Disaster Response Plan Phase 1 | Develop a disaster response plan. Increase capacity to operate as a Community Assistance Center. Purchase of backup generators. | Proposed | \$300,000 | Y |
| Regional or Shared | Five Towns Community Center Repairs and Disaster Response Plan Phase 2 | Repair damages to the Five Towns Community Center. Upgrade bathrooms and install showers and laundry facilities. | Featured | \$50,000 | Y |
| Regional or Shared | Identify Locations for Microgrids and Renewable Energy | Identification and analysis of sites for microgrid implementation. Conceptual design for microgrid implementation. | Proposed | \$167,000 | Y |

Strategy 3: Improve access to evacuation routes from high risk areas by creating a resilient corridor along Rockaway Turnpike and Nassau Expressway.

Strategy 3: Improve Access along the Rockaway Turnpike and Nassau Expressway corridor is long-term in that it requires a carefully developed plan for the Rockaway Turnpike/Nassau Expressway Corridor that addresses coastal protections, evacuation routes, and the impact of future flooding risks on economic assets in the Five Towns. These roads failed to serve as an effective evacuation route during Superstorm Sandy because sections of Rockaway Turnpike flooded. These are also areas of intense peak hour traffic congestion at intersections such as Rockaway Turnpike and Peninsula Boulevard. Finally, two creeks, Hook Creek and Motts Creek, cross under Rockaway Turnpike just south of the Five Towns Shopping

Center in Meadowmere. The tidal surge of Superstorm Sandy that flowed into these creeks was the primary cause of flooding in the Five Towns Communities of Cedarhurst, Woodmere, Hewlett, and parts of Inwood.

This strategy also presents opportunities for regional coordination, as the flooding at Hook Creek and Motts Creek was also the primary source of inundation for other communities, including South Valley Stream and Rosedale. If Rockaway Turnpike were slightly elevated and flood gates installed where these two creeks intersect with the turnpike, then a flood barrier could eventually be created that could better protect upstream areas and important assets such as the Five Towns Shopping Center, Lawrence High School, and a significant number of residential neighborhoods. Strategy 3 addresses the recovery support functions of Economic Development and Housing. The economic issue pertains to the retail

and commercial uses along the Rockaway Turnpike/Nassau Expressway corridor which was significantly impacted during Superstorm Sandy. Housing assets along this corridor require reliable access to evacuation routes in the event of emergency situations.

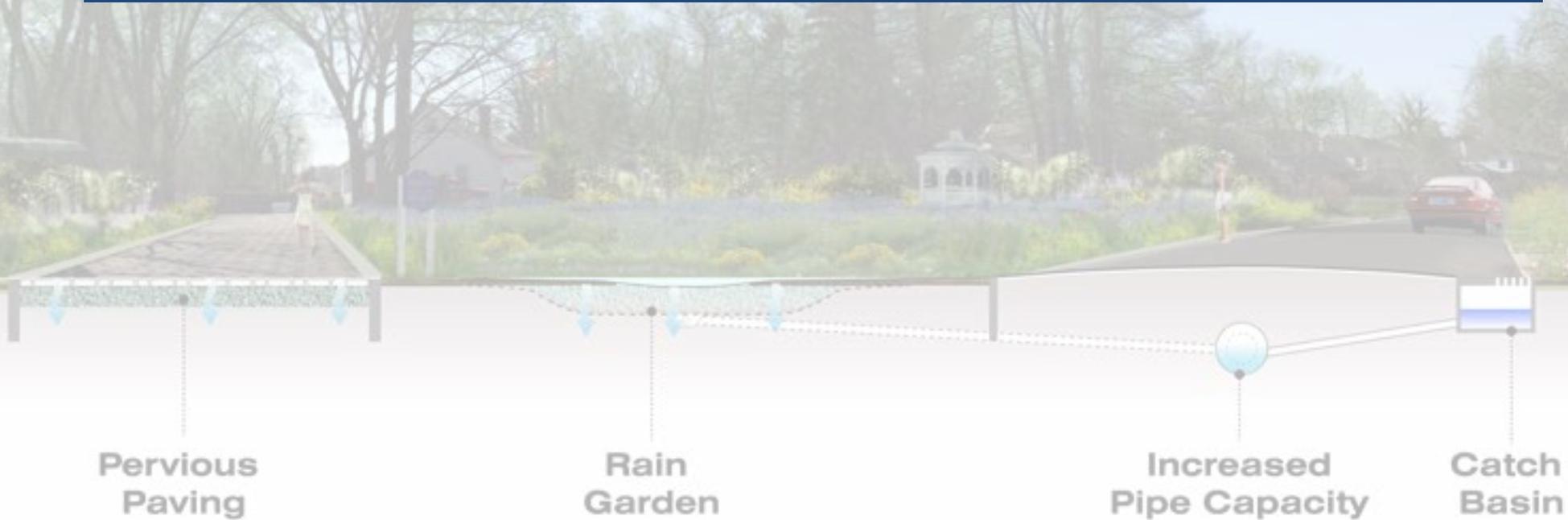
Strategy 3 addresses the need to provide reliable evacuation routes which will function effectively during any type of disaster event. Rockaway Turnpike and Peninsula Boulevard both flooded during Superstorm Sandy, which presents a critical risk in the event of future storm surge flooding. Further, both routes experience intense traffic congestion, which complicates evacuation even when these routes are not at risk of flooding in the event of a different type of disaster.

Proposed and Featured Projects that address Strategy 3 are described in Table 11.

Table 11: Strategy 3—Increase the emergency response capacity of facilities on high ground by building on the strong network of civic, health and social service organizations in the Five Towns.

| Village or Hamlet | Project Name | Short Description | Project Category | Estimated Cost | Regional (Y/N) |
|--------------------|--|---|------------------|----------------|----------------|
| Meadowmere Park | Meadowmere Park Footbridge Repairs | Repair the existing wooden footbridge. | Proposed | \$750,000 | N |
| Regional or Shared | Study Rockaway Turnpike Floodgates and Rockaway Turnpike/ Nassau Expressway Upgrades | Analyze construction of floodgates at Hook Creek and Motts Creek and elevation of Rockaway Tpke and Nassau Expy. Conduct traffic management study to decrease congestion in evacuation routes. Study opportunities for economic development in retail/commercial zones that would be protected by flood mitigation. | Proposed | \$920,000 | Y |

Section IV: Implementation—Project Profiles



The NYRCR Program has allocated to the Community up to \$27,600,000. The funding is provided through the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) program. While developing projects and actions for inclusion in the NYRCR Plan, Planning Committees took into account cost estimates, cost-benefit analyses, the effectiveness of each project in reducing risk to populations and critical assets, feasibility, and community support. Planning Committees also considered the potential likelihood that a project or action would be eligible for CDBG-DR funding. The projects and actions set forth in the NYRCR Plan are divided into three categories. The order in which the projects and actions are listed in the NYRCR Plan does not necessarily indicate the Community’s prioritization of these projects and actions.

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

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

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

The total cost of Proposed Projects in the NYRCR Plan exceeds the NYRCR Community’s CDBG-DR allocation to allow for flexibility if some

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

NYRCR Project Descriptions

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

- **Project Description:** A brief summary of the project including tasks, components or phases
- **Cost:** High (over \$1 million), medium (between \$1 million and \$500,000), or low (less than \$500,000)
- **Benefits:** Whether the project has local direct benefits within the East and South Shores of Staten Island or regional benefits, and whether those benefits are primarily public or private
- **Cost Benefit:** The following types of benefits were reviewed for the cost-benefit analysis: risk reduction benefits, economic benefits, environmental benefits, and health and social benefits.

- **Timeframe:** Immediate (can be completed in two years or less), intermediate (two to five years), or long-range (more than five years)
- **Regulatory Requirements:** Consideration of whether a project is likely to face regulatory obstacles including issues with permits or other approvals, any real property constraints, and project readiness
- **Jurisdiction:** The entity with jurisdiction over the project, such as New York City
- **Funding:** Consideration of whether a project is best suited for implementation with CDBG-DR funding through the New York Rising Community Reconstruction Program, or with other state, federal, county, or local funds. Possible funding sources are noted for each potential project; however, the ultimate funding source(s) will be determined at a later stage in the planning process.

Adding up the Costs

The Planning Committee worked with a team of cost estimators, engineers, architects, landscape architects, and planners (Consultant Team) to develop estimated costs for each Proposed and Featured Project. All costs are preliminary and based on available data as well as the Consultant Team’s understanding of the issues learned through site visits, Planning Committee member knowledge and feedback, and input from the greater Staten Island Community. Local government entities and nonprofit organizations also provided input regarding project scope and estimated costs. As available, construction costs are based upon similar

projects that have been constructed within the greater New York City area. Where applicable, actual construction cost quotes from vendors were used. Each phase within a project (design, construction, construction management, and other direct labor costs) include a contingency factor and costs are based on the level of detail available for each individual project at the time of the estimate.

Maximizing the Benefits

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

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

- Risk Reduction Benefits;
- Economic Benefits;
- Environmental Benefits; and
- Health and Social Benefits.

For feasibility studies, action plans or advocacy projects, the discussion of benefits related to the potential benefits that would result from future implementation of the selected alternative or recommendations developed through the course of study or advocacy. In addition, some

projects are scalable; the benefits of these projects are considered in their current state, and potential benefits that would result from development into regional or larger-scale projects are noted where appropriate.

Based on the process described above for evaluating the costs and benefits of projects, the Planning Committee arrived at the following list of Proposed and Featured Projects for inclusion in the NYRCR Plan. The goal in creating this list of Proposed and Featured Projects was to identify projects that would address all three strategies, thus addressing the needs of the Community post-Sandy. Since the NYRCR funding allocation has been broken out by individual Village and Hamlet in the Five Towns, the projects are likewise organized by Village and Hamlet.

Regional and Shared Projects

Within the context of the three strategies for reconstruction and resilience in the Five Towns, the Planning Committee has identified that many local, site-specific projects that can be fully funded within each community’s allocation will provide local protections but cannot address the full extent of coastal protections necessary to protect the region against another Superstorm Sandy-type event. Additionally, some projects that have been identified throughout the process do not fit within any one community, but rather provide shared benefit to multiple communities within the Five Towns or the broader region.

In the case of these long-term projects and projects with shared or regional benefit, the Five Towns Planning Committee has agreed to make a shared contribution that recognizes the

importance of addressing long-term issues at a scale larger than each individual community. The regional contribution has been distributed as follows:

- Woodmere: \$700,000
- Cedarhurst: \$375,000
- Hewlett: \$375,000
- Inwood: \$375,000
- Lawrence: \$375,000
- Meadowmere Park: \$375,000
- Hewlett Harbor: \$300,000
- Hewlett Neck: \$300,000

This varied contribution results from two factors. First, Woodmere was allocated in the NYRCR Program more than twice the funds as any other Village or Hamlet in the Five Towns, so the Planning Committee felt that Woodmere could contribute a greater amount to the regional pool. Second, Hewlett Harbor and Hewlett Neck are not within the Lawrence Union Free School District, which is served by Lawrence High School. Since a significant portion of the regional contribution is due to the Lawrence High School project, the Committee felt that Hewlett Harbor and Hewlett Neck should contribute a smaller amount to the regional share.

The Five Towns: Proposed and Featured Projects

Cedarhurst

| | | | |
|---|--|-------------|------------|
| 1 | Cedarhurst Stormwater Infrastructure: Phase 1 | \$1,500,000 | [Proposed] |
| 2 | Removable Flood Walls for DPW Facility | \$500,000 | [Proposed] |
| 3 | Cedarhurst Village Hall Disaster Response Plan | \$70,000 | [Proposed] |
| 4 | Cedarhurst Stormwater Infrastructure: Phase 2 | \$7,800,000 | [Featured] |
| 5 | Repair Berm along Municipal Property | \$710,000 | [Featured] |

Hewlett

| | | | |
|---|--|-------------|------------|
| 6 | Hewlett Stormwater Infrastructure: Phase 1 | \$2,300,000 | [Proposed] |
| 7 | Hewlett Stormwater Infrastructure: Phase 2 | \$7,600,000 | [Featured] |

Hewlett Harbor

| | | | |
|---|---|-------------|------------|
| 8 | Hewlett Harbor Stormwater Infrastructure: Phase 1 | \$3,000,000 | [Proposed] |
| 9 | Hewlett Harbor Stormwater Infrastructure: Phase 2 | \$3,800,000 | [Featured] |

Hewlett Neck

| | | | |
|----|---|-------------|------------|
| 10 | Hewlett Neck Stormwater Infrastructure: Phase 1 | \$2,600,000 | [Proposed] |
| 11 | Harden Underground Street Light Infrastructure | \$340,000 | [Proposed] |
| 12 | Hewlett Neck Stormwater Infrastructure: Phase 2 | \$2,700,000 | [Featured] |

Inwood

| | | | |
|----|---|-------------|------------|
| 13 | Inwood Stormwater Infrastructure: Phase 1 | \$2,650,000 | [Proposed] |
| 14 | Inwood Stormwater Infrastructure: Phase 2 | \$4,500,000 | [Featured] |
| 15 | Inwood Buccaneers Facility Repairs | \$200,000 | [Featured] |
| 16 | Inwood Country Club Dam Repairs | \$1,000,000 | [Featured] |

Lawrence

| | | | |
|----|---|-------------|------------|
| 17 | Lawrence Stormwater Infrastructure | \$1,500,000 | [Proposed] |
| 18 | Dike at the Isle of Wight Repairs and Elevation | \$2,300,000 | [Proposed] |
| 19 | Mesivta Ateres Yaakov Community Assistance Center | \$500,000 | [Featured] |
| 20 | Lawrence Cedarhurst FD: Mobile Command Unit | \$350,000 | [Featured] |
| 21 | Achiezer CRC: Mobile Command Unit | \$350,000 | [Featured] |

Meadowmere Park

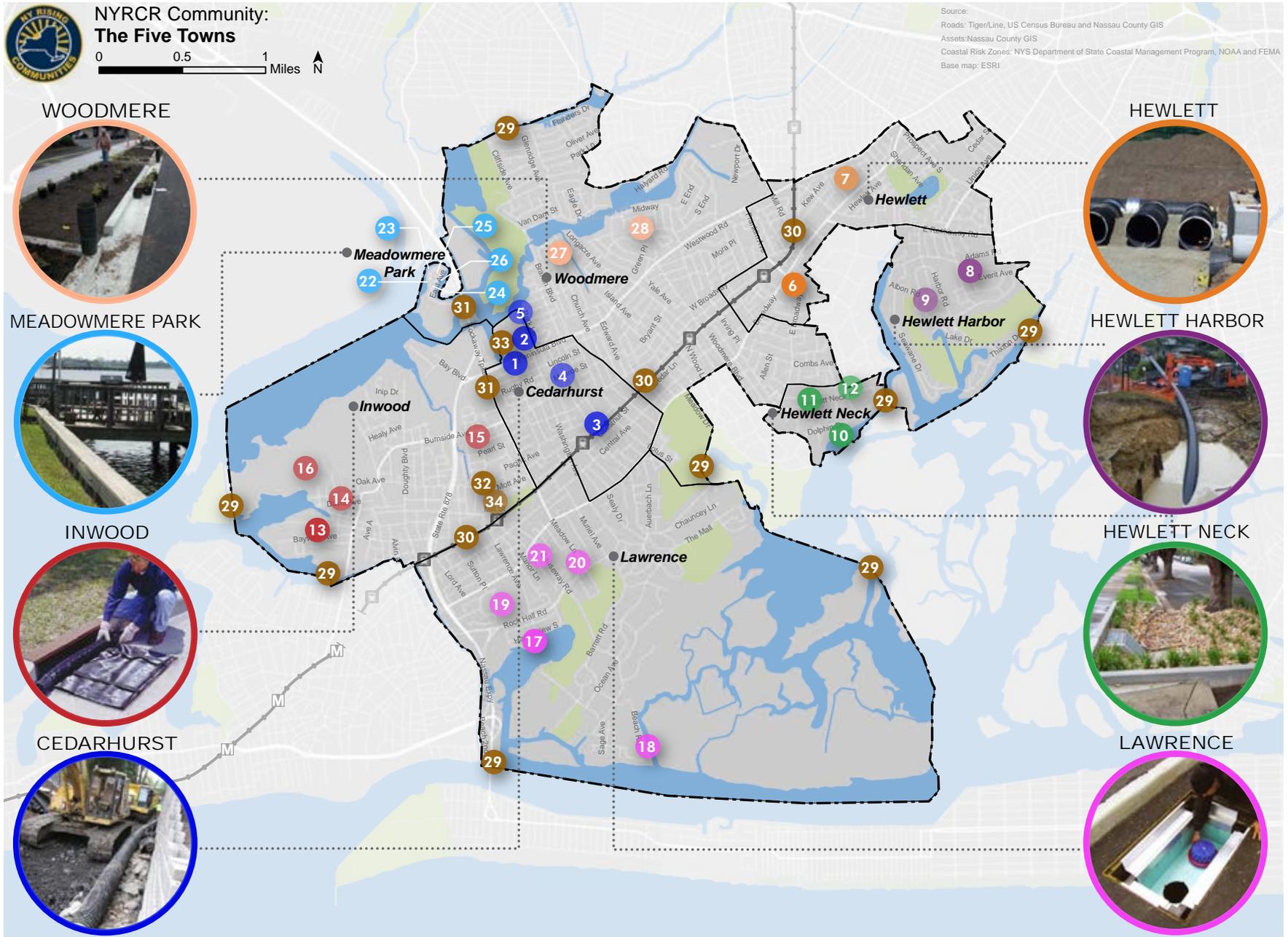
| | | | |
|----|---|-------------|------------|
| 22 | Meadowmere Park Microgrid | \$500,000 | [Proposed] |
| 23 | Meadowmere Park Bulkhead Repair Program | \$1,000,000 | [Proposed] |
| 24 | Meadowmere Park Home Elevation Program | \$1,000,000 | [Proposed] |
| 25 | Meadowmere Park Fire House Upgrades | \$50,000 | [Proposed] |
| 26 | Meadowmere Park Footbridge Hardening | \$750,000 | [Proposed] |

Woodmere

| | | | |
|----|---|--------------|------------|
| 27 | Woodmere Stormwater Infrastructure: Phase 1 | \$6,000,000 | [Proposed] |
| 28 | Woodmere Stormwater Infrastructure: Phase 2 | \$15,000,000 | [Featured] |

Regional and Shared Projects

| | | | |
|----|--|-------------|------------|
| 29 | South Shoreline Improvement Study | \$400,000 | [Proposed] |
| 30 | Microgrid Feasibility Study and Action Plan | \$167,000 | [Proposed] |
| 31 | Rockaway Tpke/Nassau Expy Resilient Corridor Study | \$920,000 | [Proposed] |
| 32 | Five Towns Community Center Upgrades: Phase 1 | \$300,000 | [Proposed] |
| 33 | Lawrence High School Hardening and Protection | \$1,600,000 | [Proposed] |
| 34 | Five Towns Community Center Upgrades: Phase 2 | \$50,000 | [Featured] |



Regional and Shared Projects

South Shoreline Improvement Program Study [Proposed]

This study would examine methods for making coordinated shoreline improvements along the shoreline of the Town of Hempstead to achieve a contiguous shoreline. The goal of the study would be to investigate funding mechanisms, ways for streamlining permitting, and options for incentivizing bulkhead repairs and living shoreline improvements.

The Town of Hempstead shoreline is largely privately-owned and individual homeowners have limited resources to make necessary improvements. Feedback from Committee Meetings and Public Engagement events reinforced the need to study the potential for a coordinated approach to making necessary improvements.

Background

The Town of Hempstead shoreline is characterized by a mix of hard protection such as bulkheads and “soft” protection, such as wetlands, shoals, etc. Both types of protection need to be able to withstand the eroding forces of the tides especially in regards to sea level rise along the back bays community, including those in the range identified above. Because the elevation of many of the areas behind the shoreline is below the existing shoreline, any opening in the shoreline protection has the potential to spread flooding landside. Furthermore as vulnerable spots in the shoreline erode, they progressively erode faster leading to even more widespread flooding. The current condition of the bay shoreline of the Town of

Hempstead provides incomplete protection against certain levels of tidal inundation; essentially bay water elevations of seven- to eight-feet and above. Although such water levels include the conditions experienced with Superstorm Sandy, the specific water levels associated with Superstorm Sandy are rare.

The proposed study would address:

1. A preliminary analysis of South Shore estuary shoreline conditions, including an inventory and assessment of shoreline conditions, development of a GIS database of current shoreline protection and development of options for potential solutions to restore shorelines with hard, hybrid-structural, living shoreline and wave attenuation measures;
2. Regulatory considerations and coordination between the government agencies that would need to be involved with this effort (including DOS, DEC, Town of Hempstead, the USACE, and FEMA);
3. Streamlining the permitting process to enable further control by the potential implementing agency over the process while still maintaining the established guidelines
4. Implementation and administrative costs to be borne by the potential implementing agency (e.g., inspections, developing geographic information systems data, etc.) and financing and funding opportunities

(including grants) for improvements on privately owned properties.

The project is likely technically feasible and no permits should be required to complete a study.

Cost Estimate

\$400,000

A suggested allocation of \$50,000 per Village or Hamlet within each NYRCR Community would be utilized for the purposes of this study, totaling \$400,000 for the Five Towns. Participation by additional NYRCR Communities would provide economies of scale for expanding the scope and outcomes of the study.

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated six full time equivalent jobs⁵⁰. While the study would not have direct economic benefits, its goal of contiguous shoreline improvements can have a positive impact on property values in the immediate area around the shoreline. As the shoreline becomes more attractive the resale value of the homes can increase. This would ultimately have an impact on the taxable values of the homes, which would translate into increased income for the Five Towns.

Additionally, the repaired bulkheads and restored shoreline could prevent future property damages. Since this area is a major contributor

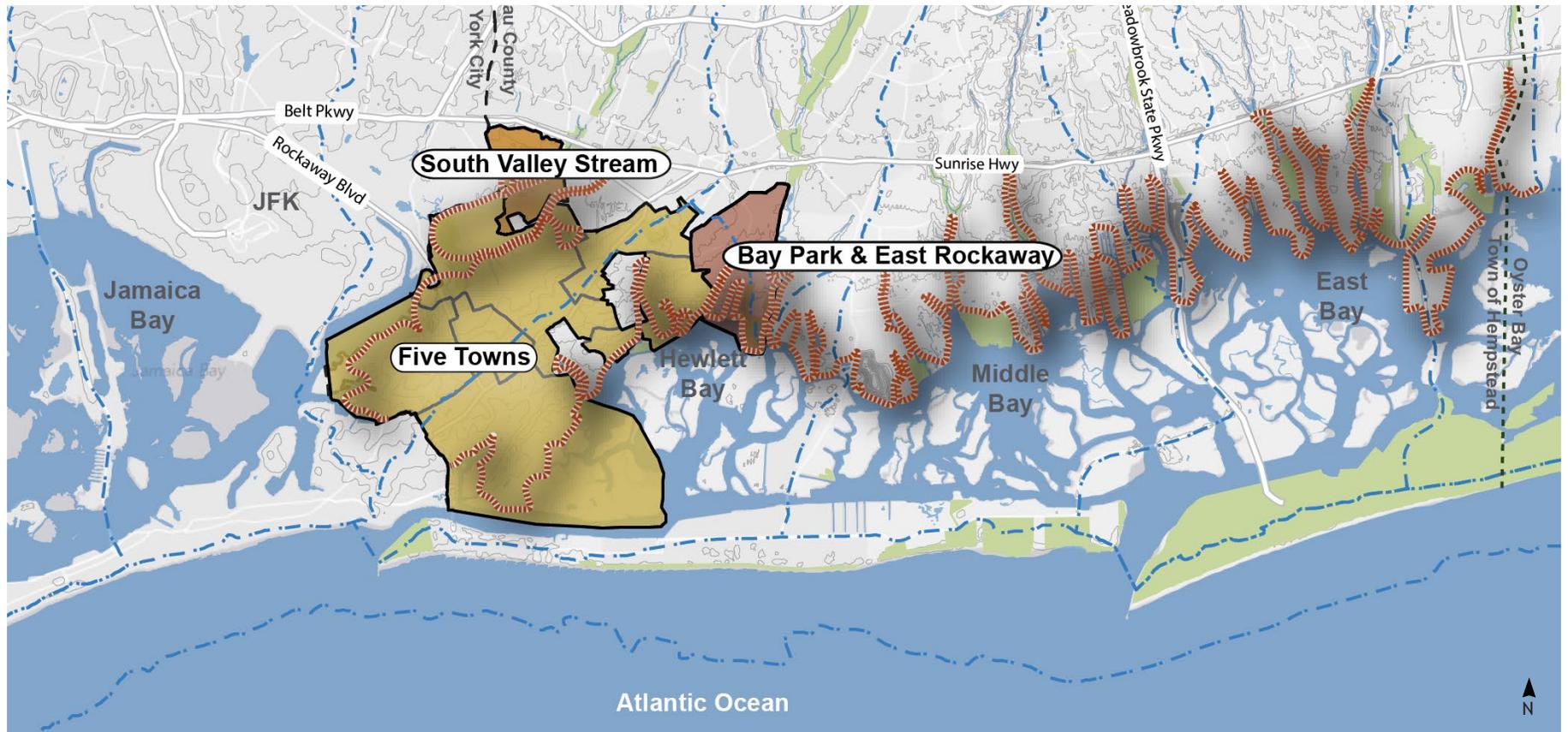


Figure 22: South Shoreline Improvement Program Study

to storm surge damage, the savings from damages could be significant. Combined, the implementation actions resulting from the South Shoreline Improvement Program Study, the proposed flood gates at Hook Creek and Motts Creek, Reynolds Channel and both in Island Park, as well as the Elevated Rockaway Turnpike would cumulatively protect approximately 12,000 individual residential or commercial properties that belong to either residents or businesses. According to Nassau County Tax

data, 97% of these properties are residential properties and the remainder are industrial or commercial properties. The combined estimated market value of the properties that would be impacted if not for these projects would be \$6.1 billion in real estate. This amount assumes total destruction of the property due to flooding. FEMA claims were only a fraction of this amount, but still 29% of the value stated, or \$1.75 billion.

When the impacted real estate from these projects is aggregated, the total amount of residential and commercial properties number 19,700 with an estimate real estate market value of \$9.7 billion. It should be noted that this estimate does not include tax-exempt properties such as parklands or community services like churches and public buildings, but does include non-exempt properties that extend outside of the current study area but would still benefit from these projects.⁵¹

Environmental Benefits

Implementation of the study's potential recommendations would help to secure all of the Natural Resource assets in the Five Towns community due to increased resiliency. The living shoreline component of the project could protect wetlands, enhance or maintain habitat for plants and animals and provide aesthetic value.

Health and Social Benefits

The resulting recommendations from the proposed study could impact all populations along the shoreline in multiple communities within the Five Towns, South Valley Stream and East Rockaway-Bay Park Communities. The total population within each block group along the Hempstead shoreline is 33,213, which represents the overall population with improved access to health and social service facilities as a result of the proposed project. This project aims to protect the multiple health and social services assets along the Hempstead shoreline among several different Communities that serve multiple populations.

Cost-Benefit Analysis

In addition to protecting against storms of Superstorm Sandy's magnitude, the Five Towns is one of several NYRCR Communities along the South Shore that recognizes the need for regionally coordinated shoreline improvements to create a contiguous line of protection against smaller, more frequent storm events. The modest proposed project investment of \$50,000 for each Village or Hamlet, with a total cost of \$400,000 for the Five Towns

Community would spur regional cooperation to determine the most cost-effective and feasible way to achieve this necessary level of coastal protection.

Anticipated Reduction of Risk

The study seeks to develop a mechanism for implementing coastal defenses that creates risk reduction along the entire south shoreline. Coastal defenses, including features such as bulkheads and living shorelines, decrease the exposure experienced by landside assets by preventing or reducing the frequency of marine inundation, and by moderating damage caused by storm surge and wave action. Assets thus protected should be less likely to experience flooding and are therefore less vulnerable.

For the purposes of the Coastal Hazard and Risk Assessment Tool, all landscape attributes should remain the same under project implementation, assuming that the study's recommended improvements would protect against a 10-year storm, while the Tool is calibrated to determine risk reduction benefits under a 100-year storm. However, the implementation actions resulting from this study should reduce the vulnerability (loss of service) of assets to the impacts of 100-year storms; therefore, the vulnerability score of all assets was reduced by 1. See Section V for the reduction in risk scores of the affected assets included in the asset inventories for the East Rockaway-Bay Park, South Valley Stream, and Five Towns communities, as a result of implementing the proposed project. Additional assets would be protected in other communities along the south shore of the Town

of Hempstead; these assets are not included in the Risk Assessment.

The populations that should benefit from a reduction in risk are those residents and businesses that live along the Hempstead shoreline. The combined population of block groups along the project area shoreline is 33,213 persons.

Timeframe of Implementation

Immediate (< 2 years)

Regulatory Requirements

Coordination is recommended with NYS Department of State for Coastal Zone Management (CZM) consistency with State coastal policies, Department of Environmental Conservation, Town of Hempstead, Nassau County, the US Army Corps of Engineers, and Federal Emergency Management Agency.

Entity with Jurisdiction

Town of Hempstead, Private property owners

Regional and Shared Projects

Microgrid Feasibility Study and Action Plan [Proposed]

After Superstorm Sandy, residents in the Five Towns experienced widespread power outages. The challenges faced during power outages include lack of heat and air conditioning, interrupted communications, and added burdens for vulnerable populations. Installing microgrids and renewable energy installations at key locations on high ground would ensure reliable communications during emergencies. Microgrids are made up of a central power source that is connected to several critical facilities. The central power source could be fueled by diesel, fuel cell, a renewable energy source, or a combination of these sources. The connected facilities could include gas stations, medical facilities, warming/cooling stations, schools, and many other critical facilities.

The total cost of the study is estimated to be \$167,000 and would include a review of available technologies, funding sources and financing, and regulatory barriers and incentives. In addition, identification and analysis of sites were included in the cost estimate. A conceptual design for the microgrid or other technology would be completed as part of this project. Lastly, a community outreach component was incorporated into the fee.

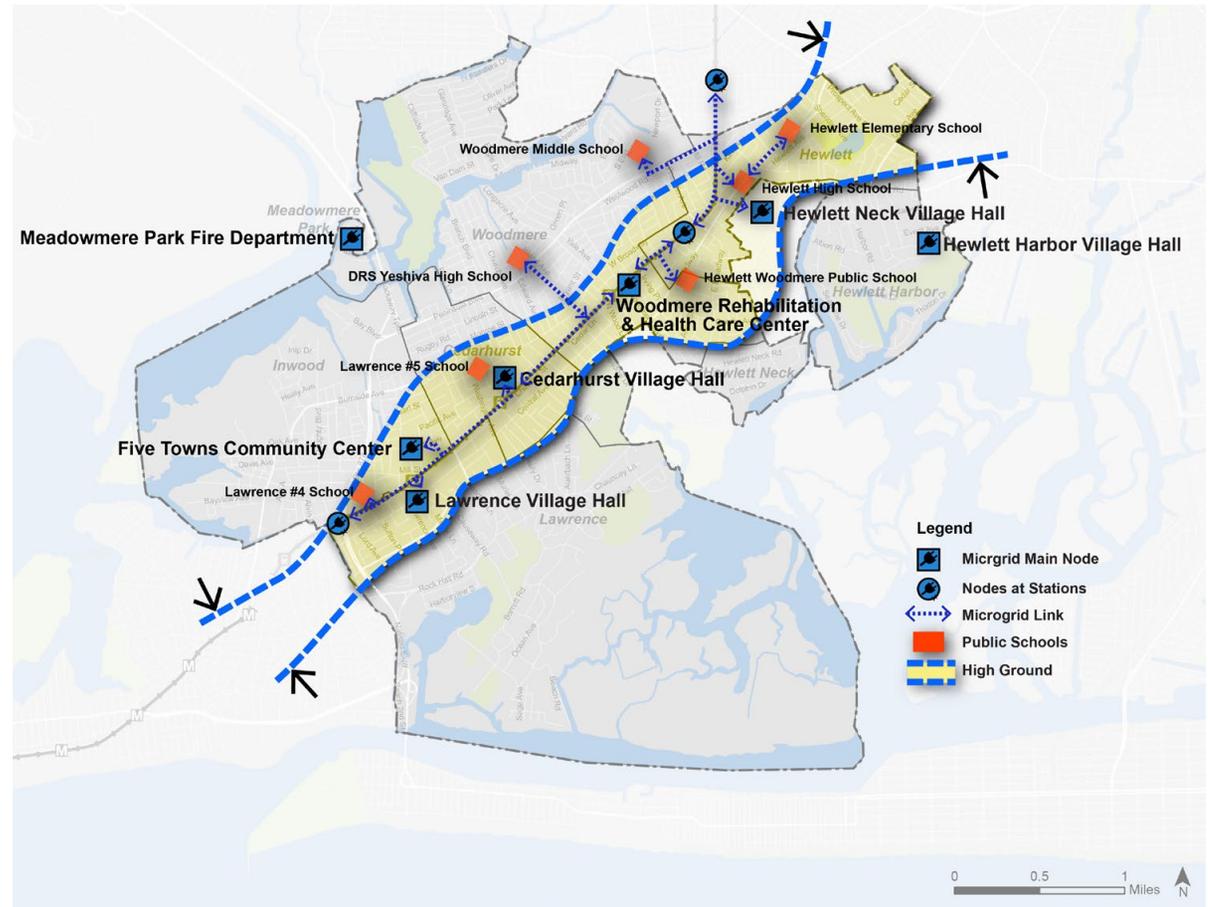


Figure 23: Microgrid Network Concept Diagram

Cost Estimate

Approximately \$167,000

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 2 full time equivalent jobs. Depending on the findings of the study, new investments in infrastructure can lead to new jobs. In addition, the study can provide insights into strengthening the electrical grid and provide back-up power in the case of emergencies.

It is anticipated that this feasibility study would integrate with the regional grid infrastructure improvement plans.

Environmental Benefits

While this project would not directly protect environmental assets, a secondary power supply could maintain floodwater pumping capacity for assets connected to a microgrid.

Health and Social Benefits

The proposed project impacts the Five Towns community, with a total population of 50,377. This project may secure several health and social services assets, depending on the recommendations of the siting analysis performed in the study. Such assets include schools, medical facilities, and critical community facilities.

Cost-Benefit Analysis

Superstorm Sandy illustrated the negative impacts that power outages can have on emergency response operations by interrupting the communications network and disabling

building systems. The total proposed project cost of \$170,000 would determine the most cost-effective way to provide reliable, efficient backup power to critical and locally significant facilities through a microgrid network. Implementation of the study's recommendations would reduce costs by shortening the recovery time for critical facilities and improving the efficiency of emergency response through reliable power and communications.

Anticipated Reduction of Risk

Although, the project would not reduce exposure of assets in the Community, the study would evaluate options that, if implemented, would reduce the vulnerability of residents and visitors in the area. Backup power supply allows equipment to operate during power black-out and first responders can use communication equipment without interruption during a blackout and provide better service to the community.

This project should provide a reduction of risks to all populations in the Five Towns since the action plan should lead to a reliable power supply during disasters. The combined population of the area is 50,377. Specific information regarding the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

The project is likely technically feasible and no permits should be required for a study. Coordination with LIPA/PSEG and National Grid, NYSEDA, and local communities is recommended. Incorporated Villages, Town of Hempstead and Nassau County agencies should be consulted for siting considerations.

Entity with Jurisdiction

Town of Hempstead, Nassau County, Private property owners



Solar Panels in a microgrid network

Regional and Shared Projects

Rockaway Turnpike/Nassau Expressway Resilience Corridor Study [Proposed]

During Superstorm Sandy, tidal flows from Jamaica Bay surged through Hook Creek and Motts Creek, inundating the northern part of the Five Towns (Cedarhurst, Woodmere and parts of Inwood), as well as the NYRCR South Valley Stream Community. While bulkheading and living shorelines should provide protection against flood elevations up to seven-feet, protection against higher flood levels like those seen during Sandy does not lend itself to local implementation due to spatial and property constraints. This project would fund a regional study of flood protection alternatives along Rockaway Turnpike at Hook and Motts Creek. The scope of this regional action plan includes the following objectives:

- Analyze the construction of floodgates and elevation of Rockaway Turnpike and Nassau Expressway. The objective of these measures would be to prevent tidal surge from flowing through the creeks and inundating the adjacent commercial properties and surrounding communities. The elevated roadways would serve as a levee to block storm surge while also protecting critical evacuation routes from flooding.
- Conduct a traffic management study to improve traffic and congestion along Rockaway Turnpike and Nassau Expressway, including the intersections with Peninsula Blvd, Burnside Ave, and West Broadway. These roadways are subject to intense congestion during

normal conditions. Peninsula Blvd and Rockaway Turnpike are both designated evacuation routes and poor traffic flow poses additional risk in the event of an evacuation.

- Study opportunities for economic development in the retail/commercial zones along Rockaway Turnpike and Nassau Expressway corridors. This component may not provide any direct flood protection or evacuation benefit, however more efficient land use and mixed use development may improve the economic resilience of the area. The above flood protection measures should make these retail and commercial sites more attractive for expansion and future development. Additionally, the study would explore if increased revenue can be leveraged to fund improvements.

A key component of this analysis is a flood damage reduction and life risk output assessment, which would assess the benefits of the alternatives for flood protection and risk reduction. The alternatives analysis would result in the identification of a preferred alternative, which would be developed into a conceptual design. Value engineering would be utilized to develop a project cost for that conceptual design, and all regulatory permits and environmental review requirements necessary for implementation would be identified. The study would culminate with a Conceptual Plan for Rockaway Turnpike/Nassau Expressway that

increases resiliency while spurring economic development and relieving traffic congestion on this regional transportation corridor.

Cost Estimate

Approximately \$920,000

Benefits or Co-Benefits

Economic Benefits

The direct study area spans approximately 120 acres in economic development potential, which currently generates over \$160 million annually.⁵² This project could create an estimated 10 full time equivalent jobs. Improvements to the transportation networks will have a positive economic impact on the region's economy as commuters, freight, and other travelers use the networks unencumbered from flooding issues. This study could also result in alternatives to more effectively evacuate residents in the case of storms or other emergency instances.

Combined, the resulting recommendations from the South Shoreline Improvement Program Study, flood gates at Hook Creek and Motts Creek, Reynolds Channel and both in Island Park (see Additional Resiliency Measure: Hempstead/Hewlett Bay Resiliency Corridor; Section V), as well as the Elevated Rockaway Turnpike cumulatively protect approximately 12,000 individual residential or commercial properties that belong to either residents or businesses. According to Nassau County Tax data, 97% of

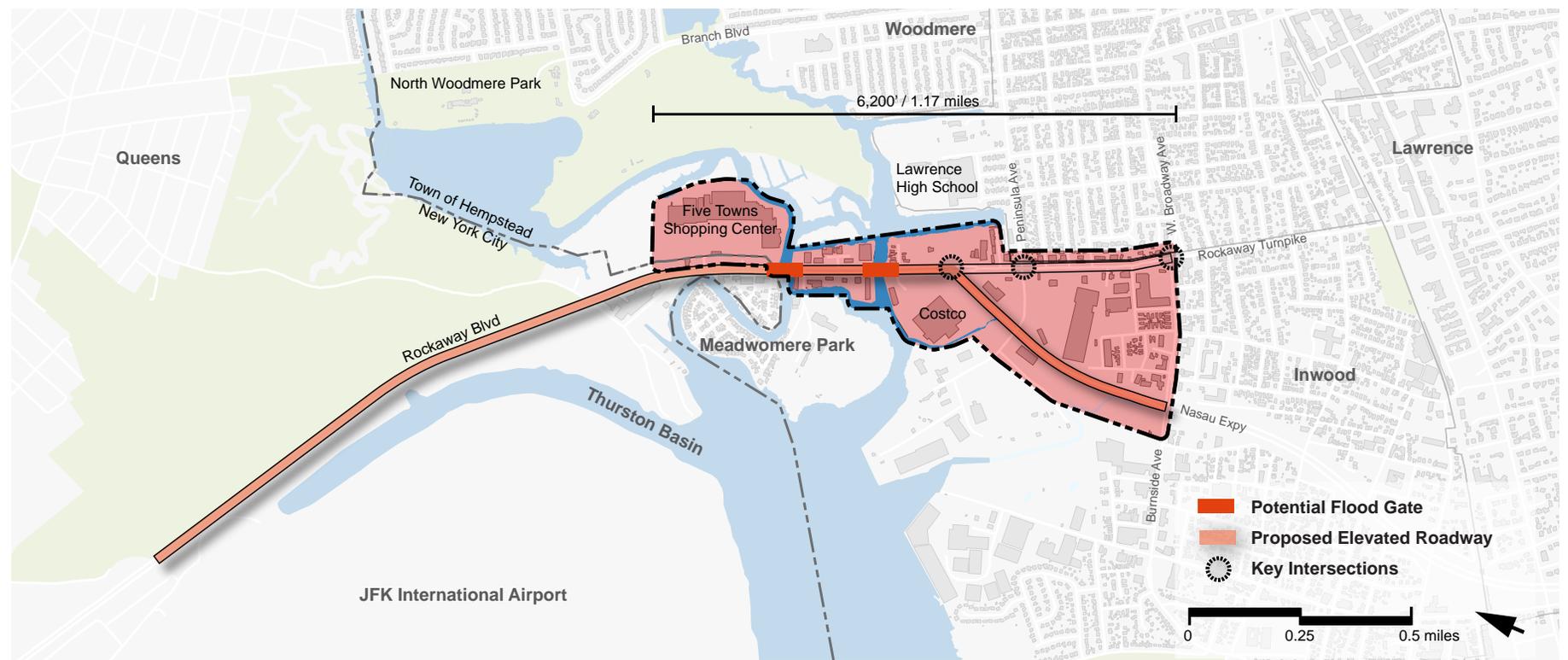


Figure 24: Diagram of Rockaway Turnpike Resilient Corridor

these properties are residential properties and the rest are industrial or commercial properties. The combined estimated market value of the properties that would be impacted if not for these projects would be \$6.1 billion in real estate. This amount assumes total destruction of the property due to flooding.⁵³ FEMA claims were only a fraction of this amount, but still 29% of the value stated, or \$1.75 billion.⁵⁴

When the impacted real estate from the South Shoreline Improvement Program Study and Rockaway Turnpike Floodgates and Rockaway Turnpike/Nassau Expressway Upgrades Study are aggregated, the total amount of residential

and commercial properties number 19,700 with an estimate real estate market value of \$9.7 billion. It should be noted that this estimate does not include tax-exempt properties such as parklands or communal service like churches and community centers, but does include non-exempt properties that extend outside of the current study area but still benefit from these projects.⁵⁵

Environmental Benefits

The proposed regional study would analyze the construction of floodgates and the elevation of Rockaway Turnpike and Nassau Expressway at Hook and Motts Creeks and develop a Conceptual Plan for the Rockaway Turnpike/Nassau Expressway that increases resiliency. Depending on the results of the study, proposed flood protection measures could secure numerous environmental assets in Inwood, Cedarhurst, Woodmere and Meadowmere Park. The Woodmere environmental assets may include North Woodmere Park and Doxy

Brook Park; Meadowmere Park assets may include Fireman’s Memorial Field and Town of Hempstead parkland; environmental assets may include Park, county-and town-owned conserved/protected land; and Cedarhurst assets may include Johnny Jack Park and Cedarhurst Park. Protecting these assets from flooding could also improve wildlife habitat that is supported by these environmental resources.

Health and Social Benefits

The proposed project impacts portions of Inwood, Cedarhurst, Lawrence (along the Nassau Expressway corridor) with a population of 23,124. This project is transportation oriented and does not secure a specific health and social services facility. However, access to all health and social services assets in the area may eventually be improved as a result of the proposed project.

Cost-Benefit Analysis

Rockaway Turnpike/Nassau Expressway is a significant economic driver and congested transportation corridor that serves as an evacuation route for the Five Towns and other south shore Communities, which passes over two waterways that flooded the area in Superstorm Sandy. New York State Department of Transportation and Nassau County recognize the need for transportation improvements along the corridor, which could serve a higher benefit for flood protection. The total proposed project cost of \$920,000 would evaluate flood protection alternatives at Hook Creek and Motts Creek and upgrades of Rockaway Turnpike/Nassau Expressway that

balance flood protection, traffic management and resilient economic growth to recommend the most cost-effective solutions for all three concerns.

Anticipated Reduction of Risk

Raising the roadway to approximately elevation 14 feet North American Vertical Datum (NAVD) would minimize flood impacts to the community transportation system, and improve emergency vehicle response. Flood gates at the same elevation would minimize flooding and improve community safety. The combination of the elevated roadway and flood gates would reduce exposure of assets from a 100-year storm event, reducing the vulnerability of assets located in the Bay. As the base flood elevation is 11-feet, this would provide an additional three-feet of protection.

For the purposes of the Coastal Hazard and Risk Assessment Tool, the installation of floodgates at elevation 14-feet NAVD (i.e., a potential outcome of the study), is assumed to provide a shore defense that would protect against a 100-year storm. Therefore, the shore defenses field for all assets that should benefit from this action are noted as “no” signifying that shore defenses are present and above base flood elevation (BFE). This project is assumed to significantly reduce the vulnerability (loss of service) of assets to the impacts of 100-year storms; therefore, the vulnerability score of all assets was reduced by 3. See Section V for the reduction in risk scores to affected assets included in the asset inventories for South Valley Stream and Five Towns communities, as a result of implementing the proposed

project. Additional assets should be protected in communities of Nassau County beyond these NYRCR communities; these assets are not included in Risk Assessment Tool.

This project should provide a reduction of risks to all populations near the Rockaway Turnpike at Hook and Motts Creek. This impacts portions of Inwood, Cedarhurst, Lawrence (along the Nassau Expressway Nassau Expressway Nassau Expressway) with a population of 23,124. Specific information regarding the population can be found above can be found above in the health and social benefits subsection.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

The study’s recommendations will likely result in actions that may require permits from NYS DEC, the USACE, CZM coastal consistency concurrence (NYS DOS) and a National Wetlands Permit. Coordination is recommended with the Town of Hempstead, Nassau County, NY Department of Transportation (NYS DOT), NYS DEC, FEMA and the US ACE.

Entity with Jurisdiction

New York State Department of Transportation (NYS DOT)

Regional and Shared Projects

Five Towns Community Center Upgrades [Phase 1: Proposed, Phase 2: Featured]

After Superstorm Sandy, the Five Towns Community Center served as an unofficial County Assistance Center. The Center distributed food and supplies to many residents from across the region. The Center played a critical role for thousands of Five Towns residents, but with more adequate preparation and resources, the organization could fill a more formal role in disaster recovery as a County Assistance Center. While the Five Towns Community Center is not an official shelter, it can provide assistance to residents after Nassau County OEM approves of re-entry following a storm event.

Phase 1: Hardening: Generator and Disaster Response Plan [Proposed]

This project aims to harden the Five Towns Community Center while developing a Disaster Response Plan. This Phase would expand available resources for the community center to serve as a community assistance and warming/cooling center, and purchase of a permanent generator to continue full operations during power outages. The project would also include coordination with the Office of Emergency Management Special Needs Registry in addition to coordination with local fire and police departments, and the Nassau County Community Emergency Response Teams (CERT). Improvements would include communications systems, such as Alert FM or scrolling updates on televisions. The response plan should help the Five Towns Community Center prepare for a variety of circumstances.

Phase 2: Capital Improvements: Shower and Laundry Facilities [Featured]

This Phase would improve facility conditions for enhanced preparedness in future storm events. Repairs would include capital improvements such as upgrades to showers and bathrooms and the installation of laundry facilities. These actions should enable the center to provide even more impactful relief services after a storm. This project will also help the Center to provide improved services during normal conditions.

Cost Estimate

Phase 1: Approximately \$300,000

Phase 2: Approximately \$50,000

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 3 full-time equivalent jobs. The supplemental impacts of this effort should be felt during the next emergency when the response plan would be enacted. Additional impacts would be the efficient use of equipment and manpower in the region during an emergency event as the Five Towns should have their citizens and infrastructure more secure than without the plan. This would allow regional emergency crews to attend to areas that are in more need of assistance. Ancillary impacts may be the preservation of valuable equipment that



The Five Towns Community Center

could have been damaged if the plan was not enacted.

Health and Social Benefits

The proposed project impacts the Five Towns community, with a total population of 50,377, which represents the overall population with improved access to health and social service facilities as a result of the proposed project. The Five Towns Community Center is identified as a health and social services asset.

Cost-Benefit Analysis

The Five Towns Community Center played an invaluable role in Superstorm Sandy recovery, and seeks to expand its role as a Community Assistance Center. The total proposed project cost of \$300,000 and featured project cost of \$50,000 is a cost-effective way to provide a location for post-storm community assistance, as it would build capacity for an existing community facility with efficient management and programming capabilities, leading to high returns and reduced government expenditures for future storm events.

Anticipated Reduction of Risk

The project would reduce the vulnerability of the Five Towns Community Center, which is a locally significant asset with a high community value that provides services to all residents within the Five Towns. The project would upgrade a disaster recovery facility and develop an emergency disaster response plan. As such, the project would reduce the vulnerability of residents and visitors in the Community.

This project should provide a reduction of risk to all populations in the Five Towns since 1) the community center serves the whole community, and 2) planning for a disaster should enhance the town’s response capability. The combined population of the area is 50,377. Specific information regarding the population can be found above can be found above in the health and social benefits subsection.

Timeframe of Implementation

Phase 1: Immediate (<2 years)



Governor Andrew Cuomo, left, distributing supplies with State Senator Dean Skelos and Bertha Pruitt, Executive Director of the Five Towns Community Center

Source: The Five Towns Community Center

Phase 2: Intermediate (2-5 years)

Regulatory Requirements

Coordination is recommended with emergency response officials, including the Town of Hempstead, Nassau County Office of Emergency Management, and FEMA. Construction can begin once design and

environmental review has been completed and permits have been secured.

Entity with Jurisdiction

Nassau County, Five Towns Community Center

Regional and Shared Projects

Lawrence High School Hardening and Protection [Proposed]

Lawrence High School is located on Motts Creek, a tidal channel with the potential to flood either from significant storm surge (as in the case of Superstorm Sandy) or from heavy rainfalls that cause the Creek to swell. Lawrence High School was closed for approximately six months due to damage caused by Superstorm Sandy. The storm resulted in significant water damage, including corroded electrical wiring and mold. The school's 975 students were temporarily relocated to the middle school, which forced 400 middle school students to be transferred to local elementary schools. A sink hole formed along the western side of the building, allowing water to enter the crawl space under the High School.

The school is currently repairing the area where waters entered the crawl space, and dry-flood proofing the building exterior. This project includes the evaluation and implementation of solutions to prevent future damage and interruption of service that would build upon the \$8.5M in repairs completed to date. A flood prevention wall would be constructed around Lawrence High School. The purpose of the wall is to provide additional protection to the building foundation in storm events.

Cost Estimate

Approximately \$1,600,000



Figure 25: Conceptual Diagram of Lawrence High School Flood Barrier

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 20 full time equivalent jobs. Aside from the construction jobs created, economic benefits would result from the avoided costs of closing the school, relocating students to other schools, and

property damages. Increasing the resiliency of the high school also offers local leaders another place to coordinate efforts in the case of an emergency, and could become a potential Community Assistance Center.

Health and Social Benefits

The proposed project impacts the town of Cedarhurst, with a population of 6,712, which represents the overall population with improved access to health and social service facilities as a result of the proposed project. This project directly secures Lawrence High School, which is identified as a health and social services asset.

Cost-Benefit Analysis

Lawrence High School was out of service for nearly six months following Superstorm Sandy due to flooding in its crawl space and damage to electrical units. The total proposed project cost of \$1,600,000 would provide protection to the crawl space, building upon the \$8,500,000 already invested in repairs, and avoid costs of closing and relocating students to other schools in the district during future storm events.

Anticipated Reduction of Risk

The project would reduce the vulnerability of this locally significant asset with high community value, and help the school to recover faster from storm events. In addition, the project would secure a facility that could serve the greater community during a disaster event.

This project should provide a reduction of risk to the approximately 1,200 students enrolled at the school and 130 teachers, as well as staff⁵⁶. The project should provide additional risk reduction benefits to all populations in Cedarhurst since the school serves as a Community Assistance Center. The combined population of the area is 6,712. Specific information regarding the population can be found above can be

found above in the health and social benefits subsection.

Timeframe of Implementation

Intermediate (2-5 years)

Regulatory Requirements

The project may require a Tidal Wetlands Permit from the NY Department of Environmental Conservation, the USACE and CZM coastal consistency concurrence (NYS DOS), as well as permits from the Village of Cedarhurst and Nassau County. Coordination is recommended between the school district and FEMA. Construction can begin once design and environmental review have been completed and permits have been secured.

Entity with Jurisdiction

Lawrence Union Free School District

Cedarhurst Projects

Cedarhurst Stormwater Infrastructure Upgrades [Phase 1: Proposed, Phase 2: Featured]

Flooding in Cedarhurst during Superstorm Sandy occurred due to the storm surge and water entering low-lying areas through the stormwater drainage systems. Stormwater outfalls are located along Motts Creek and Head of Bay and during high tide, storm events and heavy rain, bay water enters the outfalls and floods low lying parts of area through the catch basins located in the street. The largest concentration of flooding occurs in the vicinity of Peninsula Boulevard. This project would address deficiencies within the stormwater management system. The project is divided into two phases, as follows.

Phase 1: Hydrologic and Hydraulic study, Check Valves, Pumps, and Water Storage Tank [Proposed]

This first Phase 1 includes a hydrologic and hydraulic (H & H) study on the existing stormwater system to determine deficiencies. The project also includes the installation of check valves on outfalls to prevent the high tide and storm tidal flows from entering the storm sewer system, installation of wet weather pumps and the use of the decommissioned sewer tanks for stormwater capture and release. The cost estimate includes typical regulatory, labor, and constructions contingency costs.

Phase 2: Stormwater Infrastructure Upgrades[Featured]

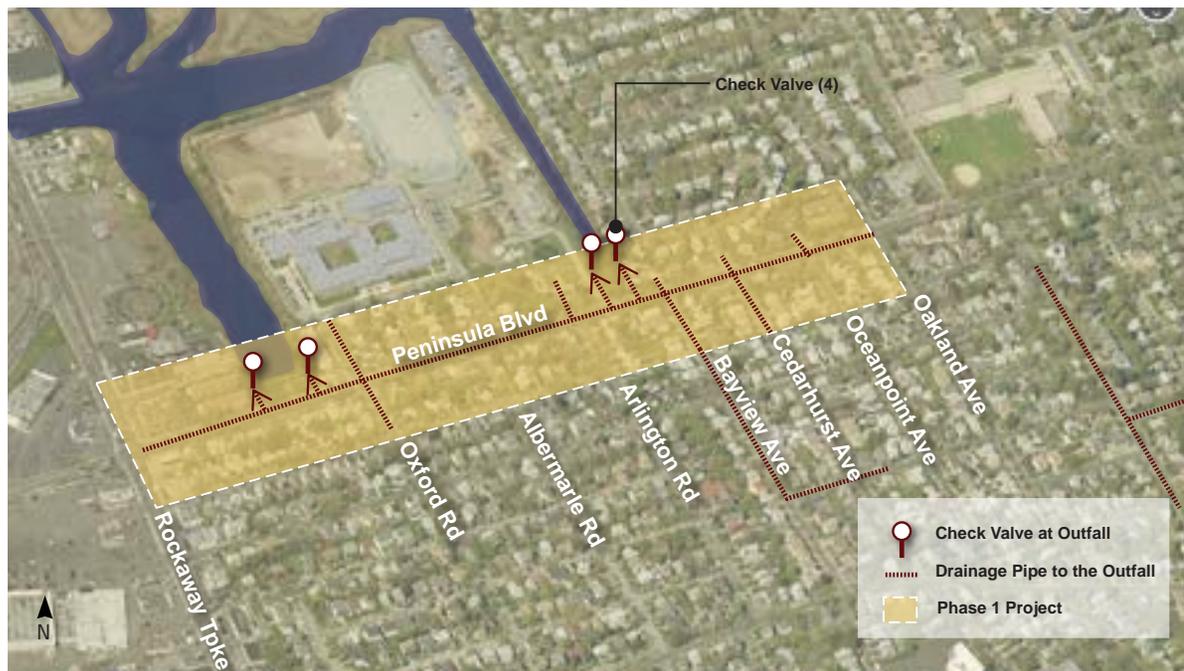


Figure 26: Cedarhurst Stormwater Infrastructure Upgrades: Phase I

Following the completion of the H&H Study, the recommended improvements would be implemented, including repairs and upgrades to stormwater pipes, drains, and catch basins. The improvements are intended to increase the capacity of the stormwater disposal system in Cedarhurst. Phase 2 would include improvements along Peninsula Boulevard from Rockaway Turnpike to Bayview Avenue and the north-south corridors in between, including Oxford Road, Albermarle Road, Arlington Road, Hanlon Drive, and Bayview Avenue.

These areas are within the extreme and high risk zones, are areas that flooded during Sandy and were identified by the Committee members and the greater public. In addition to those areas, Phase 2 would complete all recommendations determined feasible in Phase 1.

Cost Estimate

Phase 1: Approximately \$2,000,000

Phase 2: Approximately \$7,800,000

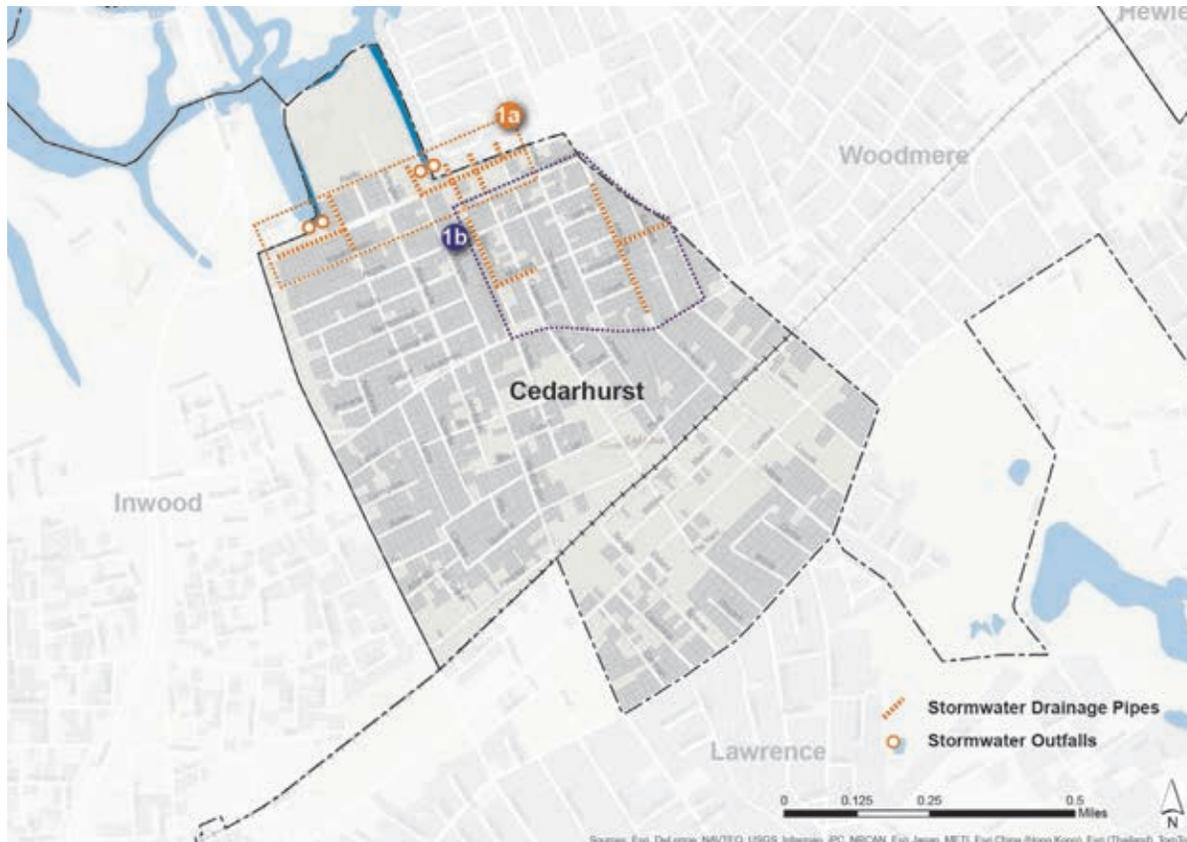


Figure 27: Map of Cedarhurst Stormwater Infrastructure Upgrades

Benefits or Co-Benefits

Economic Benefits

Phase 1 of this project could create an estimated 22 full-time equivalent jobs, while Phase 2 will create an estimated 85 full-time equivalent jobs. The additional stormwater upgrades should positively impact Cedarhurst’s existing infrastructure by reducing erosion and strain on the sewage systems. Over time this should save Cedarhurst additional expenses for

maintenance and replacement of stormwater infrastructure system components.

Environmental Benefits

The proposed project includes a study to determine the deficiencies of the existing stormwater system as well as the phased implementation of repairs and upgrades to stormwater system elements (e.g., pipes, drains, catch basins) based on the study results. The project would reduce the flooding risk of

the Village of Cedarhurst, which would help to secure all environmental assets in the area. Types of assets could include parks, such as Johnny Jack Park and Cedarhurst Park, as well as natural areas, riparian habitat, etc. Improvements to the existing stormwater system would include installation of swirl separators to filter out pollutants, which would improve water quality of water resources. Thus the project also could help to secure Motts Creek.

Health and Social Benefits

The proposed project impacts the Peninsula Boulevard (low lying) portion of Cedarhurst, with a population of 2,541. This project does not secure a specific health and social services facility. However, the stormwater improvements may benefit the Lawrence Number 6 School which is located on Peninsula Boulevard and identified as a health and social services asset by the community.

Cost-Benefit Analysis

Stormwater drainage issues were identified as a major concern by the NYRCR Committee, Village of Cedarhurst and general public due to severe flooding from Superstorm Sandy and routine localized flooding occurring since the Storm. The total proposed project cost of \$2,000,000 and featured project cost of \$7,800,000 would provide a phased approach to resolving stormwater drainage issues in the most impacted areas of Cedarhurst by improving stormwater system efficiency, which would reduce the costs of property damages and government expenditures for emergency response in future storm events.

Anticipated Reduction of Risk

Assets in Cedarhurst are susceptible to flooding because of poor drainage through the stormwater sewer system and inundation by seawater back-flowing through the stormwater sewer system. This project would reduce the vulnerability of assets in Cedarhurst by addressing these problems and thus reducing the frequency and severity of flooding during precipitation events and spring tides. Assets that provide a service would therefore experience fewer and/or shorter periods when that service is unavailable.

Initially, the study would identify deficiencies in the existing system and provide feasible alternatives to address those deficiencies and help to prevent and/or minimize flooding. By upgrading the pipe capacity, stormwater could be stored within the system and be released when higher water recedes, which would prevent or minimize flooding. Check valves would prevent backflow of tidal water into the system, also reducing flooding. As such, it would secure locally significant stormwater infrastructure assets, including the pipes and outfalls.

This project should provide a reduction of risks to all populations in the Cedarhurst community. The combined population of the area is 6,712. Although the upgrades are being completed in a specific area, the interconnectivity of the stormwater system results in a reduction of risk to all residents in Cedarhurst.

Timeframe of Implementation

Phase 1: Immediate (< 2 years)

Phase 2: Intermediate (2-5 years)

Regulatory Requirements

Phase 2 may require permits from New York State Department of Environmental Conservation (NYS DEC), USACE, (CZM) coastal consistency concurrence (NYS DOS), the Village of Cedarhurst, and Nassau County.

Entity with Jurisdiction

Village of Cedarhurst, Nassau County

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

Cedarhurst Projects

Cedarhurst Removable Flood Walls for DPW Facility [Proposed]

Cedarhurst operates a public works storage facility adjacent to Lawrence High School along Motts Creek. The facility was flooded during Superstorm Sandy, causing damage to equipment and vehicles. This damage limited the ability of the Village to respond in the aftermath of the storm, due to the reduction in vehicles.

This project would provide removable flood walls to protect the two buildings on the DPW site. The cost estimate of \$500,000 includes purchase of a seven-foot fixed removable flood wall for the perimeter of the buildings only. It includes typical regulatory, labor, and construction contingency costs. The removable flood barriers would only be deployed before the onset of a significant storm and taken down and stored once the flood waters have receded. The barriers would only protect the two buildings on site and would limit the capability of entering and exiting the buildings during a flood. However, this is a low cost, easily maintained option to protect the buildings.

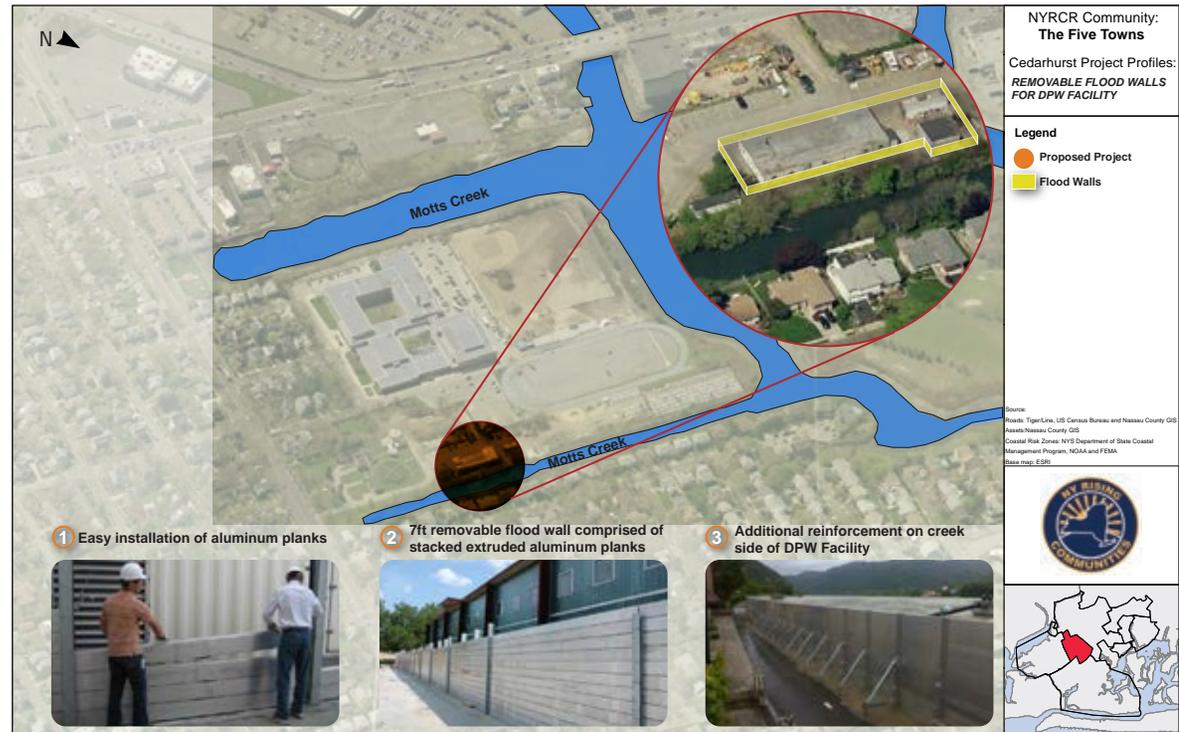


Figure 28: Removable Flood Walls for Cedarhurst DPW Facility

Cost Estimate

Approximately \$500,000

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 5 full-time equivalent jobs. Additional economic benefits could include the savings to taxpayers of

equipment that would not need to be replaced if the DPW is flooded again.

Additionally, equipment protected from the flooding can be utilized to provide a more effective restoration effort after another storm. This would speed recovery time bringing the township’s economic activity back to normal. This can provide a variety of tax payer benefits.

Health and Social Benefits

The proposed project impacts the Cedarhurst block group where the DPW is located, which includes a population of 1,287. While the DPW is not identified as a health and social services facility, the DPW is located immediately adjacent to the Lawrence High School, which is identified as a health and social services asset and may experience flood protection benefits as a result of the proposed project.

Cost-Benefit Analysis

The DPW site was flooded during Superstorm Sandy and requires protection for its buildings and the equipment within from future storm events. The total proposed project cost of \$500,000 is an innovative and cost-effective way to provide flood protection from large storm events, avoiding property and equipment damage costs during future storm events, and reducing expenditures for emergency response by enabling the DPW facility to play a larger role in operations.

Anticipated Reduction of Risk

The project would decrease the vulnerability of this locally significant facility and the equipment within by providing a removable flood wall intended to surround and protect the Cedarhurst public works storage facility during flooding events, and thereby decrease the vulnerability of the population served by the facility.

This project should provide a reduction in risk to all populations in Cedarhurst since protecting the DPW from flooding would enhance the town's response capability. The combined population of the area is 6,712. Specific information regarding the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

The project may require permits from NYS DEC, USACE, CZM coastal consistency concurrence (NYS DOS), the Village and Nassau County.

Entity with Jurisdiction

Village of Cedarhurst

Cedarhurst Projects

Cedarhurst Village Hall Disaster Response Plan [Proposed]

After Superstorm Sandy, officials from the Village of Cedarhurst worked around the clock to provide information and services to affected residents. Officials used Village Hall as an impromptu command center; however the facility was not equipped to serve as a Community Assistance Center and lacked critical resources required to operate effectively.

This project includes both the creation of a Disaster Response Plan to increase the Village’s capacity and continuity of operations following storm events, as well as the installation of backup generators to ensure ongoing operations and communications during primary power outages.

Cedarhurst has completed an assessment of hazards within the Village and is currently preparing a Hazard Mitigation Plan with an expected completion date of August 2014. The Disaster Response Plan would build upon the Hazard Mitigation Plan to provide operational guidance for the Village during storm events and other disasters.

Cost Estimate

Approximately \$70,000

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 1 full-time equivalent job. The supplemental impacts of this effort would be felt during

the next emergency when the response plan would be enacted. Ancillary impacts may be the preservation of valuable equipment that could have been damaged if the plan was not enacted. Additional benefits would include the efficient use of equipment and human resources in the region during an emergency event, as citizens and infrastructure of Cedarhurst should be more secure with the plan. This would allow regional emergency crews to attend to areas that are in more need of assistance.

Health and Social Benefits

The proposed project impacts the town of Cedarhurst, with a population of 6,712. The Cedarhurst Village Hall is identified as a health and social services asset by the community.

Cost-Benefit Analysis

The Village of Cedarhurst recognizes the need for hazard mitigation planning to improve the efficiency of emergency response operations. The total proposed project cost of \$50,000 is a minor investment that would build upon the Village’s completed Hazards Assessment to build disaster response capacity at Village Hall, which would government expenditures for emergency response.

Anticipated Reduction of Risk

While not directly reducing the risk to physical assets, the project would foster a more resilient community by providing a fully equipped

command center and emergency shelter. By increasing the efficiency of the response team, recovery time would be expected to decrease. By decreasing recovery time, the vulnerability of the community and assets within the community, should be reduced.

This project should provide a reduction of risks to all populations in Cedarhurst, since planning for a disaster would enhance the town’s response capability. The combined population of the area is 6,712. Specific information regarding the population can be found above can be found above in the health and social benefits subsection.

Timeframe of Implementation

Immediate (< 2 years)

Regulatory Requirements

No permits are required for a study. Coordination with emergency management officials including the Nassau County Office of Emergency Management (OEM), New York State OEM and FEMA is recommended. Implementation can begin following the approval of the Village’s Disaster Response Plan.

Entity with Jurisdiction

Village of Cedarhurst

Cedarhurst Projects

Cedarhurst Repair of Berm along Municipal Property [Featured]

The berm along the Village of Cedarhurst Property adjacent to the DPW facility has been eroding since Superstorm Sandy.

This project would repair the berm along the western boundary of the municipal property. The cost estimate of \$770,000 would provide minor repairs as necessary and includes environmental review, contract management and regulatory approvals.

Cost Estimate

Approximately \$700,000

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 8 full-time equivalent jobs. Additional economic benefits could include the savings to taxpayers of equipment that would not need to be replaced if the DPW is flooded again. Equipment protected from flooding can be utilized to provide a more effective restoration effort after another storm. This should speed recovery time bringing the township's economic activity back to normal and would provide a variety of tax payer benefits.

Environmental Benefits

This project would prevent further erosion of the berm; therefore it should reduce sedimentation and benefit Motts Creek, an identified environmental asset.

Health and Social Benefits

The proposed project impacts the Cedarhurst block group where the DPW is located, which includes a population of 1,287. While the DPW is not identified as a health and social services facility, the DPW is located immediately adjacent to the Lawrence High School, which is identified as a health and social services asset and may experience flood protection benefits as a result of the proposed project.

Cost-Benefit Analysis

The DPW site was flooded during Superstorm Sandy and requires protection for its buildings and the equipment within from future storm events. The total featured project cost of \$700,000 would provide additional protection in conjunction with the deployable flood walls, with similar benefits of avoided property and equipment damage costs during future storm events, as well as improved benefits to environmental quality by repairing the eroding berm.

Anticipated Reduction of Risk

The project would the berm that provides protection to the Cedarhurst public works storage facility during flooding events. In combination with the Removable Flood Walls, the project would decrease the vulnerability of this locally significant facility and the equipment within, and thereby decrease the vulnerability of the population served by the facility.

This project should provide a reduction of risks to all populations in Cedarhurst since protecting the DPW from flooding should enhance the town's response capability. The combined population of the area is 6,712. Specific information regarding the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Immediate (< 2 years)

Regulatory Requirements

The project may require a Tidal Wetlands permit from NYS DEC, USACE, CZM coastal consistency concurrence (NYS DOS), as well as permits from the Village and Nassau County.

Entity with Jurisdiction

Village of Cedarhurst

Hewlett Projects

Stormwater Infrastructure Upgrades [Phase 1: Proposed, Phase 2: Featured]

Flooding during Superstorm Sandy occurred due to inadequate storage of the stormwater drainage system. Hewlett experiences flooding and pooling of water from the stormwater system in the streets during heavy rains and high tides. Rainwater is unable to exit the stormwater system during high tides due to the tidal water inundating the piping system. This project would address deficiencies in the stormwater disposal system.

Phase 1: Hydrologic & Hydraulic Study, Check Valves, and Stormwater Infrastructure Upgrades [Proposed]

The estimated project cost of \$2.3 million includes a hydrologic and hydraulic study on the existing system to determine deficiencies within Hewlett and implementation of upgrades to the stormwater pipes, drains, and catch basins primarily in the area of Kew Road from Stevenson Road to Quay Ave, as well as E. Broadway near Franklin Ave. The H&H study would determine other areas of deficiencies and recommend feasible alternatives to address the issues. The cost estimate includes typical regulatory, labor, and construction contingency costs.

Phase 2: Additional Stormwater Infrastructure Upgrades [Featured]

This project would provide additional upgrades to the stormwater infrastructure in Hewlett in the area of Broadway, from Burton Avenue to Piermont Avenue, including north-south

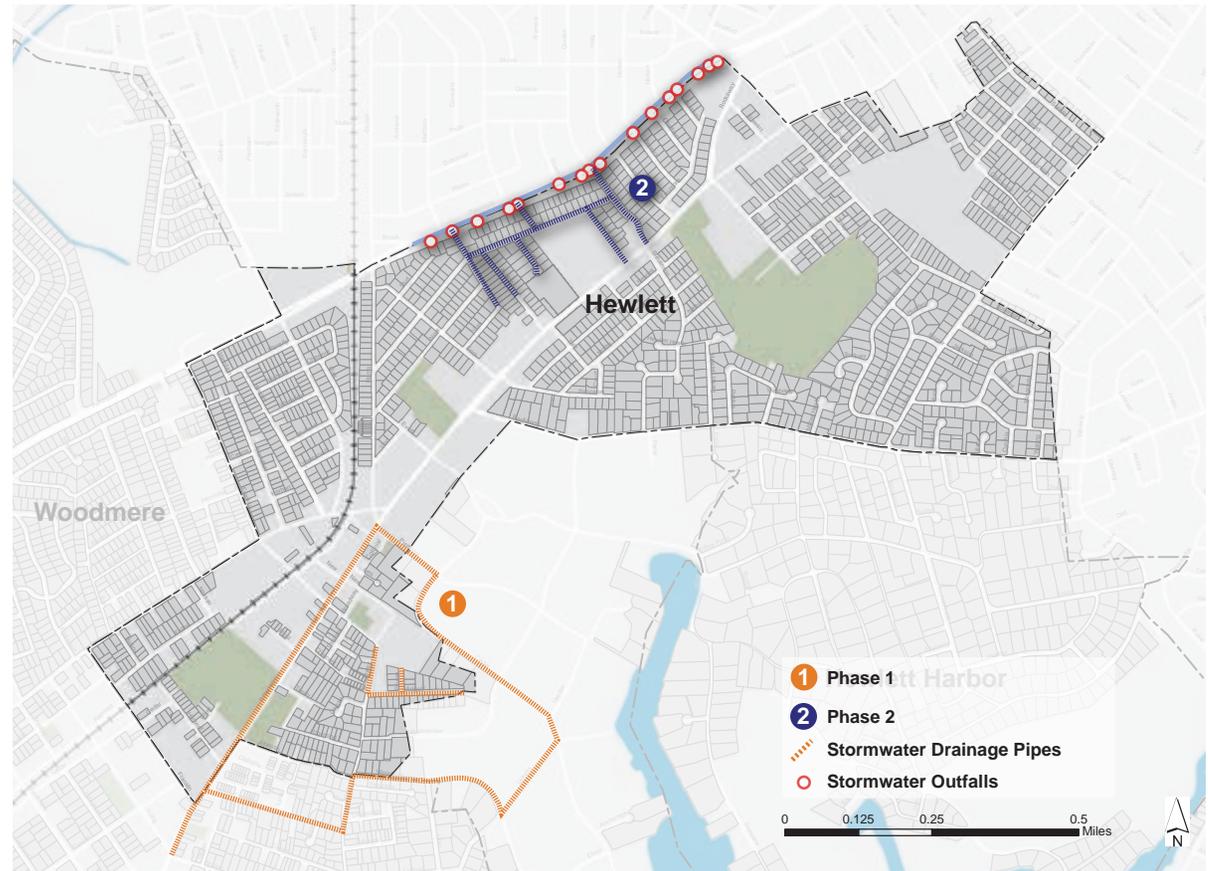


Figure 29: Map of Hewlett Stormwater Infrastructure Upgrades

roadways in between, south along Woodside Drive and Cedar Avenue. Phase 2 would improve capacity and system efficiency.

Cost Estimate

Phase 1: Approximately \$2,700,000

Phase 2: Approximately \$7,600,000

Benefits or Co-Benefits

Economic Benefits

Phase 1 of this project could create an estimated 29 full-time equivalent jobs, while Phase 2 could create an estimated 83 full-time equivalent jobs. The addition of stormwater upgrades should positively impact Hewlett's existing infrastructure by reducing erosion and strain on the stormwater infrastructure system. Over time, this would save Hewlett the additional expenses for maintenance and replacement of system components.

Environmental Benefits

The proposed project entails upgrades to the Hewlett stormwater infrastructure system, including installation of swirl separators to filter out pollutants. The project would result in reduced flooding risk to the Town of Hewlett, helping to secure all environmental assets within the area and improvements in water quality of the stormwater being discharged into the Bay, including Doxy Brook. Types of environmental features that would be protected include parks and other open spaces and natural areas in Hewlett, such as Grant Park and the Hewlett House property/ grounds.

Health and Social Benefits

The proposed project impacts the town of Hewlett, with a population of 6,800. This project does not secure a specific health and social services facility. However, improving stormwater management within Hewlett may benefit health and social services assets such as the Hewlett Fire Department.

Cost-Benefit Analysis

Stormwater drainage issues were identified as a major concern of the NYRCR Committee and general public due to severe flooding from Superstorm Sandy and routine localized flooding occurring since the Storm. The total proposed project cost of \$2,700,000 and featured project cost of \$7,600,000 would provide a phased approach to resolving stormwater drainage issues in the most impacted areas of Hewlett by improving stormwater system efficiency, which would reduce the costs of property damages and government expenditures for emergency response in future storm events.

Anticipated Reduction of Risk

The study would identify deficiencies to existing system and provide feasible alternatives to address the system deficiencies to help prevent and/or minimize flooding. Depending on the options suggested by the study, further action could include the upgrading of the stormwater discharge system and the installation of check valves. As such, the project would decrease the vulnerability of assets in the Hewlett by improving stormwater management and securing locally significant stormwater infrastructure assets, including the pipes and outfalls.

This project should provide a reduction of risks to all populations in Hewlett. Improving the stormwater system should reduce flooding throughout the community given the interconnectivity of the system. The combined population of the area is 6,800. Specific information regarding the population can be found above can be found above in the health and social benefits subsection.

Timeframe of Implementation

Phase 1: Immediate (< 2 years)

Phase 2: Intermediate (2-5 years)

Regulatory Requirements

The project may require permits from NYS DEC, USACE, CZM coastal consistency concurrence (NYS DOS), the Town of Hempstead and Nassau County. Some property constraints exist as construction may take place on private property.

Entity with Jurisdiction

Town of Hemsptead, Nassau County

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

Hewlett Harbor Projects

Hewlett Harbor Stormwater Infrastructure Upgrades [Phase 1: Proposed, Phase 2: Featured]

Flooding during Superstorm Sandy occurred due to storm surge and inadequate stormwater drainage systems. Hewlett Harbor also experienced sewage backups in streets and some basements due to the shutdown of the Bay Park Sewage Treatment Plant. Pepperidge Road was impassable during and after the storm and water tends to pool for several days because of the inadequate drainage of stormwater.

Sink holes have started to form along Pepperidge Road. The Village has retained the engineering firm Dvirka & Bartilucci (D&B) Engineers and Architects, P.C. to study the location, capacity, and flow direction of the stormwater network and to recommend improvements to the stormwater infrastructure that would protect Pepperidge Road in the area of Auerbach Avenue, Heather Lane and the Village Hall from future flooding.

Phase 1: Check Valves and Stormwater Infrastructure Upgrades [Proposed]

This project involves the implementation of the recommendations of Hewlett Harbor’s ongoing engineering study. This project also includes flood protections at Village Hall which is comprised of re-grading the Village Hall property and directing stormwater into green infrastructure detention areas. The Village intends to implement flood mitigation through further green infrastructure practices where feasible, based upon the determinations of the engineering study.

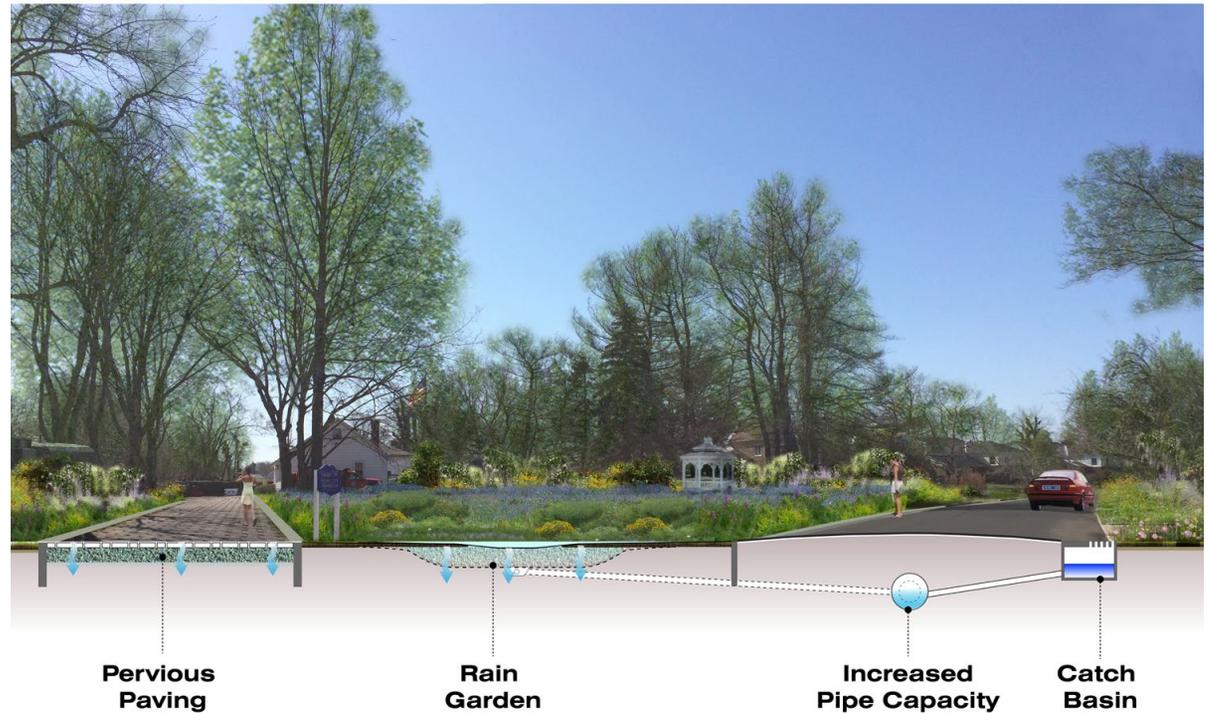


Figure 30: Hewlett Harbor Village Hall Stormwater Infrastructure Upgrades

The estimated project cost of \$3 million includes further hydrologic and hydraulic analysis on the existing system to determine deficiencies and implementation of repair and upgrades to storm water pipes, drains, and catch basins. Major upgrades include; re-direction of stormwater flow, storm drain clean-outs and approximately 4,000 linear feet of pipeline, consisting of H.D.P.E. pipe sizes ranging from 15-inch to 48-inch, to increase capacity along Pepperidge

Road. Green infrastructure elements including permeable parking lot surfaces, bioswales, a detention pond and site restoration for Village Hall were also included in the cost. The estimate includes a natural gas fueled electric generator for Village Hall and a Vacuum Truck. The cost estimate includes typical regulatory, labor, and construction contingency costs.

Phase 2: Additional Stormwater Infrastructure Upgrades [Featured]



Figure 32: Map of Hewlett Harbor Stormwater Infrastructure Upgrades

This project would provide additional upgrades to the stormwater infrastructure in Hewlett Harbor, per the forthcoming recommendations of the ongoing engineering study. Phase 2 would improve capacity and system efficiency, while addressing the study’s recommendations that cannot be addressed within Phase 1. This Phase would expand the scope of hydrologic and hydraulic analysis to include stormwater infrastructure that potentially contributes to

stormwater issues along Pepperidge Road, such as Harbor Road, Auerbach Avenue.

Cost Estimate

Phase 1: Approximately \$3,000,000

Phase 2: Approximately \$3,800,000

Benefits or Co-Benefits

Economic Benefits

Phase 1 of this project could create an estimated 33 full-time equivalent jobs, while Phase 2 could create an estimated 41 full-time equivalent jobs. The addition of stormwater upgrades should positively impact Hewlett’s existing infrastructure by reducing erosion, and reducing strain on the stormwater disposal system. Over time this would save Hewlett Harbor the additional expenses for maintenance and replacement of systems that are affected by stormwater.

Properties along Pepperidge Road should benefit from reduced repair costs due to stormwater flooding.

Environmental Benefits

The objective of the project is to protect the Pepperidge Road, Auerbach Avenue, Heather Lane and the Village Hall area within the Village of Hewlett Harbor from future flooding via improvements to stormwater pipes, drains and catch basins. As such, the project would increase the resiliency of the Pepperidge Road area and secure various types of environmental features (e.g., open spaces and other natural areas, wetlands, etc.) in the immediate vicinity. The proposed repairs and upgrades to the stormwater infrastructure system (including clean out), as well as the installation of green infrastructure at Village Hall, would have beneficial impacts to the water quality of area water bodies that the stormwater outfalls release into, including Hewlett Harbor/ Hewlett Bay and Thixton Creek. The installation of green infrastructure practices at Village Hall

would provide habitat to avian species that use the area. NYS DEC has identified three types of significant natural communities along portions of the western shore of Thixton Creek, the northern shore of Hempstead Bay, and within Hempstead Harbor: Low salt marsh at Hempstead Bay Wetlands, High salt marsh at Hempstead Bay Wetlands, and Salt pan at Hempstead Bay Wetlands.⁵⁷ These significant natural communities would also benefit from the proposed project. Swirl separators prevent pollutants from being discharged in the creek thereby improving water quality and wildlife habitat.

Health and Social Benefits

The proposed project impacts Hewlett Harbor, with a population of 1,124. This project does not secure a specific health and social services facility.

Cost-Benefit Analysis

Stormwater drainage issues were identified as a major concern of the NYRCR Committee, the Village of Hewlett Harbor and the general public due to severe flooding from Superstorm Sandy and routine localized flooding occurring since the Storm. The total proposed project cost of \$3,000,000 and featured project cost of \$3,800,000 would provide a phased approach to resolving stormwater drainage issues in the most impacted areas of Hewlett Harbor by improving stormwater system efficiency, which would reduce the costs of property damages and government expenditures for emergency response in future storm events.

Anticipated Reduction of Risk

The current study should identify deficiencies to the existing stormwater management system and provide feasible alternatives to address the system deficiencies and help to prevent and/or minimize flooding. By upgrading pipe capacity, stormwater would be discharged faster reducing flooding. Installation of check valves would prevent backflow into the system, also reducing flooding. Installation of green infrastructure would reduce flood water. As such, the project would reduce vulnerability of assets and, by reducing flooding of roadways, decrease response time of emergency response personnel. It should also secure locally significant stormwater infrastructure assets, including the pipes and outfalls.

This project should provide a reduction of risks to all populations in Hewlett Harbor. Improving the stormwater system should reduce flooding throughout the community given the interconnectivity of the system. The combined population of the area is 1,124. Specific information regarding the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Phase 1: Immediate (<2 years)

Phase 2: Intermediate (2-5 years)

Regulatory Requirements

The project may require permits from NYS DEC, USACE, CZM coastal consistency concurrence (NYS DOS), the Village of Hewlett Harbor and Nassau County.

Entity with Jurisdiction

Village of Hewlett Harbor, Nassau County

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

Hewlett Neck Projects

Hewlett Neck Stormwater Infrastructure Upgrades [Phase 1: Proposed, Phase 2: Featured]

Hewlett Neck has a network of dry wells and catch basins, but stormwater drainage is still a problem during rain events, indicating inadequate capacity. Superstorm Sandy illustrated the specific problem areas in Hewlett Neck's stormwater system, including the streets surrounding Adams Lane, Hewlett Neck Road and Dolphin Drive. Since the storm, pooling of water occurs in low-lying areas and Adams Lane has buckled in several places.

One of the areas intended to drain stormwater from Adams Lane is Woodbine Ditch. Woodbine Ditch is an approximately 500 foot long riparian zone in Hewlett Neck. The parcel, which is owned by the Village of Hewlett Neck, is populated with trees and underbrush. The ditch is a frequent source of flooding but presents an opportunity to integrate more effective green infrastructure solutions with existing stormwater infrastructure.

Phase 1: Hydrologic & Hydraulic Study, Check Valves, and Stormwater Infrastructure Upgrades [Proposed]

This project would improve the stormwater capacity of Woodbine Ditch with enhanced green infrastructure measures, including a bioswale extending from approximately Smith Lane to Woodbine Ditch. The estimated cost of the project includes a study to determine the specific deficiencies of the stormwater infrastructure in Hewlett Neck and stormwater infrastructure upgrades to improve capacity in the area of Dolphin Drive from Boulevard South

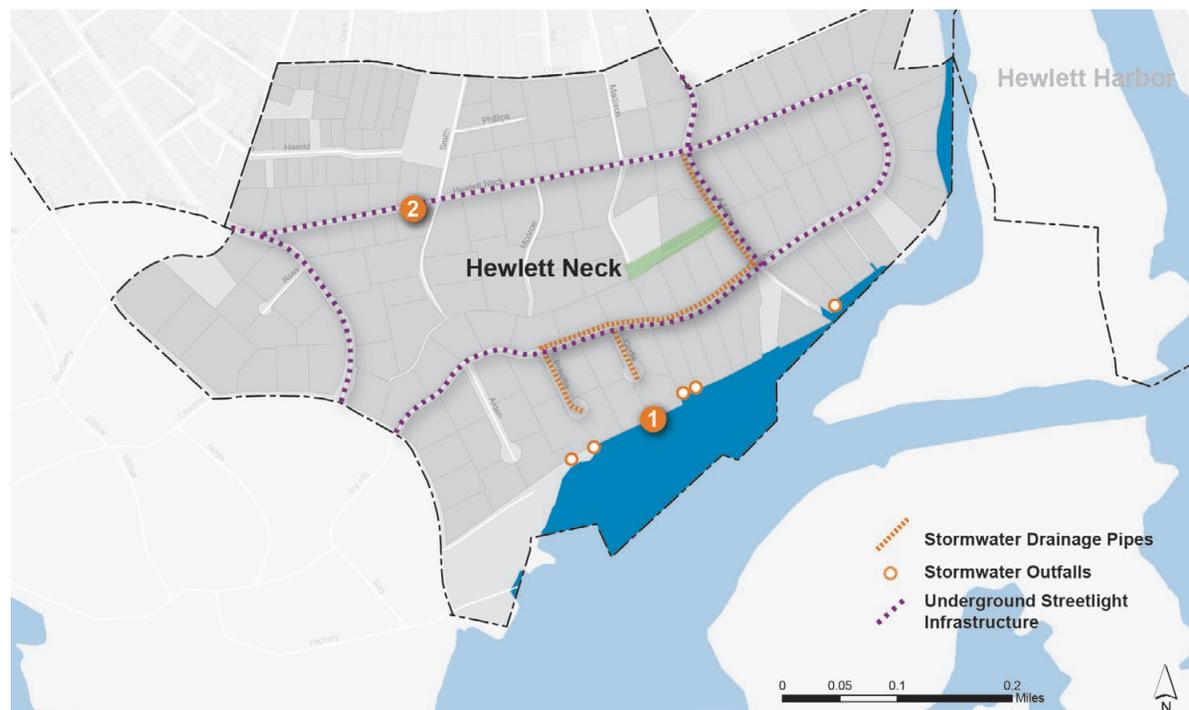


Figure 33: Map of Hewlett Neck Stormwater Infrastructure Upgrades

to Adams Lane, including north-south roadways in between. It is assumed that the carrying capacity of approximately 50 percent of the existing stormwater system can be increased. This can be achieved through installation of swirl separators and the upgrades in pipe volume and check valves on outfalls, and improvements to Woodbine Ditch. It also includes the cleaning of nine drywells and potential installation of nine new drywells, as necessary. Typical labor,

regulatory, and construction contingency costs are included.

Phase 2: Additional Stormwater Infrastructure Upgrades [Featured]

This project would provide additional upgrades to the stormwater infrastructure in Hewlett Neck in the area of Hewlett Neck Road, from Browers Point Branch to Adams Lane, including north-south roadways in between. Phase 2 would improve capacity and system efficiency.

Cost Estimate

Phase 1: Approximately \$2,600,000

Phase 2: Approximately \$2,700,000)

Benefits or Co-Benefits

Economic Benefits

Phase 1 of this project could create an estimated 28 full-time equivalent jobs, while Phase 2 would create approximately 29 full-time equivalent jobs. The addition of stormwater upgrades will positively impact Hewlett Neck’s existing infrastructure by reducing erosion and strain on the stormwater infrastructure system. Over time this would save Hewlett Neck the additional expenses for maintenance and replacement of system components.

Environmental Benefits

The proposed project would help to secure all of the various environmental assets in the Village of Hewlett Neck, including water bodies such as Hewlett Harbor/Hewlett Bay and Brosewre Bay; Woodbine Ditch, a natural area subject to flooding; Woodmere Dock, a Town of Hempstead park/recreational facility and Boorman’s Island, a protected island/marsh/wetland area.

Proposed upgrades to the Village of Hewlett Neck’s stormwater infrastructure would increase the resiliency of the area in general, protecting environmental assets such as Woodmere Dock and Woodbine Ditch. The proposed improvements include the installation of swirl separators to filter out pollutants, and implementation of green infrastructure

measures at Woodbine Ditch. Thus the project would improve the water quality of Hewlett Harbor/Hewlett Bay and Brosewre Bay, also benefiting Boorman’s Island. NYS DEC has designated three types of significant natural communities along portions of the Hewlett Neck shoreline, on Boorman’s Island, as well as within Hewlett and Brosewre Bays: Low salt marsh at Hempstead Bay Wetlands, High salt marsh at Hempstead Bay Wetlands, and Salt pan at Hempstead Bay Wetlands.⁵⁸ These significant natural communities would also benefit as a result of the proposed project.

Health and Social Benefits

The proposed project impacts the Village of Hewlett Neck, with a population of 454. This project does not secure a specific health and social services facility.

Cost-Benefit Analysis

Stormwater drainage issues were identified as a major concern of the NYRCR Committee, Village of Hewlett Neck, and general public due to severe flooding from Superstorm Sandy and routine localized flooding occurring since the Storm. The total proposed project cost of \$2,600,000 and featured project cost of \$2,700,000 would provide a phased approach to resolving stormwater drainage issues in the most impacted areas of the Village by improving stormwater system efficiency, which would reduce the costs of property damages and government expenditures for emergency response in future storm events.

Anticipated Reduction of Risk

The project would identify deficiencies with the existing system and provide feasible alternatives to address the system deficiencies in order to reduce flooding. By upgrading pipe capacity, cleaning and upgrading existing stormwater management systems, and increasing infiltration by addition of green infrastructure, stormwater should dissipate faster, reducing vulnerability of assets in the vicinity of the project. As such, it will secure locally significant stormwater infrastructure assets, including the pipes, outfalls, and Woodbine Ditch.

This project should provide a reduction of risks to all populations in Hewlett Neck. Improving the stormwater system should reduce flooding throughout the community given the interconnectivity of the system. The combined population of the area is 454. Specific information regarding the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Phase 1: Immediate (<2 years)

Phase 2: Intermediate (2-5 years)

Regulatory Requirements

The project may require permits from NYS DEC, USACE, CZM coastal consistency concurrence (NYS DOS), the Village and Nassau County.

Entity with Jurisdiction

Village of Hewlett Neck, Nassau County



Figure 34: Diagram of Hewlett Neck Stormwater Infrastructure Upgrades

A multi-jurisdictional committee/consortium consisting of local municipalities could be considered, as well. This form of governance and administration has proven successful on Long Island, as represented by both the Hempstead Harbor Protection Committee and Manhasset Bay Protection Committee. Potential actions of such a multi-jurisdictional committee/consortium might include being able to appoint a fiduciary to be responsible for grant

management, with the committee/consortium itself being responsible for project management. The recent New York – Connecticut Sustainable Communities Consortium, a program funded by a HUD Sustainable Communities Regional Planning Grant, used this structure and was successful in carrying out the planning program over a wide geography and across numerous municipal boundaries.



Hewlett Neck Projects

Harden Underground Street Light Infrastructure [Proposed]

This project is intended to secure street lights and to raise and modify existing street signage. There are currently 55 street lights within Hewlett Neck, some with exposed, above ground or damaged wiring as a result of Superstorm Sandy.

In some cases, street signage is not suited for extreme weather. This project would rectify these deficiencies. The cost estimate of \$340,000 includes the installation of underground electrical lines (in protective casing) and removal of above ground lines, replacing the current street signage with retro-reflective street signs and raising them. The installation of underground wiring involves cutting into the existing street and installing electrical conduits beneath the road/sidewalks. This estimate does not include the removal of any electrical poles and assumes they would be left in place. Further, street signs would be raised to higher elevations with the installation of new poles. Typical regulatory, labor, and construction contingency costs were included in the estimate.

Cost Estimate

Approximately \$340,000

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 4 full-time equivalent jobs. The addition of lighting upgrades should positively impact the existing

infrastructure by enhancing the resiliency of the roadway networks at night. Over time the reduction of accidents to the lighting systems and the additional expenses for maintenance and replacements they cause could reduce government expenditures for the Village.

Health and Social Benefits

The proposed project impacts the Village of Hewlett Neck, with a population of 454. This project is utility-based and does not secure a specific health and social services facility.

Cost-Benefit Analysis

The Village of Hewlett Neck recognizes the difficulty for emergency response resulting from interruptions of power to street lights, and street signs that were unreadable following the storm. The total proposed project cost of \$340,000 would reduce government expenditures for emergency response and damage to streetlight infrastructure in future storm events.

Anticipated Reduction of Risk

This project would replace infrastructure susceptible to damage from flooding and eliminate a potentially dangerous situation. Street lighting and signage that function during an emergency would decrease the vulnerability of the community.

This project should provide a reduction of risks to all populations in Hewlett Neck. The entire population should have reduced risk to black-outs, electrocution, and loss of communication. The combined population of the area is 454. Specific information regarding the population can be found above can be found above in the health and social benefits subsection.

Timeframe of Implementation

Intermediate (2-5 years)

Regulatory Requirements

The project is likely technically feasible, but may require permits from NYS DEC, the Village of Hewlett Neck, and Nassau County. Coordination with LIPA/PSEG is recommended. Some property constraints may exist as construction may take place on private property. Construction can begin following the conclusion of further investigation, completion of environmental review and when permits have been secured.

Entity with Jurisdiction

Village of Hewlett Neck

Inwood Projects

Inwood Stormwater Infrastructure Upgrades [Phase 1: Proposed, Phase 2: Featured]

Flooding during Superstorm Sandy occurred due to storm surge and inadequate stormwater drainage systems. Inwood also experiences flooding and pooling of water coming up from the stormwater system in the streets during heavy rains and high tides. This project would upgrade the stormwater infrastructure in specific areas of localized flooding Inwood.

Phase 1: Hydrologic & Hydraulic Study, Check Valves, and Stormwater Infrastructure Upgrades [Proposed]

This project would begin with a hydrologic and hydraulic (H & H) study on the existing stormwater system to determine deficiencies and subsequently, implementation of repairs and upgrades to stormwater pipes, drains, and catch basins. Check valves and swirl separators would be installed on outfalls to prevent tidal flows from entering the storm sewer system and improve the quality of water entering into the Bay, including runoff from Bayswater Boulevard, a particular area of concern. Following the completion of the H&H Study, the recommended stormwater infrastructure improvements would be implemented, which would increase pipe volume and improve system efficiency. Phase 1 would include improvements along Bayswater Boulevard and Walnut Road. To determine elements to be included in Phase 1, the stormwater infrastructure within Extreme and High risk areas and areas flooded during Superstorm Sandy were identified, including those noted at Committee meetings and Public Engagement events.



Figure 37: Inwood Stormwater Infrastructure Upgrades

Phase 2: Additional Stormwater Infrastructure Upgrades [Featured]

Phase 2 would complete all recommendations unable to be completed in Phase 1, including improvements along Chestnut Road, Davis Avenue, Maple Road and Prospect Place. These upgrades should provide further improvement of system capacity and efficiency.

Cost Estimate

Phase 1: Approximately \$2,650,000)

Phase 2: Approximately \$4,500,000)

Benefits or Co-Benefits

Economic Benefits

Phase 1 of this project could create an estimated 29 full-time equivalent jobs, while Phase 2 could create approximately 49 full-time equivalent jobs. The addition of stormwater upgrades should positively impact Inwood's existing infrastructure by reducing erosion and strain on the stormwater disposal systems. Over time this would save Inwood the additional expenses for maintenance and replacement of systems that are affected by stormwater.

Environmental Benefits

The project would increase the efficiency and capacity of the stormwater infrastructure system and includes the installation of swirl separators to filter out pollutants. The proposed upgrades to the stormwater infrastructure would reduce the risk of flooding for Inwood in general, helping to protect all environmental features in the area. The types of environmental assets that would be protected include parks, other natural areas and open spaces, such as Inwood Park and two parcels of conserved/ protected land.

The project would also filter out pollutants and reduce the volume of stormwater released into area water bodies. Thus it also would improve the water quality of area water resources such as Head of Bay and Motts Basin, helping to secure such assets and improve the overall habitat of the area. Sections of the northern shoreline of Inwood along Head of Bay have been designated by NYS DEC as a significant natural community for Low salt marsh at Jamaica Bay. This significant natural community would also benefit from the proposed project.

Health and Social Benefits

The proposed project impacts the Bayswater Boulevard portion of Inwood with a population of 2,414. This project does not secure a specific health and social services facility, but stormwater improvements in this area may provide a benefit to the Inwood Fire Department, identified as a health and social services asset and located nearby on Doughty Boulevard.

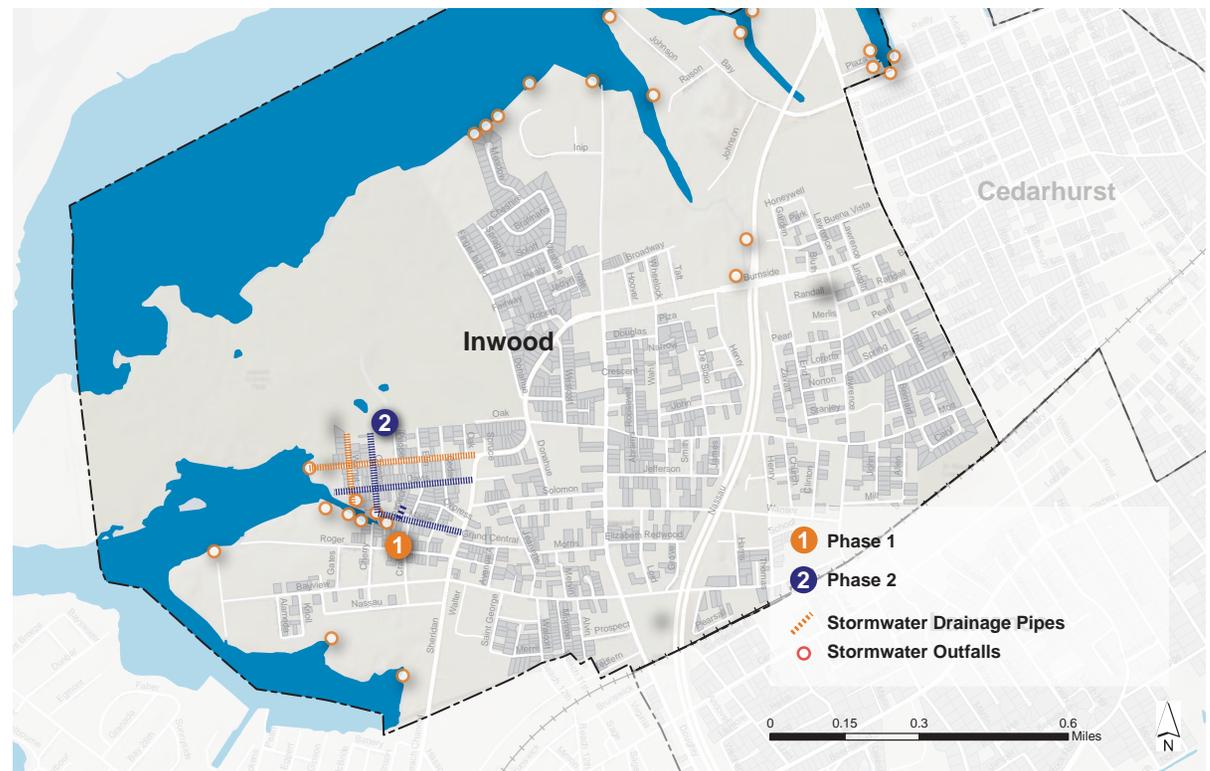


Figure 38: Inwood Stormwater Infrastructure Upgrades

Cost-Benefit Analysis

Stormwater drainage issues were identified as a major concern of the NYRCR Committee and general public due to severe flooding from Superstorm Sandy and routine localized flooding occurring since the Storm. The total proposed project cost of \$2,650,000 and featured project cost of \$4,500,000 would provide a phased approach to resolving stormwater drainage issues in the most impacted areas of Inwood by improving stormwater system efficiency, which would reduce the costs of property damages

and government expenditures for emergency response in future storm events.

Anticipated Reduction of Risk

The project would identify deficiencies with the existing stormwater infrastructure system and provide feasible alternatives to address the identified system deficiencies in order to reduce flooding. By upgrading existing stormwater management systems, and the addition of check valves, stormwater should dissipate faster, reducing vulnerability of assets in the vicinity of the project. As such, it should secure



Frequent Flooding on Bayswater Boulevard, Inwood

locally significant stormwater infrastructure assets, including the pipes and outfalls.

This project should provide a reduction of risks to all populations in Inwood. Improving the stormwater system should reduce flooding throughout the community given the interconnectivity of the system. The combined population of the area is 9,830.

Timeframe of Implementation

Phase 1: Immediate (< 2 years)

Phase 2: Intermediate (2-5 years)

Regulatory Requirements

The project may require permits from NYS DEC, USACE, CZM coastal consistency concurrence (NYS DOS), the Town of Hempstead and Nassau County. .

Entity with Jurisdiction

Town of Hempstead, Nassau County

A multi-jurisdictional committee/consortium consisting of local municipalities could be considered, as well. This form of governance and administration has proven successful on Long Island, as represented by both the Hempstead Harbor Protection Committee and Manhasset Bay Protection Committee. Potential

actions of such a multi-jurisdictional committee/consortium might include being able to appoint a fiduciary to be responsible for grant management, with the committee/consortium itself being responsible for project management. The recent New York – Connecticut Sustainable Communities Consortium, a program funded by a HUD Sustainable Communities Regional Planning Grant, used this structure and was successful in carrying out the planning program over a wide geography and across numerous municipal boundaries.

Inwood Projects

Inwood Buccaneers Facility Repair [Featured]

The Inwood Buccaneers is a youth athletic organization in Inwood. Participants include low-income children in the Five Towns area. The facility was flooded with approximately three feet of water during Superstorm Sandy, causing extensive water damage, such as flooding the existing furnace and air conditioner.

Although some repairs and renovations have begun, the facility has additional needs, including ongoing mold remediation and replacement mechanical equipment. This project would repair the facility by installing a new HVAC system with elevated utilities to provide heating and cooling for the entire facility (approximately 3,000 sq. ft.), replacing drywall and portions of stud walls that suffered water damage (approximately 800 sq. ft.).

Cost Estimate

Approximately \$200,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 2 full-time equivalent jobs. The repairs to the facility may preserve the jobs of those working at the facility in some capacity, volunteer and paid.

Health and Social Benefits

The proposed project impacts the Five Towns community, with a total population of 50,377. The project provides the overall population with improved access to health and social service facilities as a result of the proposed project. The Inwood Buccaneers Facility is identified as a health and social services asset, potentially serving all populations, including low-income families, in the Five Towns. This project would secure the recreational facility used by children within the community that participate in the athletic program, providing public health benefits.

Cost-Benefit Analysis

The Inwood Buccaneers Facility suffered extensive damage during Superstorm Sandy, and while some repairs are completed, the facility requires additional repairs and upgrades to weather a future storm event. The featured project cost of \$200,000 would build upon the investments already made in facility repairs by completing the areas not yet repaired, and reducing the costs of damages from future storm events.

Anticipated Reduction of Risk

The project would repair an important community facility with a high community value. The project would eliminate mold in the facility, improving indoor air quality and prevent associated health ramifications.

Repairing this facility should provide a reduction of risks to all populations in the Five Towns since it can be used for community purposes. The combined population of the area is 50,377. Specific information regarding the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

The project may require building permits from the Town of Hempstead.

Entity with Jurisdiction

Town of Hempstead, Nassau County

Inwood Projects

Inwood Country Club Dam Repair [Featured]

The Inwood Country Club Dam was built in 1993 and has shown signs of damage and deterioration for several years. While the dam was breached by Superstorm Sandy, it is also frequently breached during heavy rains and high tides. This breach results in the flooding of the adjacent neighborhood and the golf course.

This project would repair the existing dam that is located within the country club. The breaches cause the neighborhood around the country club to flood during high tide and heavy rains. Water flowing into the creek bypasses the dam, meaning the water is flowing right around the dam. This causes erosion of the wing walls which could result in failure of the dam and erosion of the adjacent property. The estimated cost of \$1,000,000 also includes typical regulatory, labor, and construction contingency costs. There may be property constraints as construction may take place on private property.

Cost Estimate

Approximately \$1,000,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 11 full-time equivalent jobs, and secure all economic assets behind the dam, including the Country Club.

Environmental Benefits

The dam repairs should secure environmental features within the Inwood Country Club property as well as additional environmental assets located within the surrounding area, such as Inwood Park and two parcels of conserved/protected land.

Health and Social Benefits

The proposed project impacts the Inwood Country Club area, with a total population of 1,396. This project does not secure a specific health and social services facility.

Cost-Benefit Analysis

The breach in the dam at Inwood Country Club caused damages to both the County Club and nearby properties. The total featured project cost of \$1,000,000 would provide flood protection as well as reduce costs from property damage and government expenditures for emergency response in future storm events.

Anticipated Reduction of Risk

This project would reduce exposure of assets landside of the dam, and thereby decrease the vulnerability of those assets. Repair of the dam should reduce the frequency of flooding that reaches the area and would improve community safety.

This project should provide a reduction of risks to residents in the adjacent neighborhood community. The combined population of the area is 1,396. Specific information regarding the population can be found above can be found above in the health and social benefits subsection.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

The project would require permits from NYS DEC, USACE, CZM coastal consistency concurrence (NYS DOS), the Town of Hempstead and Nassau County.



Inwood Country Club Dam

Lawrence Projects

Lawrence Stormwater Infrastructure Upgrades [Proposed]

There are several key transportation routes in Lawrence that were inundated during Superstorm Sandy but also flood during heavy rain events. These roadways include Meadow Lane at Marbridge Road, Harborview, and Lakeside Drive South. Flooding results from inadequate stormwater capacity and the ability of the tide to enter the outfall pipes, therefore backing up into the system. Lawrence has already conducted some studies in the area of Meadow Lane.

This project aims to conduct additional Hydrologic and Hydraulic studies to determine deficiencies and implement the recommended infrastructure improvements, including pipe and catchment upgrades, check valves and swirl separators. A cost estimate of \$1.5 million includes improved stormwater disposal infrastructure at the aforementioned sites, and a backup power generator for Lawrence Village Hall. The estimate includes typical regulatory, labor, and constructions contingency costs. Some property constraints exist as construction may take place on private property.

Cost Estimate

Approximately \$1,500,000)



Figure 39: Lawrence Stormwater Infrastructure Upgrades

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 16 full-time equivalent jobs. The addition of stormwater upgrades should positively impact Lawrence’s existing infrastructure by reducing erosion and strain on the stormwater disposal systems. Over time this should save Lawrence the additional expenses for maintenance and

replacement of systems that are affected by stormwater.

Environmental Benefits

The proposed improvements to the stormwater infrastructure system would increase the resiliency of the Lawrence area, which would help to secure all environmental assets (e.g., open spaces and other natural areas, wetlands, etc.) in the immediate vicinity. The infrastructure

improvements would also have beneficial effects on the water quality of Bannister Bay, helping to protect this environmental asset. NYS DEC has identified three types of significant natural communities along portions of the Lawrence shoreline in this area as well as in Bannister Bay: Low salt marsh at Hempstead Bay Wetlands, High salt marsh at Hempstead Bay Wetlands, and Salt panne at Hempstead Bay Wetlands.⁵⁹ These significant natural communities would also benefit as a result of the proposed project.

Health and Social Benefits

The proposed project impacts the Meadow Lane/ Marbridge Rd, Harborview, Lakeside Dr. South portion of Lawrence, with a population of 3,037. This project does not secure a specific health and social services facility, however, the nearby Lawrence Middle School, which is identified as a health and social services asset, may benefit from the proposed project.

Cost-Benefit Analysis

Stormwater drainage issues were identified as a major concern of the NYRCR Committee, Village of Lawrence and general public due to severe flooding from Superstorm Sandy and routine localized flooding occurring since the Storm. The total proposed project cost of \$1,500,000 would mitigate stormwater drainage issues in the most impacted areas of Lawrence by improving stormwater system efficiency, which would reduce the costs of property damages and government expenditures for emergency response in future storm events.

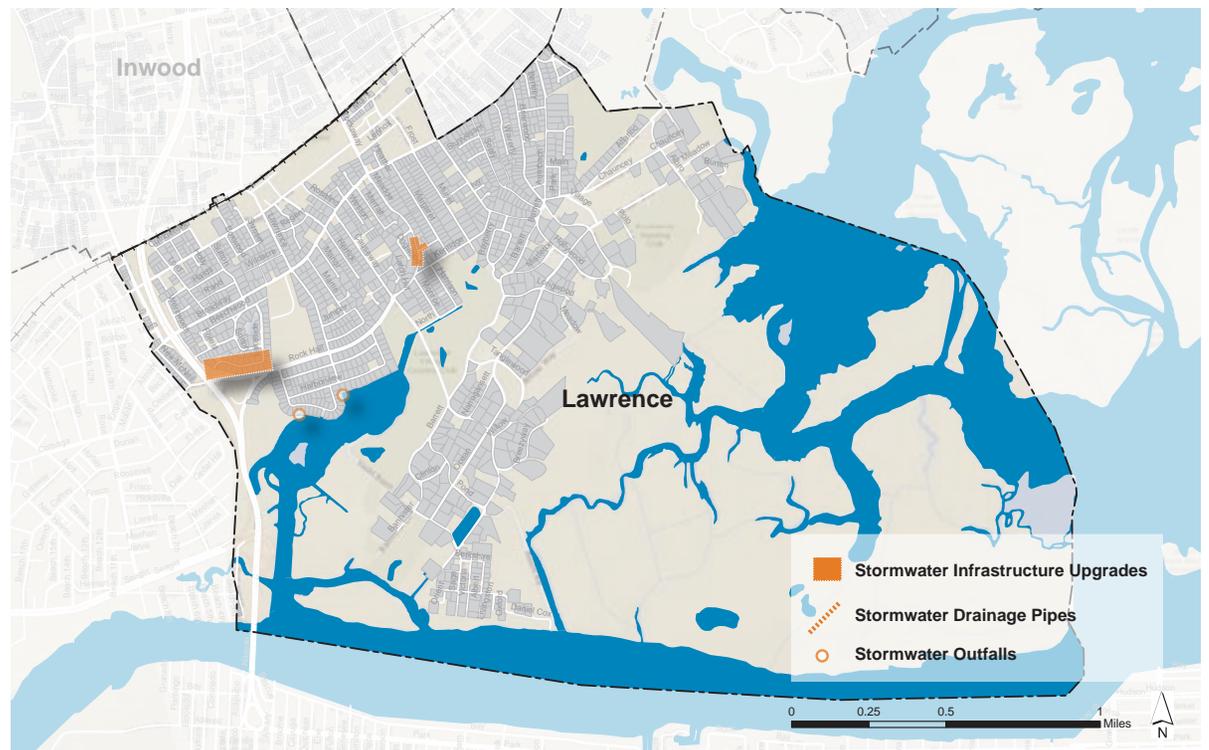


Figure 40: Lawrence Stormwater Infrastructure Upgrades

Anticipated Reduction of Risk

The study would identify deficiencies to the existing stormwater disposal system and provide feasible alternatives to address the system deficiencies in order to prevent or minimize flooding. By upgrading the system, including increasing pipe capacity and the installation of check valves to prevent backflow, stormwater should discharge faster. Swirl separators would prevent pollutants from being discharged in adjacent water bodies and improve quality of water and improve plant and animal habitat. As such, the project is expected to reduce vulnerability of assets in

the Community and secure locally significant stormwater infrastructure assets, including the pipes and outfalls.

This project should directly provide risk reduction benefits to Lawrence residents in the areas of the stormwater infrastructure upgrades, totaling 3,037. Specific information regarding the population can be found above in the health and social benefits subsection. These improvements should indirectly provide a reduction of risks to all populations in Lawrence by improving access along key roadways. Improving the

stormwater disposal system should reduce flooding throughout the community given the interconnectivity of the system. The combined population of the area is 6,582.

Timeframe of Implementation

Immediate (< 2 years)

Regulatory Requirements

The project may require permits from NYS DEC, USACE, CZM coastal consistency concurrence (NYS DOS), the Village of Lawrence and Nassau County. .

Entity with Jurisdiction

Village of Lawrence, Nassau County

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

Lawrence Projects

Dike at the Isle of Wight Repairs and Elevation [Proposed]

The Lawrence Dike at the Isle of Wight is nearly one mile long and protects approximately 50 homes from floodwaters in Crooked Creek, a tidal channel off of Reynold's Channel. While past storms have caused damage and erosion along the dike, Superstorm Sandy overtopped the dike and washed out sections of it. Since Superstorm Sandy, the neighborhood has faced frequent flooding during high tides and heavy rains. The Village of Lawrence, in consultation with FEMA and the U.S. Army Corps of Engineers, conducted repairs to the dike in early 2013. Conduits placed within the dike (a measure mandated by NYS DEC) transmit water through the dike. Seepage through the dike and around the conduit contributes to the increased flooding within the neighborhood of the Isle of Wight. Although the flood waters from Superstorm Sandy exceeded the height of the dike by more than three feet, the dike has been repaired to its pre-Sandy height.

This project involves repairing the Dike at the Isle of Wight and raising it using sheet pile core system. The objective of this project is to repair the pipe in the dike and increase the height of the dike by 4 feet (using sheet pile) to protect the adjacent residential neighborhood from large storm surge events. The use of sheet pile would reduce the footprint of the berm therefor having fewer impacts to the adjacent wetland. Sheet pile is also less expensive.

Cost Estimate

Approximately \$2,300,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 25 full-time equivalent jobs. The value of the 50 homes being protected by the dike should be preserved as the risks of damage to the homes should be reduced.

Environmental Benefits

The project would increase the resiliency of environmental assets in the vicinity of the Dike at the Isle of Wright. As such it would secure two environmental assets located in this area: a contiguous natural area comprised of wetlands and marshes, and Sage Pond.

Health and Social Benefits

The proposed project impacts the residential area protected by the Dike at the Isle of Wight a population of about 43. This project's benefits are residential in nature and it does not secure a specific health and social services facility.

Cost-Benefit Analysis

During Superstorm Sandy, the breach at the dike at the Isle of Wight caused flooding of the residential properties it seeks to protect, which continue to suffer routine flooding during high tides. The Village of Lawrence recognizes that improvements are necessary to prevent future flood events. The total proposed project cost

of \$2,300,000 would build upon the Village's previous investments in the dike, while reducing the costs of property damage for homeowners, and government expenditures for both repeated repairs to the dike and emergency response in future storm events.

Anticipated Reduction of Risk

The project would reduce the exposure of assets landside of the dike and thereby reduce the vulnerability of those assets.

The Lawrence Dike protects approximately 50 homes which should have a reduction in risk from the project. The approximate population of those benefiting from reduced risk is 43. Specific information regarding the population can be found above can be found above in the health and social benefits subsection.

Timeframe of Implementation

Intermediate (2-5 years)

Regulatory Requirements

The project may require a Tidal Wetlands Permit from NYS DEC, USACE, CZM coastal consistency concurrence (NYS DOS), as well as permits from the Village and Nassau County.

Entity with Jurisdiction

Village of Lawrence



Lawrence Dike at the Isle of Wight



Lawrence Dike at the Isle of Wight

Lawrence Projects

Mesivta Ateres Yaakov Community Assistance Center [Featured]

In situations where the normal means of communications are compromised, community members need a central place to meet, obtain information, and seek expert advice. Mesivta Ateres Yaakov fulfilled these roles in Superstorm Sandy and other past disasters. This project would enable Ateres Yaakov to expand its role as a Community Assistance Center for future storms.

Its location, structure, and existing community role make Mesivta Ateres Yaakov an optimal site to position relief services, and its track record of fulfilling those roles provides for reliable continuity. Ateres Yaakov has a very large ground level, walk-in space that has already been utilized for relief operations, and is building an adjoining gymnasium, that would provide another 9,000 square feet of ground level walk-in open space for such needs. Although Ateres Yaakov's current gymnasium annex plans are not currently being designed to host an Assistance Center, the design can easily be enhanced to make the facility a true asset to emergency management operations at a modest additional cost.

The total estimated project cost is \$500,000 to enhance facilities to make them optimally suited for providing the services typically required following a storm, including: facilities that can host hundreds of people in comfort, with reliable power, water, and HVAC services, numerous private spaces for meetings and consultations with case workers, internet, phone, and electrical access, storage for emergency equipment and supplies, and recreation space.

Cost Estimate

Approximately \$500,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 5 full time equivalent jobs. The supplemental impacts of this effort should be felt during the next emergency when the Community Assistance Center is operational. The economic impact is anticipated to be savings from more efficient use of resources for recovery operations.

Health and Social Benefits

The proposed project impacts the Five Towns community, with a total population of 50,377. This project secures Mesivta Ateres Yaakov, a health and social services asset, but may secure several additional health and social services assets by expanding the area's response capacity.

Cost-Benefit Analysis

Mesivta Ateres Yaakov played an invaluable role in Superstorm Sandy recovery, and seeks to expand its role as a Community Assistance Center. The total featured project cost of \$500,000 is a cost-effective way to provide a location for post-storm community assistance, as it would build capacity for an existing community facility with management and organizational capacity, leading to high returns and reduced government expenditures for future storm events.

Anticipated Reduction of Risk

Although the project would not reduce exposure of assets in the Community, the project should reduce the vulnerability of residents by providing an additional Community Assistance Center for recovery after storm events. Improvements to Mesivta Ateres Yaakov should bolster the emergency communications network, and speed up the recovery process by providing a dedicated location for case workers to consult with affected populations.

This project should provide a reduction of risks to all populations in the Five Towns as Ateres Yaakov serves the entire Five Towns community. The combined population of the area is 50,377. Specific information regarding the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Intermediate (2-5 years)

Regulatory Requirements

The project may require building permits from the Town of Hempstead. Coordination with emergency management officials including the Nassau County Office of Emergency Management (OEM), NYS OEM and FEMA is recommended.

Entity with Jurisdiction

Mesivta Ateres Yaakov

Lawrence Projects

Lawrence Cedarhurst Fire Department: Mobile Command Unit [Featured]

The Lawrence Cedarhurst Fire Department (LCFD) and other departments within the Five Towns played a critical role in emergency response after Superstorm Sandy, including water rescues. In the aftermath of Superstorm Sandy, LCFD performed water rescues throughout the night due to extensive flooding. In the 11 days after the storm, the department received 400 calls for both fire and water rescue (an average of nearly 40 per day, versus their typical average of three per day). During many water rescues, equipment was contaminated by raw sewage and fuel oil. Most of the department's radios are water resistant, but were not designed for extensive submersion and were therefore damaged or destroyed. One fire truck was destroyed during a water rescue when flood waters rapidly rose around the truck. LCFD's most pressing needs include a mobile command post which would include signal repeaters, extra radios, and a live video feed. While LCFD hopes to add this resource to their department, the unit would be dispatched on a mutual aid basis to other fire districts within the Five Towns battalion. In addition to the mobile command post, LCFD also needs backup equipment, especially suits and waterproof radios, to prepare for water rescues that contaminated suits and damaged radios during Superstorm Sandy.

This project includes the purchase of a Mobile Communications Unit that would help to improve coordination of operational response for Fire Departments in the Five Towns battalion during widespread emergencies.

Cost Estimate

Approximately \$325,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 4 full time equivalent jobs. The supplemental impacts of this effort should be felt during the next emergency when the LCFD and departments in the Five Towns Battalion have improved response capacity, enabling more efficient emergency response. The economic impact is anticipated to be savings from more efficient use of resources for recovery operations.

Health and Social Benefits

The proposed project impacts the Five Towns community, with a total population of 50,377. This project secures various health and social services assets, as well as assets across all classes, by improving response capacity and speeding up recovery.

Cost-Benefit Analysis

The LCFD played an invaluable role in Superstorm Sandy recovery, but recognizes that it could provide services more efficiently with increased resources. The total featured project cost of \$325,000 for a Mobile Command unit is a cost-effective way to improve the Fire Department's emergency response capacity, leading to more efficient operations and

reduced government expenditures for future storm events.

Anticipated Reduction of Risk

Although the project would not reduce exposure of assets in the Community, the project should reduce the vulnerability of residents by providing emergency response equipment for disaster response during and after storm events, therein improving the emergency response capacity of the Lawrence-Cedarhurst volunteer Fire Department.

This project should provide a reduction of risks to the populations served by the Fire Department, which directly includes the Villages of Lawrence and Cedarhurst, as well as two unincorporated areas known as North Lawrence and East Lawrence, an approximate population of 13,294. However, the Department has mutual aid agreements with other volunteer and municipal fire departments within the Five Towns fire battalion, therefore the project may indirectly benefit all populations in the Five Towns, a combined population of 50,377. Specific information regarding the population can be found above in the health and social benefits subsection. The Department also has a mutual aid agreement with the City of Long Beach, which could increase the population benefitting from this project.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

No permits are required for a study. Coordination with emergency management officials including the Nassau County Office of Emergency Management (OEM), NYS OEM and FEMA is recommended.

Entity with Jurisdiction

Lawrence Cedarhurst Fire Department

Lawrence Projects

Achiezer Community Resource Center: Mobile Command Unit [Featured]

Achiezer played a key role in emergency response following Superstorm Sandy, albeit without adequate resources. This project would improve the capacity of Achiezer by purchasing a generator-powered mobile communication center for telephone and satellite communications. A mobile command/communication center would allow vital emergency services such as Hatzalah, and local rescue organizations to seamlessly work from one mobile command center, which would ultimately ensure that any rescue, relief, or post-disaster operations would be coordinated.

Cost Estimate

Approximately \$325,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 4 full time equivalent jobs. The supplemental impacts of this effort should be felt during the next emergency when improved communications strengthen emergency communications to catalyze faster recovery. The economic impact is anticipated to be savings from more efficient use of resources for recovery operations.

Health and Social Benefits

The proposed project impacts the Five Towns community, with a total population of 50,377. This project secures various health and social

services assets, as well as assets across all classes, by improving response capacity and speeding up recovery.

Cost-Benefit Analysis

Achiezer played an invaluable role in Superstorm Sandy recovery, but recognizes that it could provide even more services with sufficient communications resources. The total featured project cost of \$325,000 is a cost-effective way to improve Achiezer’s emergency communications and disaster response capacity, leading to more efficient emergency response operations and reduced government expenditures for future storm events.

Anticipated Reduction of Risk

Although the project would not reduce exposure of assets in the Community, the project should reduce the vulnerability of residents by improving communications following storm events. The mobile communications/command unit should improve the emergency communications network, and speed up the recovery process by enabling coordination among first responders.

This project should provide a reduction of risks to all populations in the Five Towns as Achiezer serves the entire Five Towns community. The combined population of the area is 50,377. Specific information regarding the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

No permits are required for a study. Coordination with emergency management officials including the Nassau County Office of Emergency Management (OEM), NYS OEM and FEMA is recommended.

Entity with Jurisdiction

Achiezer Community Resource Center

Meadowmere Park Projects

Meadowmere Park Microgrid [Proposed]

This project would provide a foundation for a microgrid network by establishing a backup power supply source at the Meadowmere Fire Department. Following Superstorm Sandy, the fire house had a generator that provided electricity for three days after the storm, but then the generator shut down and could not be repaired.

This project would provide backup power to a critical facility during periods of primary power outage, and create the first “node” of a potential microgrid network, which and can be expanded in future phases to serve as a ‘community grid’ that would supply backup power to homes in the Meadowmere Park community.

The total cost of the project is estimated to be \$500,000 which includes 5 kW of backup power, potentially split between two generators, elevated above the floodplain. The exact configuration and location of generators is to be determined during implementation, therefore the estimated cost includes typical regulatory, labor, and constructions contingency costs.

Cost Estimate

Approximately \$500,000)



Figure 41: Meadowmere Park Microgrid

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 5 full-time equivalent jobs. The installation of micro-grids and other energy saving devices can reduce the overall strain on the regional electrical network. In addition to the benefits of fewer storm-related power outages, this project could have potential

economic benefits such as reducing the impact of blackouts and brownouts due to demand out pacing capacity. The program should include a demand response program which pays the electricity consumer to stand ready as a last line of defense to these rare but dangerous electric reliability crisis situations. This can become an additional income stream in the future if the project includes this in its financial model.

Environmental Benefits

The project would provide off-grid power supply in the event of a primary power outage. Although this project would not directly protect environmental resources, a secondary power supply could maintain floodwater pumping capacity for the Fire Department.

Health and Social Benefits

The proposed project impacts the town of Meadowmere Park, with a population of 68. This project does not secure a specific health and social services facility.

Cost-Benefit Analysis

Superstorm Sandy illustrated the negative impacts that power outages can have on emergency response by interrupting the communications network and disabling building systems. The total proposed project cost of \$500,000 would establish the first node of a potential Microgrid by providing backup power supply at a critical facility, the Meadowmere Park Fire Department, which would enable the Fire Department to recover faster during future storm events, reducing government expenditures for disaster response.

Anticipated Reduction of Risk

By providing a back-up power source for this critical facility, this project would reduce the vulnerability of assets, of residents and visitors of the Meadowmere Park Community.

This project should provide a reduction of risks to all residents in the Meadowmere Park, a population of 68, by providing a reliable power supply during disaster. Specific information regarding the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Intermediate (2-5 years)

Regulatory Requirements

The project may require building permits from the Town of Hempstead, and potential future coordination (should this microgrid node be expanded into a network) with NYSERDA, local communities, and utilities (LIPA/PSEG). The project can begin following permitting and environmental review.

Entity with Jurisdiction

Meadowmere Park Fire Department, Town of Hempstead

Meadowmere Park Projects

Meadowmere Park Bulkhead Repair Program [Proposed]

The objective of the Meadowmere Park Bulkhead Repair Program is to evaluate the condition of bulkheads in Meadowmere Park, complete design and permitting for bulkhead repairs and elevation, and complete construction of bulkhead repairs and elevation for property owners not currently served by the NY Rising Housing Recovery Program. Property owners would work through NY Rising Housing Recovery Program first, as this is the State's primary vehicle for funding bulkhead repair and replacement. To the extent that homeowners are not fully served by this program, or that their needs or the needs of the community extend beyond the services offered by NY Rising Housing Recovery, this project would fill the gap and expand upon those services provided by NY Rising Housing Recovery using the Meadowmere Park's NYRCR funding.

This project could serve as a pilot project for the South Shoreline Improvement Program Study, the study of developing a regional program to create a contiguous shoreline through coordinated bulkhead repair and living shoreline improvements. It would encourage private property owners to organize for more cost efficient comprehensive and continuous shoreline restoration and protection.

The proposed cost estimate of \$1,000,000 includes repairing and replacing bulkheads as necessary (estimate assumes approximately one quarter of bulkheads need replacement or repair along approximately 3,000 linear feet of shoreline). For the purposes of this

estimate, it has been assumed that bulkheads would be elevated up to 18-inches above their current elevation, to approximately seven-feet' above the base flood elevation. The estimate includes surveying, typical regulatory, labor, and construction contingency costs.

Cost Estimate

Approximately \$1,000,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 11 full-time equivalent jobs. Improvements of shorelines can have a positive impact on property values in the immediate area around the shoreline areas. As the shoreline becomes more attractive the resale value of the homes can increase. Additionally, the repaired bulkheads and restored shoreline could prevent property damages from occurring in the future. Since this area incurred major storm surge damage, the savings from reduced damages could be significant. This should ultimately have an impact on the taxable values of the homes which would translate into increased income for the township.

Environmental Benefits

The project entails improving the resiliency of the Meadowmere Park community via bulkhead restoration. Environmental assets would be

secured by the proposed improvements include Town of Hempstead parkland and Fireman's Memorial Field.

Health and Social Benefits

The proposed project impacts the town of Meadowmere Park, with a population of 68. This project does not secure a specific health and social services facility, but may provide a benefit to the entire community including the Meadowmere Park Fire House, which is identified as a health and social services asset.

Cost-Benefit Analysis

Continuous shoreline protection through bulkhead repairs and elevations would help to protect Meadowmere Park against minor tidal flooding. The total project cost of \$1,000,000 would build upon the investments made through the NY Rising Housing Recovery program, covering those which were not covered by the program and reducing the costs of property damage and government expenditures for emergency response from smaller storm events.

Anticipated Reduction of Risk

The repair and elevation of bulkheads would reduce exposure of assets in Meadowmere Park and thereby decrease the vulnerability of those assets. The proposed project seeks to improve protection against water levels up to elevation seven-feet, which is estimated to be consistent with a 10-year storm. These water

levels conditions occur relatively frequently (approximately twice a month during spring tides) and are expected to increase in frequency as a result of climate change (which increases both the general sea level and the frequency of extreme events such as high wind induced surges). Bulkheads at the proposed elevation should protect private properties from flood, reduce exposure and improve community safety.

For the purposes of the Coastal Hazard and Risk Assessment Tool, all landscape attributes should remain the same under project implementation, as this project should protect against a 10-year storm, while the Tool is calibrated to determine risk reduction benefits under a 100-year storm. However, this project should reduce the vulnerability (loss of service) of assets to the impacts of 100-year storms; therefore, the vulnerability score of all assets was reduced. See Section V for the reduction in risk scores to affected assets in Meadowmere Park, as a result of implementing the proposed project.

The project should provide a reduction of risks to those protected by the bulkheads which is all residents of Meadowmere Park. The community has population of 68.⁶⁰ Specific information regarding the population can be found above can be found above in the health and social benefits subsection.

Timeframe of Implementation

Intermediate (2-5 years)



Figure 42: Meadowmere Park Bulkhead Repair Program

Regulatory Requirements

The project may require a Tidal Wetlands permit from the NYS DEC, USACE, CZM coastal consistency concurrence (NYS DOS), as well as permits from the Town of Hempstead and Nassau County. Construction can begin once the improvement district has been established, environmental review completed and permits secured.

Entity with Jurisdiction

NY Rising Housing Recovery Program, Town of Hempstead

Meadowmere Park Projects

Meadowmere Park Home Elevation Program [Proposed]

Meadowmere Park is one of the areas with the greatest share of housing at risk with a full 64.4% of housing units in Extreme or High risk areas,⁶¹ nearly all of which were damaged during Superstorm Sandy. This Housing Assistance Program would provide home elevation assistance for property owners not currently served by the NY Rising Housing Recovery Program.

Property owners would work through NY Rising Housing Recovery Program first, as this is the State's primary vehicle for funding home elevations. To the extent that homeowners are not fully served by this program, or that their needs or the needs of the community extend beyond the services offered by NY Rising Housing Recovery, this project would fill the gap and expand upon those services provided by NY Rising Housing Recovery using Meadowmere Park's NYRCR funding.

The proposed cost estimate of \$1,000,000 would provide for elevations of approximately 15 homes (assuming the average home elevation cost of \$70,000 per home and contingent on administrative costs).

Cost Estimate

Approximately \$1,000,000)



Figure 44: Meadowmere Park Home Elevation Program

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 11 full time equivalent jobs. The additional benefit of this project is the potential savings of residential real estate from future flood damage. Given an estimated home elevation cost of \$70,000, approximately 15 homes in Meadowmere Park could become more resilient with the completion

of this project. Additional benefits include lives saved and reduced property damages.

Health and Social Services Benefits

The proposed project potentially impacts the town of Meadowmere Park, with a population of 68. This project does not secure a specific health and social services facility.

Cost-Benefit Analysis

The NYRCR Committee recognizes that the majority of Meadowmere Park residents plan to stay in Meadowmere Park, and several have applied to elevate homes through the NY Rising Housing Recovery Program. The total project cost of \$1,000,000 would build upon the investments made through the New York Rising Housing Recovery program, covering that which was not covered by the program, which would reduce the costs of property damage and government expenditures for emergency response from future storm events.

Anticipated Reduction of Risk

This program would provide gap or supplemental funding for home elevation costs not covered by the NY Rising Housing Recovery Program. The program would decrease vulnerability of housing.

The project could provide direct risk reduction benefits to the homeowners that take advantage of the program, which could feasibly elevate approximately 15 homes. Indirectly, this project may provide a reduction of risk to all Meadowmere Park residents by increasing resiliency of residential properties and stabilizing the neighborhood to prevent blight. According to data from census blocks in the area, this is a population of 68. Specific characteristics of the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Intermediate (2-5 years)

Regulatory Requirements

The project may require building permits from the Town of Hempstead and environmental review. Real property constraints exist as private property owners would need to apply for participation, which is voluntary. Construction can begin after environmental review completed and permits secured.

Entity with Jurisdiction

NY Rising Housing Recovery Program, Town of Hempstead



Figure 45: Home Elevation in Meadowmere Park

Meadowmere Park Projects

Meadowmere Park Fire Department Building Upgrades [Proposed]

The Meadowmere Park Fire Department served as an impromptu Community Assistance Center for several weeks after the storm, as residents waited for electricity to return, began initial repairs on their flooded homes, and awaited additional assistance.

This project would work in partnership with the Meadowmere Park Microgrid project to fund building repairs that would improve the capacity of the Fire Department to assist the community during disaster events.

Cost Estimate

Approximately \$200,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 2 full-time equivalent jobs. The economic benefits of an increased capacity of the local fire department to assist their community could be great in the event of an emergency. Loss of property, life, and equipment could be mitigated as the ability of the fire department to meet these challenges is increased.

As the local fire department increases their capacity to assist their community, the regional emergency network becomes more efficient as less manpower and equipment is needed in areas that are now being assisted by the local fire department. This can provide cost savings at the regional planning level.



Figure 46: Meadowmere Park Fire Department Building Upgrades

Health and Social Benefits

The proposed project impacts the community of Meadowmere Park, with a population of 68. The proposed project directly impacts the Meadowmere Park Fire House, which is identified as a health and social services asset.

Cost-Benefit Analysis

The Meadowmere Park Fire Department played an invaluable role in Superstorm Sandy recovery, and seeks to expand its role as a Community Assistance Center following storm events. The total proposed project cost of \$50,000 is a modest investment that can bolster the Department's capacity for post-storm community assistance, leading to high returns

and reduced government expenditures for future storm events.

Anticipated Reduction of Risk

This project would reduce the vulnerability of the Fire House, a FEMA Critical Facility, and the community by providing a refuge during extreme weather.

The project should provide a reduction of risks to all populations in Meadowmere Park since the fire department serves the whole community. The combined population of the area is 68. Specific information regarding the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Immediate (< 2 years)

Regulatory Requirements

The project is likely technically feasible, but may require building permits from the Town of Hempstead. Coordination is recommended with emergency response officials, including the Town of Hempstead, Nassau County Office of Emergency Management, and FEMA. Construction can begin once design and environmental review have been completed and building permits have been secured.

Entity with Jurisdiction

Meadowmere Park Fire Department



Meadowmere Park Fire Department

Meadowmere Park Projects

Meadowmere Park Footbridge Hardening [Proposed]

The Meadowmere Park Footbridge is a critical access point for residents, as there is only one road onto the island of Meadowmere Park. Linking Meadowmere Park (Nassau) to Meadowmere (Queens), the bridge was damaged by Superstorm Sandy and other recent heavy storms, including Tropical Storm Irene.

The Town of Hempstead has completed immediate repairs of the footbridge, but the bridge requires further stabilization or replacement to secure this asset. This project would harden the existing wooden footbridge while maintaining the footbridge's character and use exclusively for pedestrian access.

Cost Estimate

Approximately \$750,000

Benefits or Co-Benefits

Economic Benefits

This project is estimated to create 8 full time equivalent jobs and would provide a vital transportation link in the event of further storms disable the only other roadway onto the island of Meadowmere Park. The footbridge is an essential conduit to the residents of Meadowmere Park as there is a limited amount of physical connection to the mainland. This footbridge could provide life and property saving benefits to the community in the event of another storm.



Figure 47: Meadowmere Park Footbridge Hardening

Health and Social Benefits

The proposed project impacts the community of Meadowmere Park, with a population of 68. The proposed project directly impacts the Meadowmere Park Fire House, which is identified as a health and social services asset.

Cost-Benefit Analysis

The NYRCR Committee recognizes the need for improved evacuation capacity in Meadowmere Park, as well as the Community's desire to maintain original wooden character of the Meadowmere Park Footbridge. The total proposed project cost of \$750,000 would cost-effectively balance these needs, strengthening the bridge and reducing

government expenditures for emergency response from future storm events.

Anticipated Reduction of Risk

This project, while not reducing the risk of assets from flooding and storm activity, would reduce the vulnerability of residents and visitors in Meadowmere Park by providing alternatives for evacuation efforts and by allowing residents to move to safe areas. This project provides a reduction in risk to all Meadowmere Park residents, a total population of 68.

Timeframe of Implementation

Immediate (< 2 years)

Regulatory Requirements

The project is likely technically feasible, but may require permits from the Town of Hempstead and Nassau County. It is not likely to face regulatory obstacles including issues with permits or other approvals, has no real property constraints and is ready to begin as soon as funding is available. Some property constraints exist as construction staging may take place on private property. Construction can begin once study is complete, environmental review completed and permits have been secured.

Entity with Jurisdiction

Town of Hempstead, City of New York



Meadowmere Park Footbridge

Woodmere Projects

Woodmere Stormwater Infrastructure Upgrades [Phase 1: Proposed, Phase 2: Featured]

Flooding during Superstorm Sandy occurred due to tidal surge through Jamaica Bay and into Mott’s Creek, as well as inadequate stormwater drainage systems. Branch Boulevard, which passes over Mott’s Creek, buckled from the force of storm surge waters rising from underneath. This project includes the study and upgrade of the stormwater infrastructure in Woodmere.

Phase 1: Hydrologic & Hydraulic Study, Check Valves, and Stormwater Infrastructure Upgrades [Proposed]

This project would begin with a hydrologic and hydraulic (H & H) study on the existing stormwater system to determine deficiencies and the subsequent implementation of repair and upgrades to stormwater pipes, drains, and catch basins. This initial step would include the installation of check valves on outfalls to prevent tidal flows from entering the stormwater disposal system. Following the completion of the H&H Study, the recommended stormwater infrastructure improvements would be implemented, which aim to increase pipe volume and improve system efficiency. Improvements can be achieved through installation of swirl separators and check valves on outfalls and the associated upgrades in pipe volume. Phase 1 would include improvements along Derby, Church, Barnard and Arbuckle Avenues. To determine elements to be included in Phase 1, the stormwater infrastructure within Extreme and High risk areas and areas flooded during Superstorm Sandy were identified, including

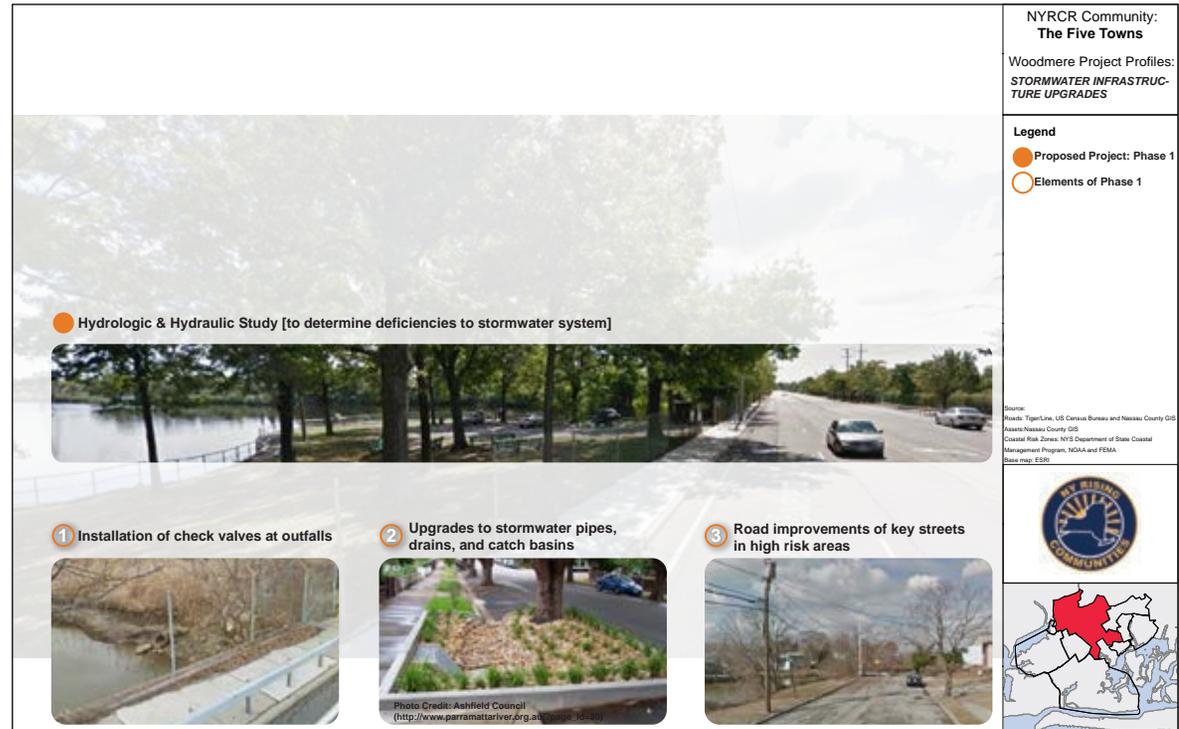


Figure 48: Woodmere Stormwater Infrastructure Upgrades

those noted at Committee meetings and Public Engagement events.

Phase 2: Additional Stormwater Infrastructure Upgrades [Featured]

Phase 2 would complete all recommendations unable to be completed in Phase 1, north and south of Mott’s Creek. Upgrades along the south side of the Creek include Ibsen Street, Howard Ave, Island Ave, Jefferson Street, King

Street, Lowell Street and Moore Street, as well as Lakeside Drive, Rica Lane, Midway, Norman Way, Donald Lane and Saddle Ridge Road. Along the north side of the creek, upgrades include those along Golf Drive and north-south corridors that connect to Golf Drive. These upgrades would provide further improvement of system capacity and efficiency.

Cost Estimate

Phase 1: Approximately \$6,000,000)

Phase 2: Approximately \$15,000,000)

Benefits or Co-Benefits

Economic Benefits

Phase 1 of this project could create an estimated 65 full-time equivalent jobs, while Phase 2 will create approximately 163 full-time equivalent jobs. Stormwater upgrades should positively impact the Woodmere's existing infrastructure by reducing erosion and strain on the infrastructure systems. Over time this would save Woodmere the additional expenses for maintenance and replacement of system components that are affected by stormwater.

Environmental Benefits

The project includes upgrades to Woodmere's stormwater infrastructure system, increasing the resiliency of the entire community and helping to secure all environmental assets. Environmental assets that would be protected include parks such as North Woodmere Park and Doxey Brook Park. The proposed improvements would also be expected to have beneficial effects on the water quality and condition of water resources in the area. Water body assets in Woodmere that would likely benefit from the project include Motts Creek, Doxey Brook, Cedar Point Lake, Hook Creek and Lagoon, and Fosters Brook Lower. Aquatic and riparian habitats supported by these water bodies would also be expected to benefit from the proposed upgrades.

Health and Social Benefits

The proposed project impacts the town of Woodmere, with a population of 17,490. This project does not secure a specific health and social services facility but may improve the community's access to multiple health and social services assets such as the DRS Yeshiva High School, Woodmere Middle School and the Hebrew Academy for Special Children.

Cost-Benefit Analysis

Stormwater drainage issues were identified as a major concern of the NYRCR Committee and general public due to severe flooding from Superstorm Sandy and routine localized flooding occurring since the Storm. The total proposed project cost of \$6,000,000 and featured project cost of \$15,000,000 would provide a phased approach to resolving stormwater drainage issues in the most impacted areas of Woodmere by improving stormwater system efficiency, which would reduce the costs of property damages and government expenditures for emergency response in future storm events.

Anticipated Reduction of Risk

Assets in Woodmere are susceptible to flooding because of poor drainage of precipitation through the stormwater sewer system, inundation by seawater back flowing through the stormwater sewer system, and the generally low elevations in portions of the community. These projects would reduce the vulnerability of assets in the Woodmere by addressing these problems and thus reducing the frequency and severity of flooding during precipitation events and spring tides. Assets that provide a service

would therefore experience fewer and/or shorter periods when service is unavailable. As such, this project should secure locally significant stormwater infrastructure assets, including the pipes and outfalls.

This project should provide a reduction of risks to all populations in the Woodmere community by improving the stormwater system, which should reduce flooding throughout the community. The combined population of the area is 17,490. Specific information regarding the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Phase 1: Immediate (< 2 years)

Phase 2: Intermediate (2-5 years)

Regulatory Requirements

The project may require permits from NYS DEC, USACE, CZM coastal consistency concurrence (NYS DOS), the Town of Hempstead and Nassau County. .

Entity with Jurisdiction

Town of Hempstead, Nassau County

A multi-jurisdictional committee/consortium consisting of local municipalities could be considered, as well. This form of governance and administration has proven successful on Long Island, as represented by both the Hempstead Harbor Protection Committee and Manhasset Bay Protection Committee. Potential actions of such a multi-jurisdictional committee/consortium might include being able to

The Five Towns NY Rising Community Reconstruction Plan

appoint a fiduciary to be responsible for grant management, with the committee/consortium itself being responsible for project management. The recent New York – Connecticut Sustainable Communities Consortium, a program funded by a HUD Sustainable Communities Regional Planning Grant, used this structure and was successful in carrying out the planning program over a wide geography and across numerous municipal boundaries.

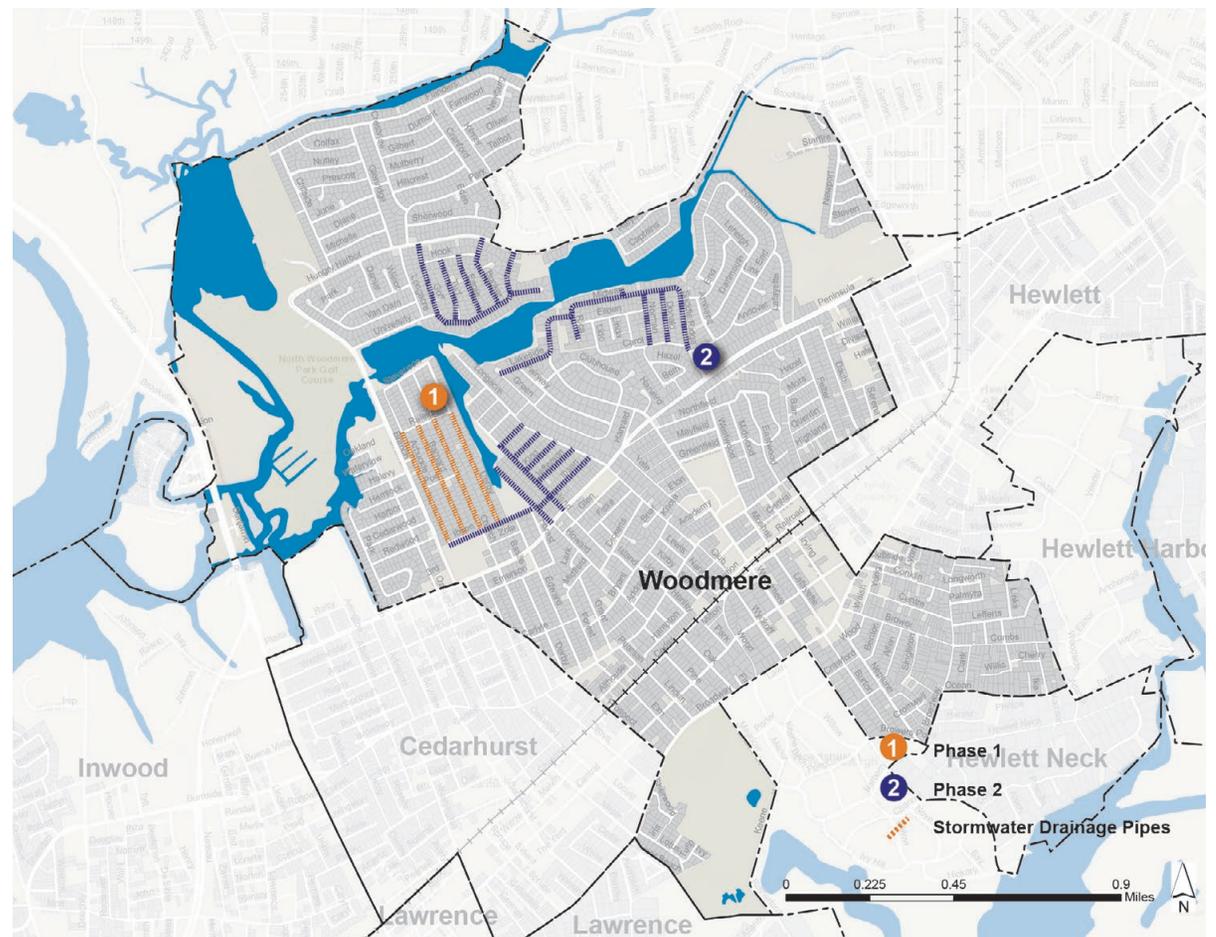


Figure 49: Woodmere Stormwater Infrastructure Upgrades

Section V: Additional Materials



A: Additional Resiliency Recommendations

Table 12: Additional Resiliency Recommendations

| Project Name | Project Description | Estimated Cost | Regional Project (Y/N) |
|--|--|----------------|------------------------|
| Meadowmere Park | | | |
| Meadowmere Park Community Center Site Selection, Design and Construction | Construct a Community Center in Meadowmere Park to serve as a day-to-day resources center and provide additional community assistance following storm events. | \$2,600,000 | N |
| Town of Hempstead-owned Parkland Reconstruction | Repair deteriorating bulkheads and reconstruct park to improve public access and benefit | \$420,000 | N |
| Regional | | | |
| Hempstead / Hewlett Bay Resilient Corridor Study | Build upon the Rockaway Turnpike Floodgates and Rockaway Turnpike/Nassau Expressway Upgrades study to analyze the creation of a continuous 'Resiliency Corridor' that uses existing roadway elevations in combination with floodgates at waterway crossings to protect the entire Hempstead/Hewlett Bay area against coastal flooding and hardens evacuation routes. | \$2,500,000 | Y |
| Implement Rockaway Turnpike/Nassau Expressway Upgrades | Pending the results of the Rockaway Turnpike / Nassau Expressway Upgrades study, this project is to construct the recommended flood protection alternative (potentially flood gates and/or elevated roadways). | TBD | Y |
| Enhance Levees to Protect Gas Storage Facilities | Harden and elevate existing flood levees that protect gas storage facilities in Inwood from flooding. | \$2,900,000 | Y |

B: Master Table of Projects

Table 13: Master Table of Projects

| Strategy | Project Name | Short Description | Project Category | Estimated Cost | Regional (Y/N) |
|--|--|---|------------------|----------------|----------------|
| Cedarhurst | | | | | |
| | Regional Contribution | | Proposed | \$375,000 | Y |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Cedarhurst Stormwater Infrastructure Upgrades: Phase 1 | Hydrologic and hydraulic study on the existing stormwater system. Installation of check valves, wet weather pumps, water storage tank. | Proposed | \$2,000,000 | N |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Removable Flood Walls for DPW Facility | Purchase of removable flood walls to protect the two buildings on the Cedarhurst DPW site. | Proposed | \$500,000 | N |
| Strategy 2: Emergency Response Capacity | Cedarhurst Village Hall Disaster Response Plan | Creation of a disaster response plan for Cedarhurst Village Hall. Installation of backup generators | Proposed | \$70,000 | N |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Cedarhurst Stormwater Infrastructure Upgrades: Phase 2 | Increase stormwater system capacity in the area surrounding Peninsula Blvd from Rockaway Tpk to Bayview Ave. | Featured | \$7,800,000 | N |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Cedarhurst Repair of the berm along Municipal Property | Repair of earthen berm along east side of Municipal Property. | Featured | \$710,000 | N |
| Hewlett | | | | | |
| | Regional Contribution | | Proposed | \$375,000 | Y |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Hewlett Stormwater Infrastructure Upgrades | Hydrologic and hydraulic study on the existing stormwater system. Installation of check valves, upgrades to stormwater pipes, drains, and catch basins. | Proposed | \$2,300,000 | N |

Table 13: Master Table of Projects (Con't)

| Strategy | Project Name | Short Description | Project Category | Estimated Cost | Regional (Y/N) |
|--|---|--|------------------|----------------|----------------|
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Hewlett Stormwater Infrastructure Upgrades: Phase 2 | Increase stormwater system capacity in the area of Broadway from Burton Ave to Piermont Ave. | Featured | \$7,600,000 | N |
| Hewlett Harbor | | | | | |
| | Regional Contribution | | Proposed | \$300,000 | Y |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Hewlett Harbor Stormwater Infrastructure Upgrades along Pepperidge Road | Hydrologic and hydraulic study on the existing stormwater system. Increase stormwater system capacity in the area of Pepperidge Rd from Auerbach Ave to Waverly Ave. Flood protections and green infrastructure at Village Hall. | Proposed | \$3,000,000 | N |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Hewlett Harbor Stormwater Infrastructure Upgrades: Phase 2 | Increase stormwater system capacity | Featured | \$3,800,000 | N |
| Hewlett Neck | | | | | |
| | Regional Contribution | | Proposed | \$300,000 | Y |

Table 13: Master Table of Projects (Con't)

| Strategy | Project Name | Short Description | Project Category | Estimated Cost | Regional (Y/N) |
|--|--|--|------------------|----------------|----------------|
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Hewlett Neck Stormwater Infrastructure Upgrades: Phase 1 | Hydrologic and hydraulic study on the existing stormwater system. Increase stormwater system capacity in the area of Dolphin Dr from Woodmere Blvd to Adams Ln. Cleaning and installation of dry wells. Increase stormwater capacity of Woodbine Ditch with green infrastructure. | Proposed | \$2,600,000 | N |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Harden Underground Street Light Infrastructure | Installation of underground electrical lines for street lights and removal of above ground lines. Replacement of current street signage with elevated retro-reflective street signs. | Proposed | \$340,000 | N |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Hewlett Neck Stormwater Infrastructure Upgrades: Phase 2 | Increase stormwater system capacity in the area of Hewlett Neck Rd. from Browsers Point Branch to Adams Ln. | Featured | \$2,700,000 | N |
| Inwood | | | | | |
| | Regional Contribution | | Proposed | \$375,000 | Y |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Inwood Stormwater Infrastructure Upgrades: Phase 1 | Hydrologic and hydraulic study on the existing stormwater system. Increase stormwater system capacity in the area of Bayswater Blvd and Walnut Rd. | Proposed | \$2,650,000 | N |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Inwood Stormwater Infrastructure Upgrades: Phase 2 | Increase stormwater system capacity in the area surrounding Hewlett Neck Road, from Browsers Point Branch to Adams Lane. | Featured | \$4,500,000 | N |

Table 13: Master Table of Projects (Con't)

| Strategy | Project Name | Short Description | Project Category | Estimated Cost | Regional (Y/N) |
|--|---|---|------------------|----------------|----------------|
| Strategy 2: Emergency Response Capacity | Inwood Buccaneers Facility Repairs | Mold remediation and replacement of mechanical equipment. | Featured | \$200,000 | N |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Repair Inwood Country Club Dam | Rebuild and elevate existing concrete dam. | Featured | \$1,000,000 | N |
| Lawrence | | | | | |
| | Regional Contribution | | Proposed | \$375,000 | Y |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Lawrence Stormwater Infrastructure Upgrades | Hydrologic and hydraulic study on the existing stormwater system. Increase stormwater system capacity in the area of Meadow Ln, Harborview, and Lakeside Dr South. Installation of backup generators at Village Hall. | Proposed | \$1,500,000 | N |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Lawrence Dike at the Isle of Wight: Repairs and Elevation | Repair and elevation of the dike using sheet pile core system. | Proposed | \$2,300,000 | N |
| Strategy 2: Emergency Response Capacity | Coordinated Mobile Response Unit - Lawrence Cedarhurst Fire Dept | Purchase a Mobile Response Unit for the Lawrence Cedarhurst Fire Department | Featured | \$325,000 | N |
| Strategy 2: Emergency Response Capacity | Coordinated Mobile Response Unit - Achiezer Community Resource Center | Purchase a Mobile Response Unit for the Achiezer Community Resource Center | Featured | \$325,000 | N |

Table 13: Master Table of Projects (Con't)

| Strategy | Project Name | Short Description | Project Category | Estimated Cost | Regional (Y/N) |
|--|---|--|------------------|----------------|----------------|
| Strategy 2: Emergency Response Capacity | Mesivta Ateres Yaakov: Disaster Relief Center | Enhance new gymnasium construction to provide backup power, private meeting spaces, reliable communications, and storage for emergency equipment and supplies. | Featured | \$500,000 | N |
| Meadowmere Park | | | | | |
| | Regional Contribution | | Proposed | \$375,000 | Y |
| Strategy 2: Emergency Response Capacity | Meadowmere Park Microgrid | Establish a microgrid node to provide backup power supply for the Meadowmere Park Fire House and a charging station for residents. | Proposed | \$500,000 | N |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Meadowmere Park Bulkhead Restoration Program | Provide gap funding to provide assistance to homeowners who are denied assistance for bulkhead repairs through the NY Rising Housing Recovery Program. | Proposed | \$1,000,000 | N |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Meadowmere Park Home Elevation Program | Provide gap funding to provide assistance to homeowners who are denied assistance for home elevation through the NY Rising Housing Recovery Program. | Proposed | \$1,000,000 | N |
| Strategy 2: Emergency Response Capacity | Meadowmere Park Fire Department - Building Upgrades | Installation of permanent generator for increased backup power capacity (cost included in Meadowmere Park Microgrid). Improvements and hardening of the facility to ensure that it can function as a Community Assistance Center. | Proposed | \$50,000 | N |
| Strategy 3: Improve Access | Meadowmere Park Footbridge Repairs | Repair the existing wooden footbridge. | Proposed | \$750,000 | N |

Table 13: Master Table of Projects (Con't)

| Strategy | Project Name | Short Description | Project Category | Estimated Cost | Regional (Y/N) |
|--|--|---|------------------|----------------|----------------|
| Woodmere | | | | | |
| | Regional Contribution | | | \$700,000 | Y |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Woodmere Stormwater Infrastructure Upgrades: Phase 1 | Hydrologic and hydraulic study on the existing stormwater system. Increase stormwater system capacity in the area of Derby Ave. to Arbuckle Ave. | Proposed | \$6,000,000 | N |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Woodmere Stormwater Infrastructure Upgrades: Phase 2 | Increase stormwater system capacity in the area surrounding Peninsula Boulevard from Howard Ave. to Longacre Ave. | Featured | \$15,000,000 | N |
| Regional Projects | | | | | |
| Strategy 1: Coastal Protection and Stormwater Infrastructure | South Shoreline Improvement Program Study | Study methods for facilitating coordinated shoreline improvements to achieve a contiguous shoreline, including funding mechanisms, streamlining permitting, and incentivizing bulkhead repairs and living shoreline improvements. | Proposed | \$400,000 | Y |
| Strategy 2: Emergency Response Capacity | Five Towns Community Center Repairs and Disaster Response Plan Phase 1 | Develop a disaster response plan. Increase capacity to operate as a Community Assistance Center. Purchase of backup generators. | Proposed | \$300,000 | Y |
| Strategy 2: Emergency Response Capacity | Five Towns Community Center Repairs and Disaster Response Plan Phase 2 | Repair damages to the Five Towns Community Center. Upgrade bathrooms and install showers and laundry facilities. | Featured | \$50,000 | Y |

Table 13: Master Table of Projects (Con't)

| Strategy | Project Name | Short Description | Project Category | Estimated Cost | Regional (Y/N) |
|--|---|---|------------------|----------------|----------------|
| Strategy 1: Coastal Protection and Stormwater Infrastructure | Lawrence High School Hardening and Protection | Construction of a flood wall to protect the building foundation from future storm surge. | Proposed | \$1,600,000 | Y |
| Strategy 1: Coastal Protection and Stormwater Infrastructure Strategy 3: Improve Access | Study Rockaway Turnpike Floodgates and Rockaway Turnpike/Nassau Expressway Upgrades | Analyze construction of floodgates at Hook Creek and Motts Creek and elevation of Rockaway Tpke and Nassau Expy. Conduct traffic management study to decrease congestion in evacuation routes. Study opportunities for economic development in retail/commercial zones that would be protected by flood mitigation. | Proposed | \$920,000 | Y |
| Strategy 2: Emergency Response Capacity | Identify Locations for Microgrids and Renewable Energy | Identification and analysis of sites for microgrid implementation. Conceptual design for microgrid implementation. | Proposed | \$167,000 | Y |
| | | Regional Contribution: Woodmere | | \$700,000 | |
| | | Regional Contribution: Cedarhurst, Hewlett, Inwood, Lawrence, Meadowmere Park | | \$375,000 | |
| | | Regional Contribution: Hewlett Harbor, Hewlett Neck | | \$300,000 | |
| | | Total Regional Contribution | | \$3,175,000 | |

C: Public Engagement Process

Goals and Objectives

The Goals and Objectives of the NYRCR Five Towns Public Engagement Strategy complemented the overall goals and objectives of the NYRCR Program, while ensuring an end product that featured the support of the local communities.

Goals of the program's public engagement included:

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

Planning Committee

The Five Towns Planning Committee consisted of a group of local community leaders who provided input and guidance to the NYRCR Program. The Committee was comprised of representatives of diverse geographic area within the Five Towns area.

The Planning Committee met in person with the Consultant Team six times during the plan development process.

Each of these meetings was open to the public, who were invited to participate at various times during the meetings. Discussions among Committee members and the public focused on the following:

- Current issues, conditions and needs;
- The elements that comprised the community's strengths and asset;
- The specific definitions of what the NYRCR Program could support;
- Visions of the future and how these could be translated into achievable opportunities;
- Feedback regarding the technical risk assessment;
- Input regarding the assessment of the community's economic and housing needs, and guidance to the technical team as it defined opportunities and recommendations for addressing these;
- Guidance and decisions on the various investments, funding, program and policy implementation strategies needed to achieve the community vision as defined for the area; and
- Review of the NYRCR Plan, in order to ensure that it is one that the community can continue to support and champion over time.

In addition, the Planning Committee played a primary role in guiding the community outreach process in order to ensure that a broad and representative spectrum of the public was provided the opportunity to actively participate in this process. For example, the Consultant Team worked with Committee members to arrange tours and meetings in the field throughout the Five Towns area in order to better understand existing conditions, needs, and possible improvements.

Stakeholder and Public Group Contact List

With the assistance of the Planning Committee, the Consultant Team identified stakeholder organizations and individuals who should be part of this effort. A stakeholder list was created and updated as needed. The list was added to throughout the NYRCR planning process. These stakeholders received notifications and information electronically through email during the course of the project.

Project Website

The NYRCR Program's website (www.stormrecovery.ny.gov/nyrcr) was used to provide information about the development of the plan and to host project documents. Information about the Five Towns Community Reconstruction effort is available on this website, including:

- Planning Committee meetings
- Public Engagement events
- News and Announcements
- Project Documents
- An Electronic Comment form
- FAQs

Public Engagement Events

Public meetings were held to offer participation opportunities for individuals in all the communities of the Five Towns. Public Meetings were scheduled at key points in the development of the NYRCR Plan to ensure that the public had an opportunity to provide meaningful input and help shape the NYRCR Plan. Meetings were held in the evenings to allow those who work during regular business hours the opportunity to attend. All public meetings began with a PowerPoint presentation of progress to date. What then followed were intensive discussions between Consultant Team and Planning Committee members and members of the public, either in one-on-one discussions at boards stationed around the meeting room or in facilitated breakout groups.

Public Open Houses were held on October 17, 2013, November 19, 2013, and February 6, 2014. A fourth Public Open House will be held after the release of the NYRCR Plan, in Spring 2014.

The Consultant Team prepared flyers to advertise each public meeting. The flyers were available in print and electronic formats and were distributed to the Planning Committee members for them to distribute to the public. Electronic versions were also advertised on the NY Rising website. The flyers were also translated into Spanish and were distributed both electronically and in hard copy to Committee members and

The Five Towns NY Rising Community Reconstruction Plan

the general public. In addition, prior to the first public meeting on October 17, 2013, a Consultant Team member distributed flyers at the Five Towns Fair, held at Andrew J. Parise Park in Cedarhurst, NY, on the Sunday prior to this first public meeting.

To further promote public meeting attendance, paid advertisements were placed in three local newspapers in advance of each public meeting. The Committee members recommended these newspapers. They were:

1. Nassau Herald;
2. Jewish Star; and
3. Mundo Hispano News.

Finally, public meetings were advertised on community websites. Committee members were encouraged to contact organizations to provide them with information for their particular websites. The Five Towns patch.com, a public community calendar website, also announced each public meeting in advance of the meeting date.



NEW YORK RISING
Community Reconstruction Program

Five Towns Public Workshop #2



Tuesday, November 19

7PM – 9PM
Hewlett-Woodmere
Public Library
1125 Broadway
Hewlett, NY

Your Input is Important

Five Towns suffered significant damage from Superstorm Sandy. Governor Cuomo created the New York Rising Program to help communities become stronger and better prepared for future storms. A committee of Five Towns residents is working with the State to develop a plan to do just that – **and they want your help.**

Join us on Tuesday, November 19th at 7PM to discuss the future of Five Towns.

Over the coming months, the committee will be developing reconstruction strategies, projects, and programs, and will ask for your input each step along the way. Your knowledge and vision for Five Towns are crucial to the success of the plan.

Please come and help shape the plan – and the future of Five Towns!

www.NYRisingCommunities.com
#NYRising @NYStormRecovery



NEW YORK RISING
El Programa del Reconstrucción de La Comunidad

Five Towns Reunión Pública #2



Martes, 19 de noviembre

7PM – 9PM
Hewlett-Woodmere
Public Library
1125 Broadway
Hewlett, NY

Su opinión es importante.

Five Towns sufrió daños significativos por de “Superstorm Sandy.” Gobernador Cuomo creó el Programa de “New York Rising” para ayudar a las comunidades se vuelven más fuertes y mejor preparados para futuras tormentas. Un comité de residentes de Five Towns está trabajando con el Estado para desarrollar un plan para hacer precisamente eso – y quieren su ayuda.

Unirse a nosotros el Martes, 19 de noviembre a las 7 PM para discutir al futuro de Five Towns.

Durante el próximo mes, el comité desarrollará reconstrucción estrategias, proyectos, y programas, y nos pediremos su opinión cada paso en el camino. Vuestra conocimientos y visión por Five Towns son cruciales para la éxito del plan.

Por favor venga y ayudar a dar forma al plan - y al futuro de Five Towns.

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www.NYRisingCommunities.com
#NYRising @NYStormRecovery

D: Inventory of Assets

Table 14: Risk of Economic Assets

| Economic Asset(s) | NYS Risk Area | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
|---|---------------|--------------|----------------|---------------------|------------|
| Apotex USA Incorporated | High | 3 | 3.00 | 4 | 36 |
| Bayview Ave Economic Corridor_Extreme | Extreme | 3 | 4.50 | 5 | 68 |
| Bayview Ave Economic Corridor_High | High | 3 | 2.50 | 5 | 38 |
| Bell Hop Cleaners | High | 3 | 2.50 | 4 | 30 |
| Branch Blvd/Oakland Ave Economic Corridor_High | High | 3 | 2.50 | 4 | 30 |
| Cedarhurst Yacht Club Economic Asset_Extreme | Extreme | 3 | 4.00 | 4 | 48 |
| Cedarhurst Yacht Club Economic Asset_High | High | 3 | 3.50 | 4 | 42 |
| Chase Bank at Peninsula Boulevard | High | 3 | 2.50 | 4 | 30 |
| Cruise One | High | 3 | 3.00 | 4 | 36 |
| Inip Dr/Doughty Blvd Economic Corridor_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| Inip Dr/Doughty Blvd Economic Corridor_High | High | 3 | 3.00 | 4 | 36 |
| Inwood Country Club/Marina Economic Corridor_Extreme | Extreme | 3 | 3.50 | 4 | 42 |
| Inwood Country Club/Marina Economic Corridor_High | High | 3 | 3.50 | 4 | 42 |
| Johnson Rd/Rason Rd Economic Corridor_High | High | 3 | 3.00 | 4 | 36 |
| Key Foods Shopping Center at Rosedale Road | High | 3 | 3.00 | 4 | 36 |
| Keystone Yacht Club | Extreme | 3 | 4.50 | 4 | 54 |
| Lawrence Country Club & Yacht Club Economic Asset_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| Lawrence Country Club & Yacht Club Economic Asset_High | High | 3 | 3.50 | 4 | 42 |
| Long Beach Taxi Service | High | 3 | 3.00 | 4 | 36 |
| Nassau Expy Economic Corridor_High | High | 3 | 2.50 | 4 | 30 |
| Peninsula Blvd/Mill Rd Economic Corridor_High | High | 3 | 2.50 | 4 | 30 |
| Prospect St Economic Corridor_High | High | 3 | 2.50 | 4 | 30 |

Table 14: Risk of Economic Assets (Con't)

| Economic Asset(s) | NYS Risk Area | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
|---|---------------|--------------|----------------|---------------------|------------|
| Rockaway Turnpike Economic Corridor_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| Rockaway Turnpike Economic Corridor_High | High | 3 | 3.50 | 4 | 42 |
| Seawane Club Economic Corridor_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| Seawane Club Economic Corridor_High | High | 3 | 3.50 | 4 | 42 |
| Seven Eleven at Peninsula Boulevard | High | 3 | 3.00 | 4 | 36 |
| Sheridan Blvd/Burnside Ave Economic Corridor_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| Sheridan Blvd/Burnside Ave Economic Corridor_High | High | 3 | 2.50 | 4 | 30 |
| South Sheridan Blvd Economic Corridor_Extreme | Extreme | 3 | 4.00 | 4 | 48 |
| South Sheridan Blvd Economic Corridor_High | High | 3 | 2.50 | 4 | 30 |
| The Woodmere Club/Rockaway Hunting Club Economic Corridor_Extreme | Extreme | 3 | 4.00 | 4 | 48 |
| The Woodmere Club/Rockaway Hunting Club Economic Corridor_High | High | 3 | 3.00 | 4 | 36 |
| US Cargo, Inc | High | 3 | 2.50 | 4 | 30 |
| Wolfe Animal Hospital | High | 3 | 2.50 | 4 | 30 |

Table 15: Risk of Health and Social Services Assets

| Health and Social Services Asset(s) | NYS Risk Area | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
|-------------------------------------|---------------|--------------|----------------|---------------------|------------|
| A H R C | High | 3 | 3.00 | 4 | 36 |
| Cedarhurst Village Hall | None | 3 | - | 4 | 0 |
| DRS Yeshiva High School | High | 3 | 3.00 | 4 | 36 |
| Five Towns Medical Center | High | 3 | 2.50 | 4 | 30 |
| Five Towns Childcare Center | High | 3 | 2.50 | 4 | 30 |

Table 15: Risk of Health and Social Services Assets (Con't)

| Health and Social Services Asset(s) | NYS Risk Area | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
|---|---------------|--------------|----------------|---------------------|------------|
| Franklin School and Athletic Field | High | 3 | 2.50 | 4 | 30 |
| Hewlett Fire Department | None | 3 | - | 4 | 0 |
| Hewlett Harbor Health and Social Services Assets_High | High | 3 | 2.50 | 4 | 30 |
| Hewlett Harbor Village Hall | High | 3 | 2.50 | 4 | 30 |
| Hewlett Neck Village Hall | None | 3 | - | 4 | 0 |
| Hollander Early Childhood Center | High | 3 | 2.50 | 4 | 30 |
| Hunter Ambulance | High | 3 | 2.50 | 4 | 30 |
| Inwood Fire Department | Moderate | 3 | 2.00 | 4 | 24 |
| Inwood Health and Social Services Assets_Extreme | Extreme | 3 | 4.00 | 4 | 48 |
| Inwood Health and Social Services Assets_High | High | 3 | 3.00 | 4 | 36 |
| Lawrence Health and Social Services Assets_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| Lawrence Health and Social Services Assets_High | High | 3 | 3.00 | 4 | 36 |
| Lawrence High School | High | 3 | 3.00 | 4 | 36 |
| Lawrence Number 6 School | High | 3 | 3.00 | 4 | 36 |
| Lawrence Village Hall | None | 3 | - | 4 | 0 |
| Lawrence-Cedarhurst Fire Department | None | 3 | - | 4 | 0 |
| Meadowmere Park Fire House | Extreme | 3 | 3.50 | 4 | 42 |
| Nassau County Police Dept 4th Precinct | Moderate | 3 | 2.00 | 4 | 24 |
| The Bristol Assisted Living | High | 3 | 3.50 | 4 | 42 |
| Woodmere Fire Department | None | 3 | - | 4 | 0 |
| Woodmere Health and Social Services Assets_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| Woodmere Health and Social Services Assets_High | High | 3 | 3.50 | 4 | 42 |
| Woodmere Middle School | High | 3 | 2.50 | 4 | 30 |
| Yeshiva Of South Shore | High | 3 | 2.50 | 4 | 30 |

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

Table 16: Risk of Housing Assets

| Housing Asset(s) | NYS Risk Area | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
|--|---------------|--------------|----------------|---------------------|------------|
| Affordable Housing – Merlis Street | High | 3 | 2.50 | 4 | 30 |
| Affordable Housing – Randall Ave | High | 3 | 2.50 | 4 | 30 |
| Affordable Housing – Bayview Ave | High | 3 | 2.50 | 4 | 30 |
| Cedarhurst Housing Assets_Extreme | Extreme | 3 | 4.00 | 4 | 48 |
| Cedarhurst Housing Assets_High | High | 3 | 2.50 | 4 | 30 |
| Hewlett Harbor Housing Assets_Extreme | Extreme | 3 | 4.50 | 3 | 41 |
| Hewlett Harbor Housing Assets_High | High | 3 | 2.50 | 3 | 23 |
| Hewlett Housing Assets_High | High | 3 | 2.50 | 4 | 38 |
| Hewlett Neck Housing Assets_Extreme | Extreme | 3 | 4.50 | 4 | 68 |
| Hewlett Neck Housing Assets_High | High | 3 | 3.00 | 4 | 36 |
| Inwood Gardens Apartments Senior Housing | High | 3 | 2.30 | 4 | 30 |
| Inwood Housing Assets_Extreme | Extreme | 3 | 3.50 | 4 | 42 |
| Inwood Housing Assets_High | High | 3 | 2.50 | 4 | 30 |
| Lawrence Housing Assets_Extreme | Extreme | 3 | 4.00 | 4 | 48 |
| Lawrence Housing Assets_High | High | 3 | 3.00 | 4 | 36 |
| Mary's Manor | Moderate | 3 | 2.00 | 4 | 24 |
| Meadowmere Park Assets_Extreme | Extreme | 3 | 4.00 | 4 | 48 |
| Woodmere Housing Assets_High | High | 3 | 3.00 | 4 | 36 |

Table 17: Risk of Infrastructure Systems Assets

| Infrastructure Systems Asset(s) | NYS Risk Area | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
|--|---------------|--------------|----------------|---------------------|------------|
| 175 Roger Avenue LLC Remediation Site | High | 3 | 2.50 | 4 | 30 |
| 2nd Street Beach Bridge | High | 3 | 3.00 | 4 | 36 |
| 525 - 535 Burnside Avenue Remediation Site | High | 3 | 3.00 | 4 | 36 |
| American Drive In Cleaners Remediation Site | High | 3 | 3.00 | 4 | 36 |
| Amoco Oil | High | 3 | 3.50 | 4 | 42 |
| Atlantic Beach Toll Plaza Bridge | Moderate | 3 | 2.50 | 2 | 15 |
| Bel-Mar Oil Company Incorporated | High | 3 | 2.50 | 4 | 30 |
| BP Gas Station at Plaza Road | High | 3 | 3.00 | 4 | 36 |
| Branch Boulevard Bridge | High | 3 | 3.00 | 4 | 36 |
| Carbo Industries | High | 3 | 3.50 | 3 | 32 |
| Cedarhurst Sewage Treatment Plant | High | 3 | 3.50 | 2 | 21 |
| City Gas Station at Sheridan Boulevard | High | 3 | 2.50 | 4 | 30 |
| Clearwire Spectrum Holdings III, LLC 1, 4, 8, 9 | High | 3 | 3.00 | 4 | 36 |
| Clearwire Spectrum Holdings III, LLC 2 2, 3, 5, 6, 7 | High | 3 | 3.00 | 4 | 36 |
| Concord Oil Co | High | 3 | 3.00 | 4 | 36 |
| Dock Street Pedestrian Bridge | Extreme | 3 | 4.00 | 4 | 48 |
| Doxey Brook Stormwater Pump Station | High | 3 | 3.00 | 4 | 36 |
| Eagle Oil | High | 3 | 2.50 | 4 | 30 |
| East Avenue Bridge | Extreme | 3 | 4.00 | 4 | 48 |
| Far Rockaway LIRR Line | High | 3 | 2.50 | 4 | 30 |
| Fuel Storage & Distribution | Extreme | 3 | 4.50 | 4 | 54 |
| Global Companies LLC - Inwood Terminal | Moderate | 3 | 2.50 | 4 | 30 |

Table 17: Risk of Infrastructure Systems Assets (Con't)

| Infrastructure Systems Asset(s) | NYS Risk Area | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
|--|---------------|--------------|----------------|---------------------|------------|
| Grove Cleaners Remediation Site | High | 3 | 3.00 | 4 | 36 |
| Gulf Gas Station at Mill Road | High | 3 | 2.50 | 4 | 30 |
| Hess Gas Station at Burnside Ave, Inwood | High | 3 | 2.50 | 4 | 30 |
| Hewlett LIRR Station | None | 3 | - | 4 | 0 |
| Inwood Gas Holder | High | 3 | 3.50 | 4 | 42 |
| Inwood LIRR Station | Moderate | 3 | 2.50 | 4 | 30 |
| Lawrence LIRR Station | None | 3 | - | 4 | 0 |
| LIPA Facility at Peninsula Boulevard | High | 3 | 2.50 | 4 | 30 |
| LIPA Power Lines | None | 3 | - | 4 | 0 |
| LIPA Power Stations_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| LIPA Power Stations_High | High | 3 | 3.50 | 4 | 42 |
| LIPA Power Stations_Moderate | Moderate | 3 | 2.00 | 4 | 24 |
| LIPA Power Stations | None | 3 | - | 4 | 0 |
| LIPA Transformer at Fulton Street | None | 3 | - | 4 | 0 |
| LIRR Peninsula Boulevard Bridge | High | 3 | 3.00 | 4 | 36 |
| McNeil Ave Fuel Storage | Moderate | 3 | 3.00 | 4 | 36 |
| Meadowmere Footbridge | Extreme | 3 | 4.00 | 4 | 48 |
| Middle School Footbridge (at Lafayette Avenue) | High | 3 | 2.50 | 4 | 30 |
| Mobil Gas Station at Burnside Ave | High | 3 | 3.00 | 4 | 36 |
| Mobil Gas Station at Peninsula Blvd | High | 3 | 2.50 | 4 | 30 |
| Mobil Gas Station at Rockaway Tpke | Extreme | 3 | 4.00 | 4 | 48 |
| Motiva Enterprise | Extreme | 3 | 4.50 | 4 | 54 |
| Motiva Enterprises LLC Remediation Site | Extreme | 3 | 4.00 | 4 | 48 |

Table 17: Risk of Infrastructure Systems Assets (Con't)

| Infrastructure Systems Asset(s) | NYS Risk Area | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
|---|---------------|--------------|----------------|---------------------|------------|
| Motts Creek Footbridge | High | 3 | 3.00 | 4 | 36 |
| Nassau County Inwood Sewage Treatment Plant | High | 3 | 3.00 | 2 | 18 |
| Nassau Expressway Bridge | None | 3 | - | 4 | 0 |
| Nassau Expy_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| Nassau Expy_High | High | 3 | 3.50 | 4 | 42 |
| Peninsula Blvd_Extreme | Extreme | 3 | 4.50 | 3 | 41 |
| Peninsula Blvd_High | High | 3 | 2.50 | 2 | 15 |
| Peninsula Boulevard Bridge | High | 3 | 3.00 | 2 | 18 |
| Peninsula Boulevard Remediation Site | High | 3 | 3.00 | 4 | 36 |
| Pep Boys Supercenter #349 Remediation Site | High | 3 | 3.00 | 4 | 36 |
| Plant 5, Long Island American Water | High | 3 | 2.50 | 1 | 8 |
| Roadway Assets_Extreme | Extreme | 3 | 4.00 | 4 | 48 |
| Roadway Assets_High | High | 3 | 2.50 | 4 | 30 |
| Rockaway Boulevard Bridge over Hook Creek | Extreme | 3 | 4.00 | 4 | 48 |
| Rockaway Tpke_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| Rockaway Tpke_High | High | 3 | 3.50 | 4 | 42 |
| Rockaway Turnpike Bridge | None | 3 | - | 4 | 0 |
| Seagirt Boulevard Bridge | Moderate | 3 | 2.00 | 4 | 24 |
| Seawane Drive Bridge | None | 3 | - | 4 | 0 |
| Sewer System_Extreme | Extreme | 3 | 4.00 | 3 | 36 |
| Sewer System_High | High | 3 | 2.50 | 2 | 15 |
| Shell Gas Station at Mill Rd | High | 3 | 2.50 | 4 | 30 |
| Shell Gas Station at Rockaway Tpke | High | 3 | 2.50 | 4 | 30 |

Table 17: Risk of Infrastructure Systems Assets (Con't)

| Infrastructure Systems Asset(s) | NYS Risk Area | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
|---|---------------|--------------|----------------|---------------------|------------|
| Shell Gas Station at Rosedale Rd | Extrepme | 3 | 4.00 | 4 | 48 |
| Stormwater Drainage System_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| Stormwater Drainage System_High | High | 3 | 3.00 | 4 | 36 |
| Stormwater Outfall_Extreme | Extreme | 3 | 4.00 | 4 | 48 |
| Stormwater Outfall_High | High | 3 | 2.50 | 4 | 30 |
| Sunoco Gas Station at Peninsula Blvd | High | 3 | 2.50 | 4 | 30 |
| Sunoco Gas Station at Sheridan Blvd | High | 3 | 2.50 | 4 | 30 |
| Town of Hempstead Sanitation District 1 | High | 3 | 3.00 | 2 | 18 |
| U-Haul | High | 3 | 2.50 | 4 | 30 |
| Village of Lawrence Waste Water Treatment Plant | High | 3 | 3.50 | 1 | 11 |
| Water Supply Infrastructure 1 | Moderate | 3 | 2.00 | 4 | 24 |
| Water Supply Infrastructure 2 | High | 3 | 3.50 | 4 | 42 |
| Water Supply Infrastructure 3 | Extreme | 3 | 4.00 | 4 | 48 |
| Woodbine Ditch | High | 3 | 3.00 | 4 | 36 |
| Woodmere LIRR Station | 0 | 3 | FALSE | 2 | 0 |
| Woodmere Middle School Footbridge | High | 3 | 3.00 | 3 | 27 |

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

Table 18: Risk of Natural and Cultural Resources Assets

| Natural and Cultural Resources Asset(s) | NYS Risk Area | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
|--|---------------|--------------|----------------|---------------------|------------|
| Brosewre Bay | Extreme | 3 | 4.50 | 4 | 54 |
| Cedar Point Lake | High | 3 | 3.50 | 4 | 42 |
| Doxey Brook | High | 3 | 3.50 | 4 | 42 |
| Fosters Brook Lower | High | 3 | 3.50 | 4 | 42 |
| Hewlett Bay | Extreme | 3 | 4.50 | 4 | 54 |
| Hewlett Neck Natural and Cultural Resources Assets_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| Hook Creek & Lagoon | Extreme | 3 | 4.50 | 4 | 54 |
| Inwood Natural and Cultural Resources Assets_High | High | 3 | 2.50 | 4 | 30 |
| Johnny Jack Park | Extreme | 3 | 4.50 | 4 | 54 |
| Lawrence Natural and Cultural Resources Assets_Extreme | Extreme | 3 | 4.50 | 4 | 54 |
| Lawrence Natural and Cultural Resources Assets_High | High | 3 | 3.00 | 4 | 36 |
| Town of Hempstead Owned Park | Extreme | 3 | 4.50 | 4 | 54 |
| Valley Stream | Extreme | 3 | 4.00 | 4 | 48 |
| Woodmere Natural and Cultural Resources Assets_Extreme | Extreme | 3 | 4.00 | 4 | 48 |
| Woodmere Natural and Cultural Resources Assets_High | High | 3 | 2.50 | 4 | 30 |

Table 19: Risk of Assets that Serve Socially Vulnerable Populations

| Asset(s) that serve Socially Vulnerable Populations | NYS Risk Area | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
|---|---------------|--------------|----------------|---------------------|------------|
| Affordable Housing – Merlis St | High | 3 | 2.50 | 4 | 30 |
| Affordable Housing – Randall Ave | High | 3 | 2.50 | 4 | 30 |
| Affordable Housing – Bayview Ave | High | 3 | 2.50 | 4 | 30 |
| A H R C | High | 3 | 3.00 | 4 | 36 |
| DRS Yeshiva High School | High | 3 | 3.00 | 4 | 36 |
| Five Towns Child Care Center | High | 3 | 2.50 | 4 | 30 |
| Franklin School and Athletic Field | High | 3 | 2.50 | 4 | 30 |
| Hollander Early Childhood Center | High | 3 | 2.50 | 4 | 30 |
| Inwood Gardens Apartments Senior Housing | High | 3 | 2.50 | 4 | 30 |
| Inwood Housing Assets_Extreme | Extreme | 3 | 3.50 | 4 | 42 |
| Inwood Housing Assets_High | High | 3 | 2.50 | 4 | 30 |
| Lawrence High School | High | 3 | 3.00 | 4 | 36 |
| Lawrence Number 6 School | High | 3 | 3.00 | 4 | 36 |
| Mary's Manor | Moderate | 3 | 2.00 | 4 | 24 |
| Middle School Footbridge (at Lafayette Avenue) | High | 3 | 2.50 | 4 | 30 |
| The Bristol Assisted Living | High | 3 | 3.50 | 4 | 42 |
| Wolfe Animal Hospital | High | 3 | 2.50 | 4 | 30 |
| Woodmere Middle School | High | 3 | 2.50 | 4 | 30 |
| Woodmere Middle School Footbridge | High | 3 | 3.00 | 3 | 27 |
| Yeshiva Of South Shore | High | 3 | 2.50 | 4 | 30 |

E: Housing Profile

Description of housing stock:

The Five Towns area is incredibly diverse in terms of structure types, size and age of property.

Structure Type

In the Five Towns Community as a whole, the largest share of housing, 68.9%, is traditional single-family detached. The next largest share of units, 10.6%, is in buildings with 20 units or more. While 8.3% are two-unit structures.

Table 20: Distribution of Housing Units by Structure Type, 2011

| | Five Towns | Cedarhurst | Hewlett | Hewlett Harbor | Hewlett Neck | Inwood | Lawrence | Woodmere / Meadowmere Park |
|------------------|--------------|------------|---------|----------------|--------------|--------|----------|-------------------------------|
| 1-unit, detached | 68.9% | 54.4% | 65.2% | 100.0% | 100.0% | 46.6% | 72.5% | 86.3% |
| 1-unit, attached | 3.0% | 4.8% | 0.0% | 0.0% | 0.0% | 7.7% | 0.0% | 2.2% |
| 2 units | 8.3% | 13.4% | 1.8% | 0.0% | 0.0% | 25.6% | 2.1% | 2.2% |
| 3 or 4 units | 4.2% | 2.8% | 5.5% | 0.0% | 0.0% | 11.8% | 0.5% | 1.5% |
| 5 to 9 units | 1.9% | 1.6% | 3.8% | 0.0% | 0.0% | 1.6% | 4.7% | 0.2% |
| 10 to 19 units | 3.0% | 3.9% | 10.6% | 0.0% | 0.0% | 0.8% | 1.5% | 1.0% |
| 20 or more units | 10.6% | 19.1% | 13.0% | 0.0% | 0.0% | 5.8% | 18.7% | 6.4% |
| Mobile home | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.2% |

Source: American Community Survey 2007-2011

The distribution of housing types varies greatly among the areas within the Community. As shown in Table above, the highlighted cells indicate communities in which the share of that housing type is greater than the overall Community Share. Hewlett Harbor and Hewlett Neck homes are 100% single-family detached. Woodmere/Meadowmere Park and Lawrence also have greater shares of single-family detached housing with 86.3% and 72.5%, respectively.

Year Built

The largest share of housing in the Five Towns Community, 33.7%, was built in 1939 or earlier. Eleven percent was built between 1940 and 1949, while 23.7% was constructed between 1950 and 1959 and an additional 16% between 1960 and 1969. Only 15.6 % of area housing has been built since 1970. And very little, only 0.7% of units have been built since 2005.

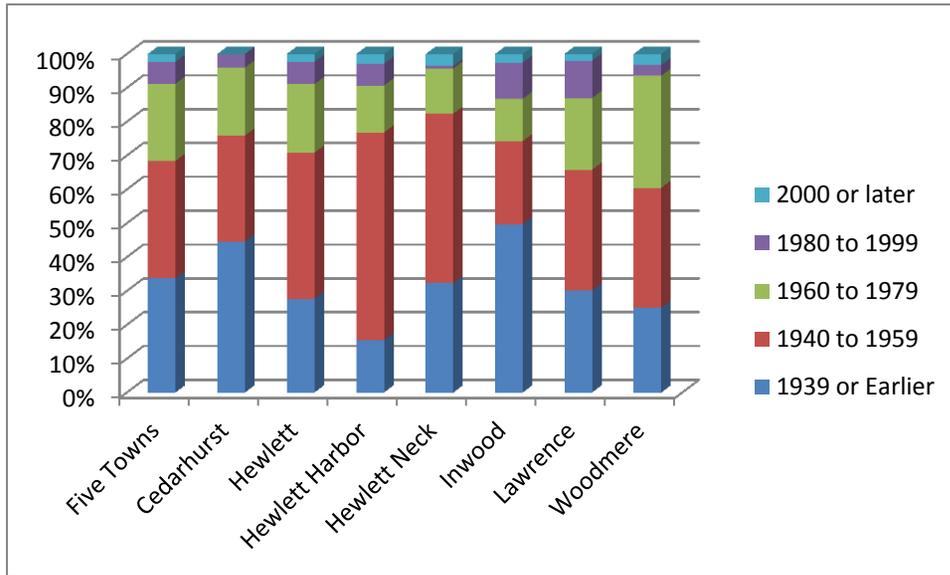
Table 21: Distribution of Five Towns Housing Units by Year Built

| Total Units | 16,534 | Percent of Total |
|-----------------|--------|------------------|
| 2005 or later | 112 | 0.7% |
| 2000 to 2004 | 268 | 1.6% |
| 1990 to 1999 | 224 | 1.4% |
| 1980 to 1989 | 846 | 5.1% |
| 1970 to 1979 | 1,127 | 6.8% |
| 1960 to 1969 | 2,644 | 16.0% |
| 1950 to 1959 | 3,923 | 23.7% |
| 1940 to 1949 | 1,811 | 11.0% |
| 1939 or earlier | 5,579 | 33.7% |

Source: American Community Survey 2007-2011

The following chart shows the distribution of housing units by year built for each of the component places in Five Towns by roughly twenty year cohorts. As illustrated by the share of units built in 1939 or earlier, Inwood and Cedarhurst were the first areas to be settled. Between 1940 and 1959 however, the majority of the all of Five Towns was built out: 82.4% of all housing in Hewlett Neck; 76.8% of Hewlett Harbor; 75.9% of Cedarhurst; and 74.3% of Inwood. Woodmere/Meadowmere Park and Lawrence are the only places in the Five Towns in which less than 70% of housing was constructed before 1960.

Figure 50: Distribution of Five Towns Housing Units by Year Built



Source: American Community Survey 2007-2011

Figure 51: Distribution of Five Towns Housing Units by Year Built, 1959 or Earlier

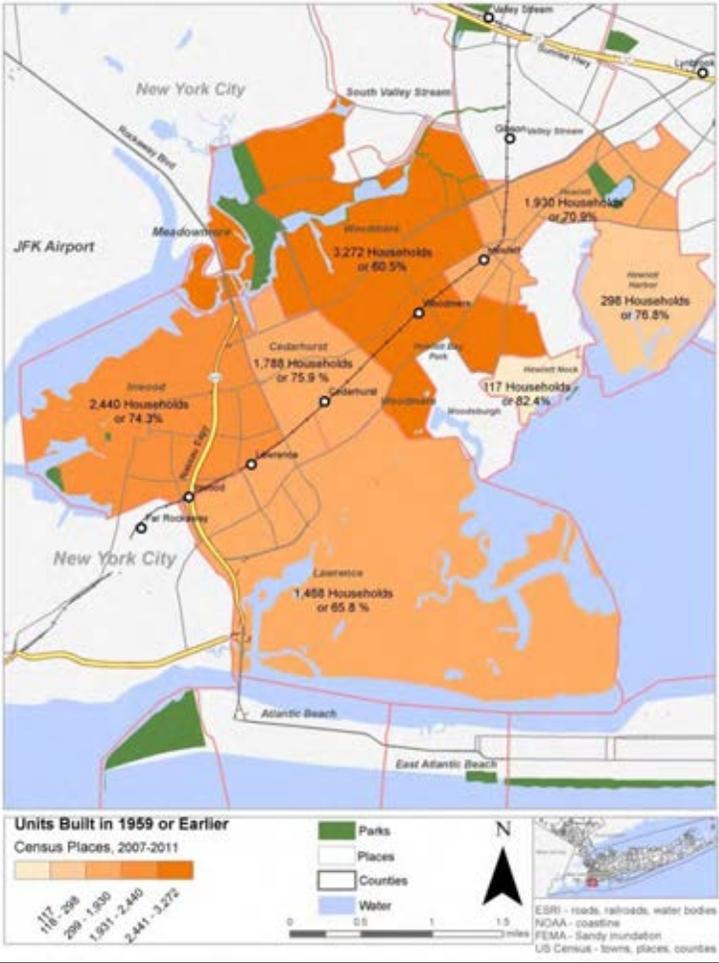
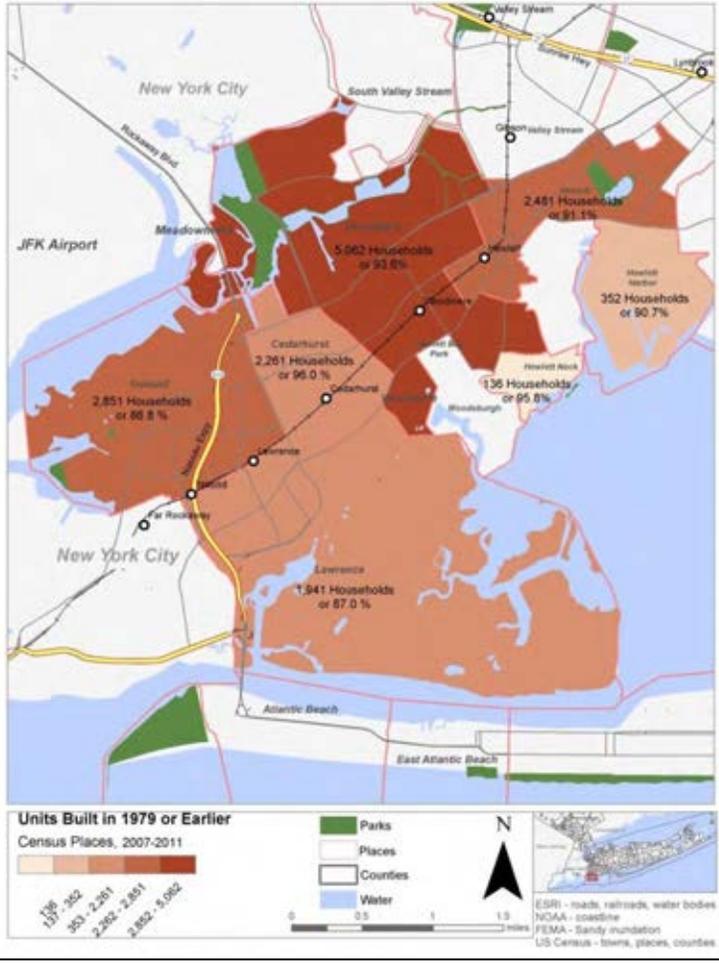


Figure 52: Distribution of Five Towns Housing Units by Year Built, 1979 or Earlier



Occupancy and vacancy

Before Superstorm Sandy, the Five Towns area had an overall vacancy rate of 7.0%. Vacancy rates ranged from a low of 1.3% in Hewlett Harbor to a high of 12.3% in Lawrence. Post-storm vacancy data are not yet available from the Census, but requests have been made of Nassau County and the Town of Hempstead for current information.

Table 22: Five Towns Housing Units by Occupancy Status

| | Total | Occupied | Vacant | Percent Occupied | Percent Vacant |
|----------------------------------|---------------|-----------------|---------------|-------------------------|-----------------------|
| Five Towns | 16,534 | 15,369 | 1,165 | 93.0% | 7.0% |
| Cedarhurst | 2,355 | 2,132 | 223 | 90.5% | 9.5% |
| Hewlett | 2,724 | 2,562 | 162 | 94.1% | 5.9% |
| Hewlett Harbor | 388 | 383 | 5 | 98.7% | 1.3% |
| Hewlett Neck | 142 | 139 | 3 | 97.9% | 2.1% |
| Inwood | 3,285 | 2,954 | 331 | 89.9% | 10.1% |
| Lawrence | 2,231 | 1,956 | 275 | 87.7% | 12.3% |
| Woodmere / Meadowmere Park | 5,409 | 5,243 | 166 | 96.9% | 3.1% |

Source: American Community Survey 2007-2011

Age of head of household

Almost one third (29.6%) of all Five Towns Households are headed by persons 65 or older. The distribution of the senior held housing is equally distributed among the Risk areas, but is slightly higher (31.9%) for owner-occupied housing than for renter-occupied housing at 24.6%.

Table 23: Five Towns Occupied Housing Units by Tenure and Age of Head

| Age of Head | Share of Total | Share of Owners | Share of Renters |
|----------------|----------------|-----------------|------------------|
| 15 to 24 | 1.1% | 0.5% | 3.3% |
| 25 to 34 | 9.5% | 7.4% | 16.7% |
| 35 to 44 | 15.7% | 14.6% | 20.2% |
| 45 to 54 | 22.2% | 23.0% | 21.4% |
| 55 to 64 | 20.4% | 22.5% | 15.5% |
| 65 Plus | 29.6% | 31.9% | 24.6% |
| 65 to 74 | 12.5% | 13.8% | 9.6% |
| 75 to 84 | 11.4% | 12.8% | 8.0% |
| 85 Plus | 5.8% | 5.4% | 7.1% |

Source: 2010 Decennial Census

Households with heads between the ages of 45 and 54 are the next most common at 22.2% of all households, 23% of all owned households and 21.4% of all rentals. These are followed by households headed by those between the ages of 55 and 64 at 20.4% of total, 22.5% of owners and 15.5% of renters.

The Census data supports anecdotal evidence that it is difficult for young families and singles to find housing in Five Towns. Only 9.5% of households have heads between the ages of 25 and 34, and only 1.1% are headed by persons under the age of 25. It should be noted that those under the age of 45 and over the age of 84 have renter headship rates higher than the overall average.

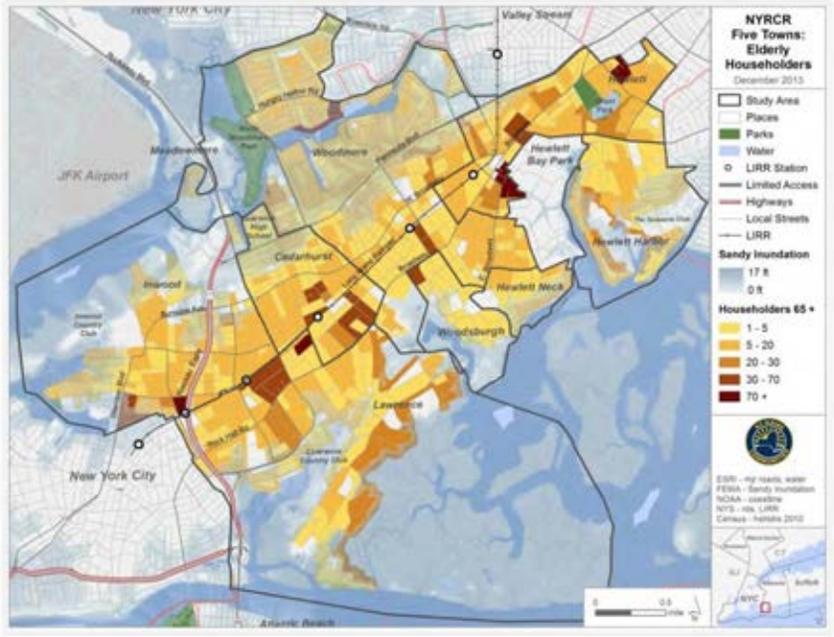
In terms of Risk levels, younger owners are more at risk than average of living in High and Extreme Risk Flood Zones as shown in the chart that follows; whereas renters 75 and older are more at risk than the average.

The following maps show the distribution of householders by age category, then the distribution of those 65 and over by Census block overlaid with the Superstorm Sandy inundation layer. Unlike other communities in Nassau, there is not a disproportionate correspondence between elderly households and flood zones.

Figure 53: Households by Age of Head



Figure 54: Elderly Householders



Programmatic affordability

In addition to the question of actual affordability, there is programmatic definition of affordable housing based on a county-wide matrix of income by household size and HUD-determined Fair Market Rents. The following discussion presents households that may be eligible for housing subsidies or other programs such as homeowner grants, etc.

The households discussed are NOT necessarily receiving housing subsidies.

Median income in Nassau County as determined by HUD for housing cost estimates is \$105,900. To qualify for different levels of housing subsidy, household incomes are gauged in relation to the median, e.g., Workforce housing is affordable to households making between 80 and 120% of median. The table below shows the estimated percentage of households in each community that have incomes below the listed limit. These numbers are inclusive, i.e., all households below the extremely low income limit are also included in the three categories above.

Table 24: Share of Five Towns Households below HUD Income Limits for Affordable Housing

| | Maximum Income | Five Towns | Cedarhurst | Hewlett | Hewlett Harbor | Hewlett Neck | Inwood | Lawrence | Woodmere / Meadowmere Park |
|---------------------|----------------|------------|------------|---------|----------------|--------------|--------|----------|----------------------------|
| Median Income | \$105,900 | 49.7% | 60.8% | 54.8% | 18.1% | 18.3% | 74.7% | 34.2% | 37.8% |
| Low (80%) | \$74,500 | 37.7% | 47.5% | 43.8% | 13.6% | 13.5% | 64.8% | 21.6% | 24.1% |
| Very Low (50%) | \$52,950 | 25.7% | 36.9% | 26.0% | 11.3% | 6.3% | 44.6% | 12.4% | 16.8% |
| Extremely Low (30%) | \$31,750 | 13.4% | 19.0% | 12.3% | 3.1% | 4.0% | 26.2% | 3.9% | 9.0% |

Source: American Community Survey 2008-2012, HUD FY2013 Income Limits

As shown in the table above, in the Five Towns Community as a whole, roughly half of households make the county median income or less—the median is directly comparable to Nassau County. However, the share with incomes less than the median varies greatly among the component communities. Hewlett Harbor and Hewlett Neck have just over 18% of households with incomes at or lower than the County median. On the other end of the spectrum, Inwood and Cedarhurst in particular have more households at 74.7% and 60.8%, respectively, at or below median income. This indicates that there are more programmatic opportunities in the qualifying lower income areas for homeowner aid and other grants.

As indicated in the affordability table at the beginning of this section, renters are more likely than owners to be paying more than they can afford on housing. To this end, HUD establishes fair market rents (FMR) for households by number of bedrooms based on county market conditions. According to HUD, FMR for a 2 bedroom rental unit in Nassau County is \$1,583. According to the table below, more than two in every five renters (44.6%) in the Five Towns are paying more than FMR for their housing.

Table 25: Five Towns Rents by Location

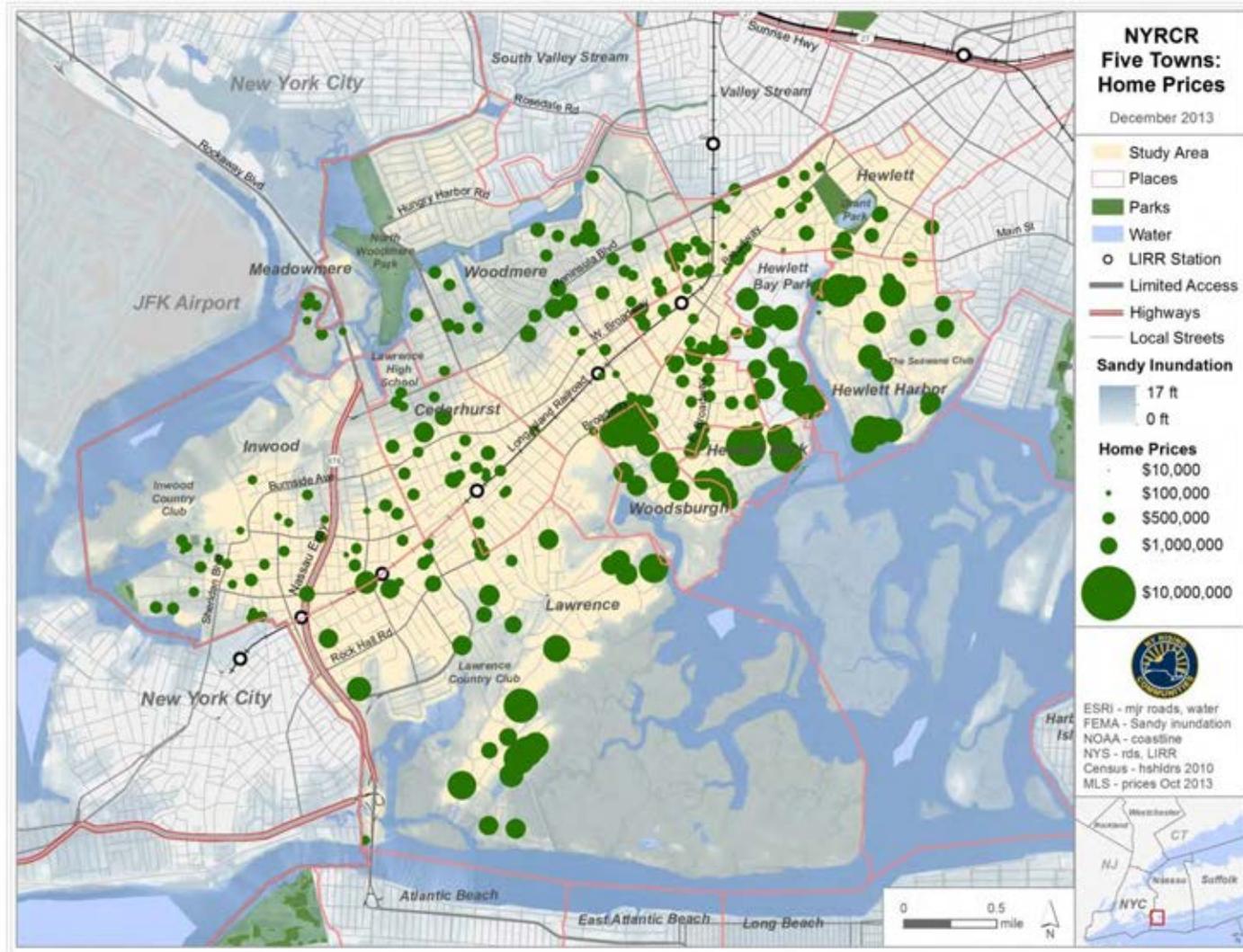
| | Five Towns | Cedarhurst | Hewlett | Hewlett Harbor | Hewlett Neck | Inwood | Lawrence | Woodmere |
|------------------------------|------------|------------|---------|----------------|--------------|--------|----------|----------|
| Total Rented Units | 3,157 | 688 | 370 | 11 | 0 | 1,362 | 184 | 542 |
| Less than \$200 | 17 | 0 | 0 | 0 | 0 | 17 | 0 | 0 |
| \$200 to \$299 | 57 | 0 | 0 | 0 | 0 | 57 | 0 | 0 |
| \$300 to \$499 | 141 | 0 | 0 | 0 | 0 | 141 | 0 | 0 |
| \$500 to \$749 | 215 | 0 | 0 | 0 | 0 | 133 | 0 | 82 |
| \$750 to \$999 | 182 | 47 | 0 | 0 | 0 | 88 | 0 | 47 |
| \$1,000 to \$1,499 | 1,136 | 271 | 164 | 0 | 0 | 442 | 96 | 163 |
| \$1,500 or more | 1,409 | 370 | 206 | 11 | 0 | 484 | 88 | 250 |
| Paying more than Average FMR | 44.6% | 53.8% | 55.7% | 100.0% | NA | 35.5% | 47.8% | 46.1% |

Source: American Community Survey 2007-2011, <http://www.huduser.org/portal/datasets/fmr>

Sales Prices

A recent (October 9, 2013) extract from the Realtor.com multiple listing service identified 395 homes for sale in the villages and hamlets that make up the Five Towns Community. These listings have been geocoded by sales price and are shown in the map on the following page. The sales prices of single family homes range from \$60,000 in Inwood to more than \$7 million in Hewlett Neck. The median price was \$499,999—a full 21% lower than the Census reported median price in 2011. It should be noted that there is likely a lag in homes to be placed on the market in areas such as Inwood, where the impacts of Superstorm Sandy were great, but household incomes are lower so residents have been dependent on insurance payouts and receipts of loans and grants.

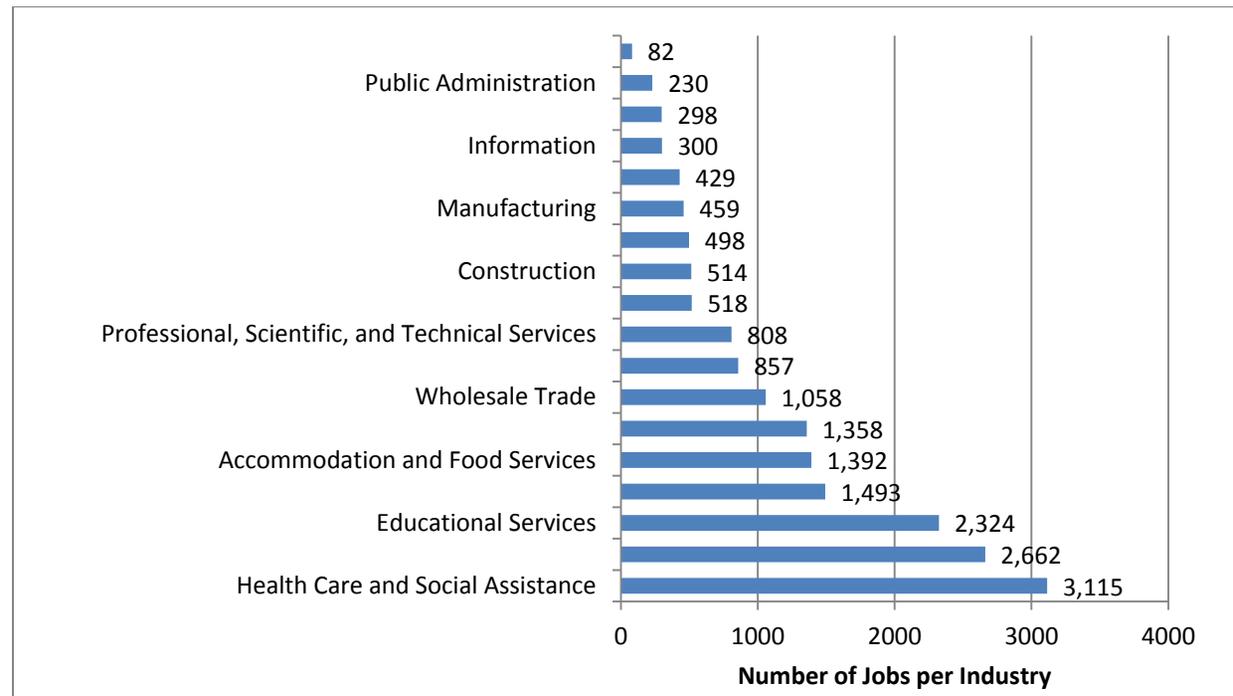
Figure 55: Home Prices



F: Economic Profile

Following the regional and national trend, the largest numbers of jobs in the Five Towns are in Health Care and Social Assistance (3,115 jobs, 16.9%), Retail Trade (2,662 jobs, 14.5%) and Educational Services (2,324 jobs, 12.6%) (See Table). These are followed by Transportation and Warehousing (1,493 jobs, 8.1 %), Accommodation and Food Services (1,392 jobs, 7.6%) and Other Services (excluding Public Administration (1,358 or 7.4%). Wholesale Trade also provides more than 5% of local jobs (1,058).

Table 26: Five Towns Jobs by Industry, 2011



Source: US Bureau of the Census OnTheMap LED dataset

Table 27: Five Towns Retail Gaps



Source: ESRI Retail MarketPlace Profile

Unmet local demand is shown by the green bars on the right side of the central axis. There is unmet demand in terms of Motor Vehicle and Parts Dealers (\$36.2 million), Bldg Materials, Garden Equipment and Supply stores (\$22.2 million), Food and Beverage Stores (\$15.9 million), Food Services and Drinking Places (\$13.8 million), as well as Sporting Goods, Hobby, Book and Music Stores (\$12.2 million). Any of these would be viable additions to the retail areas if suitable space could be found.

The blue bars to the left of the central access indicate retail sales that exceed what local residents consume. General merchandise stores, gas stations, health and personal care stores, electronics and appliance stores, as well as home furnishings bring shoppers from outside of the community to the Five Towns, particularly Inwood.

G: Regional Plans

Regulatory

- Federally approved Significant Coastal Fish and Wildlife Habitats (New York State Department of State [NYS DOS], New York State Department of Environmental Conservation [NYS DEC])
- Long Island South Shore Estuary Reserve - Comprehensive Plan (NYS DOS, 2001)
- Nassau County Department of Public Works Drainage Requirements (Nassau County Department of Public Works)
- Nassau County Stormwater Management Program Plan (Nassau County, 2009)
- Town of Hempstead Adopted 2013 Budget (Town of Hempstead, 2013)

Advisory

- Inwood Vision Plan (Town of Hempstead, 2010)
- Hurricane Sandy Rebuilding Strategy (U.S. Hurricane Sandy Rebuilding Task Force, 2012)
- County Draft Master Plan (Nassau County, 2010)
- County Multi-Jurisdictional Hazard Mitigation Plan (Nassau County, 2007)
- Long Island Regional Economic Development Council Strategic Plan (LIREDC, 2011)
- Cleaner Greener Long Island (CGCLI, 2013)
- The Long Island Index: "Places to Grow" (Regional Plan Association, 2010)
- Long Island Infrastructure Priorities to Recover from Hurricane Sandy (Long Island Association 2012)
- Nassau County 2013 Annual Municipal Separate Storm Sewer Systems Report (Nassau County Stormwater Coalition, 2013)
- Nassau Urban County Consortium 5 Year Consolidated Plan (Nassau County, 2010)
- Nassau County Infill Redevelopment Feasibility Study: Cultivating Opportunities for Sustainable Development (Nassau County, Regional Plan Association, and NY-CT Sustainable Communities Consortium, 2013)
- Long Island 2035 Sustainability Plan and Visioning Initiative (Long Island Regional Planning Council/Nassau County/Suffolk County/New York Metropolitan Transportation Council/Regional Plan Association, 2009)
- Long Island 2035 Comprehensive Sustainability Plan (Nassau County/Suffolk County/LIREDC/LI2035, 2010)

H: End Notes

- ¹ Five Towns Community Chest, <http://www.fivetownscommunitychest.org/>
- ² Barron, James. "IF YOU'RE THINKING OF LIVING IN: FIVE TOWNS." The New York Times. The New York Times, 09 July 1983.
- ³ Pennsylvania Railroad Technical and Historical Society, PRR Chronology 1869, June 2004 Edition.
- ⁴ American Community Survey 2007-2011
- ⁵ US Census Longitudinal Employer Household Dataset (LEHD)
- ⁶ The Village of Cedarhurst, Village History, <http://www.cedarhurst.gov/community/village-history/>
- ⁷ 2010 US Census
- ⁸ Long Island Newsday, Real Estate Profile, www.longisland.newsday.com/realestate/profile.php
- ⁹ 2010 US Census
- ¹⁰ Hewlett Fire Department, <http://www.hewlettfd.org/>
- ¹¹ Long Island Newsday, Real Estate Profile, www.longisland.newsday.com/realestate/profile.php
- ¹² Village of Hewlett Harbor, Our History, <http://www.hewlettharbor.org/history.php>
- ¹³ Long Island Newsday, Real Estate Profile, www.longisland.newsday.com/realestate/profile.php
- ¹⁴ Long Island Newsday, Real Estate Profile, www.longisland.newsday.com/realestate/profile.php
- ¹⁵ Inside Inwood, History of Inwood, <http://www.insideinwood.com/pages/history.shtml>
- ¹⁶ Long Island Newsday, Real Estate Profile, www.longisland.newsday.com/realestate/profile.php
- ¹⁷ Village of Lawrence, History, <http://www.villageoflawrence.org/History.htm>
- ¹⁸ Long Island Newsday, Real Estate Profile, www.longisland.newsday.com/realestate/profile.php
- ¹⁹ BORTOLOT, Lana. "Tiny Meadowmere Park Is an Island Refuge." The Wall Street Journal. Dow Jones & Company, n.d.
- ²⁰ Long Island Newsday, Real Estate Profile, www.longisland.newsday.com/realestate/profile.php
- ²¹ US Department of Commerce. Hurricane/Post-Tropical Cyclone Sandy, October 22–29, 2012. (Accessed 9/2013 at http://www.nws.noaa.gov/os/assessments/pdfs/Superstorm_Sandy13.pdf)
- ²² US Department of Commerce. Hurricane/Post-Tropical Cyclone Sandy, October 22–29, 2012 <http://www.nws.noaa.gov/os/assessments/pdfs/Sandy13.pdf>,
- ²³ US Department of Commerce. Hurricane/Post-Tropical Cyclone Sandy, October 22–29, 2012. (Accessed 9/2013 at http://www.nws.noaa.gov/os/assessments/pdfs/Superstorm_Sandy13.pdf)
- ²⁴ US Department of Commerce. *Service Assessment Hurricane Irene, August 21–30, 2011*. (Accessed 10/2013 at <http://www.nws.noaa.gov/os/assessments/pdfs/Irene2012.pdf>)
- ²⁵ NOAA Water Level and Meteorological Data Report. *Hurricane Irene*. (Accessed on 10/2013 http://tidesandcurrents.noaa.gov/publications/Hurricane_Irene_Water_Level_and_Meteorological_Data_Report.pdf)
- ²⁶ Stanne, Steve. *Perfect Storms – how Hurricane Irene and Tropical Storm Lee slammed NY*. New York State Conservationist, August 2012. (Accessed on 9/2013 http://www.dec.ny.gov/docs/administration_pdf/0812perfectstorms.pdf)
- ²⁷ Benkoe, Jeff. *Long Island pounded by Irene but residents feel lucky*. Reuters. <http://www.reuters.com/article/2011/08/28/us-storm-irene-longisland-idUSTRE77R2FG20110828> (Accessed 9/2013).
- ²⁸ US Department of Commerce. *Service Assessment Hurricane Irene, August 21–30, 2011*. (Accessed 10/2013 at <http://www.nws.noaa.gov/os/assessments/pdfs/Irene2012.pdf>)

²⁹ Richner, Zachary. SBA DCMS Application Information. Nassau and Suffolk Counties Business Applicant Information. Report Date 12/13/2013

³⁰ Site Visit with Village of Cedarhurst officials, 18 September 2013; NYS Sandy Inundation data; feedback at Public Engagement meetings.

³¹ NYS Sandy Inundation data; feedback at Public Engagement meetings.

³² Site Visit with Village of Hewlett Neck officials, 18 September 2013; NYS Sandy Inundation data; feedback at Public Engagement meetings.

³³ Site Visit with Village of Hewlett Harbor officials, 18 September 2013; NYS Sandy Inundation data; feedback at Public Engagement meetings.

³⁴ Site Visit with Village of Lawrence officials, 18 September 2013; NYS Sandy Inundation data; feedback at Public Engagement meetings.

³⁵ NYS Sandy Inundation data; feedback at Public Engagement meetings.

³⁶ NYS Sandy Inundation data; feedback at Public Engagement meetings.

³⁷ NYS Sandy Inundation data; feedback at Public Engagement meetings.

³⁸ Special Initiative for Rebuilding and Resiliency (SIRR)

³⁹ The study uses a low income threshold of \$35,000 per household. To actuate the analysis the American Community Survey (ACS, 2007-2011) was used to estimate the households making a low percentage of the median income, typically used as standard thresholds for income definitions for federal assistance. Since the ACS uses tranches (for instance between 0 and \$10,000 Household Income) the analysis required to accept the first two tranches of \$0-\$35,000 to define the household income. This then provides a percentage estimation of the total household population making less than 36% of the Median Household Income. This figure is based on a percentage of the overall Nassau County Median Household Income of \$97,000. Various Federal organizations define income thresholds in terms of Household Median Income at the 20%, 50%, and 80% thresholds. As this analysis wanted to identify households making below 50% this metric was assumed the most appropriate.

⁴⁰ American Community Survey 2008-2012

⁴¹ American Community Survey 2008-2012

⁴² American Community Survey 2008-2012

⁴³ American Community Survey 2008-2012

⁴⁴ American Community Survey 2008-2012

⁴⁵ *Local Multi-Hazard Mitigation Guidance*, FEMA, July 1, 2008, pp. 42-43

⁴⁶ Urbanomics. Spatial join of Nassau County Assessment GIS 2013 and NYS Risk Maps

⁴⁷ Ibid.

⁴⁸ American Community Survey 2008-2012

⁴⁹ Nassau County Consolidated Plan 2010-2014

⁵⁰ In estimating the job-years created by direct government spending, the NYRCR Plan utilizes the simple rule provided by the Office of the President Council of Economic Advisors that \$92,000 creates one job-year. This procedure is somewhat crude and does not take into account the obvious differences in wages and other costs across different types of projects and across different parts of the country. It does, however, take into account the key difference between tax changes or state fiscal relief, and direct government investment spending. The rule's key virtue is its simplicity and conservatism. Because it is derived to be consistent with the macroeconomic jobs estimates, it minimizes discrepancies between the aggregate jobs estimates across the various geographies. Estimates of Job Creation from the American Recovery and Reinvestment Act of 2009, EXECUTIVE OFFICE OF THE PRESIDENT COUNCIL OF ECONOMIC ADVISERS, May 2009.

⁵¹ Nassau County GIS Parcels.

⁵² ESRI and Dun & Bradstreet. Copyright 2013 Dun & Bradstreet, Inc.

⁵³ Nassau County Parcel Data, GIS, 2013.

⁵⁴ Superstorm Sandy FEMA Claims, c/o New York State, received August 2013.

⁵⁵ Nassau County Parcel Data, GIS, 2013.

⁵⁶ <http://lawrencehighschool.lawrence.org/?PageName='AboutTheSchool'>

⁵⁷ Significant natural communities are rare or high-quality wetlands, forests, grasslands, ponds, streams, and other types of habitats, ecosystems, and ecological areas. The NYS DEC New York Natural Heritage Program keeps

The Five Towns NY Rising Community Reconstruction Plan

track of significant natural communities because they serve as habitat for a wide range of plants and animals, both rare and common; and because natural communities in good condition provide ecological value and services. <http://www.dec.ny.gov/pubs/42978.html>

⁵⁸ Significant natural communities are rare or high-quality wetlands, forests, grasslands, ponds, streams, and other types of habitats, ecosystems, and ecological areas. The NYS DEC New York Natural Heritage Program keeps track of significant natural communities because they serve as habitat for a wide range of plants and animals, both rare and common; and because natural communities in good condition provide ecological value and services. <http://www.dec.ny.gov/pubs/42978.html>

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⁶⁰ ESRI Community Analyst.

⁶¹ 2010 Decennial Census, NYS Risk Areas

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J: Glossary

Base Flood Elevation (BFE)

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

Coastal Hazard and Risk Assessment Tool (“Risk Assessment Tool”)

The Risk score for each group of assets is determined by multiplying its hazard, exposure and vulnerability values (Risk = Hazard x Exposure x Vulnerability). The Coastal Hazard and Risk Assessment Tool automatically generates this risk score, which represents the relative risk of the community. Risk scores include some subjective analysis and should not be compared from one community to another. Risk scores can range from 1.5, the lowest score reflecting negligible or ‘residual’ risk, to 75, the highest score reflecting severe risk. These ranges are broken down as follows:

Residual (Risk Score <6): Residual risk scores result from both low exposure and vulnerability, however if assets are critical or have a very high community value, actions may be warranted to reduce their risk.

Moderate (Risk Score 6 - 23): A moderate risk score represents that the assets may suffer moderate to serious storm impacts, but that adaptation may be of a lower priority because either exposure or vulnerability are low

High (Risk Score 24 - 53): Risk scores in the high range are indicative of conditions that could lead to significant negative impacts from a storm, and actions should be taken to reduce the assets’ vulnerability and restore the assets’ coastal protections.

Severe (Risk Score >53): A severe risk score represents that the assets are in a dangerous situation and that both exposure and vulnerability should be reduced.

Risk scores help identify assets with increased potential for storm damage and serve as one of many factors that helped the Committee to determine the potential projects to include in the NYRCR Plan; see section IV for further discussion on Projects. In addition to the risk score, other contributing factors in determining which assets should be addressed and how immediately they should be addressed include:

- The assets’ contribution to life safety,
- If the asset(s) are critical or locally significant,
- The assets’ community value,
- Environmental services provided by the assets,
- Economic contribution of the assets,
- Availability or alternative assets or facilities, and
- The capacity of the assets to adapt.

The Coastal Hazard and Risk Assessment Tool measures against a 100-year storm, or a Hazard Score of 3. The Hazard score is based on the likelihood an event would occur and the magnitude (destructive capacity) of the event. For the purpose of preparing a NY Rising Community Reconstruction Plan, NY State recommends that Bay Park/East Rockaway consider a 100-year storm (1% annual chance). Because the magnitude of storm events increases as the likelihood decreases (100-year storms have higher magnitude than 10-year storms), the Hazard score increases as the likelihood goes down. Therefore, the Coastal Hazard and Risk Assessment Tool is calibrated to a 100-year storm. Although the NYRCR Plan seeks to protect against a 100-year storm, equally important is protecting against smaller, more frequent storm events such as the 10-year storm, which has a 10% chance of occurrence each year. Several projects may not have risk reduction benefits, measured by the Tool or qualitatively, for the 10-year storm. These benefits are described qualitatively.

Community Assets

Identified assets are places or facilities where economic, environmental and social functions occur or are critical infrastructure required to support those functions. These assets were identified by the NYRCR Committee and residents and are grouped into the following categories: Economic, Housing, Health and Social Services, Infrastructure, Natural and Cultural Resources, and Socially Vulnerable Populations.

Community Development Block Grant-Disaster Recovery (CDBG-DR)

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

Flood Insurance Rate Map (FIRM)

The official map of a community on which FEMA has delineated both the special hazard areas and the risk premium zones applicable to the community.

NYRCR Committee

The NYRCR Planning Committee is composed of local civically minded residents and was established to help develop a plan that accurately reflect's the Community and its needs. The NYRCR Committee worked closely with the appropriate municipal, non-profit and consultant representatives to identify a vision, goals and objectives for the NYRCR Plan. The Committee actively advised on all aspects of the project and will help shape the overall direction of the NYRCR Plan and the actions that flow from it. The members of the Committee were not paid, and were required to follow a detailed code of ethics provided by New York State.

NYRCR Community

The NYRCR Community planning area follows the Census-designated place boundary for Bay Park and the Village of East Rockaway. This boundary has been reviewed and accepted by the NYRCR Committee.

NYRCR Project Categories

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

Featured Projects: Innovative projects where an initial study or discrete first phase of the project is proposed for CDBG-DR funding or other identified funding; and regulatory reforms and other programs that do not involve capital expenditures.

Additional Resiliency Recommendations: Resiliency projects and actions the NYRCR Committee would like to highlight for further consideration.

Recovery Support Functions

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

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

Risk Reduction Benefits

A qualitative analysis of reduction in risk to assets that results from implementation of each potential NYRCR project was prepared for each project. Three factors contribute to risk: hazard, exposure and vulnerability. The Coastal Hazard and Risk Assessment Tool

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

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

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

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

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

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

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

Health and Social Benefits: Health and Social Benefits resulting from the proposed project were qualitatively evaluated using ESRI Community Analyst. Population data was gathered at the census

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

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

1. "Overall population with improved access to health and social services facilities" was reported as the entire population of the area (census tract, block group or polygon) that would benefit from the proposed project. The population was reported regardless of whether the project actually *involves* a health and social services asset because presumably all projects would improve access to facilities in one form or another.
2. "Type and population size of socially vulnerable population secured" was evaluated across four categories of socially vulnerable populations:
 - poverty/low income (annual household income less than \$35,000)
 - elderly population (over age 65 years)
3. "Population served by essential health and social services facilities that are secured to provide or continue service during acute events as a result of the action", was considered to be applicable only if the project itself proposed an action that directly affected/pertained to a health and social services facility. (Health and social services facilities were previously identified/determined during the asset inventory). If the project directly impacted a health and social services facility, that facility (asset) was noted, and the population of the entire

area (as reported under the previous criteria) can be considered to be the "population served".

Risk Assessment Map Risk Areas (NYS DOS)

Extreme Risk Areas: Areas currently at risk of frequent inundation, vulnerable to erosion in the next 40 years, or likely to be inundated in the future due to sea level rise. Extreme Risk Areas include:

- FEMA V zone.
- Shallow Coastal Flooding per National Oceanic and Atmospheric Administration (NOAA) National Weather Service's (NWS) advisory threshold.
- Natural protective feature areas susceptible to erosion.
- Sea level rise - Added three feet to the mean higher high water (MHHW) level shoreline and extended this elevation inland to point of intersection with ground surface.

High Risk Areas: Areas outside the Extreme Risk Area that are currently at infrequent risk of inundation or at future risk from sea level rise. High Risk Areas include:

- Area bounded by the 1% annual flood risk zone (FEMA V and A zones). Often referred to as base flood or 100-year flood, this is the area that has a 1% chance of inundation from a flood event in any given year.
- Sea level rise - Added three feet to NOAA NWS coastal flooding advisory threshold and extended this elevation inland to point of intersection with ground surface.

Moderate Risk Areas: Areas outside the Extreme and High Risk Areas but currently at moderate risk of inundation from infrequent events or at risk in the future from sea level rise. Moderate Risk Areas include:

- Area bounded by the 0.2% annual risk (500 year) flood zone, where available.
- Sea level rise - Added 3 feet to the Base Flood Elevation for the current 1%
- Annual risk flood event and extended this elevation inland to point of intersection with ground surface.

- Area bounded by the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) category 3 hurricane inundation zone (NOAA NWS).

Socially Vulnerable Populations

The NYRCR Program Guidance notes that "Socially vulnerable populations" may be defined by the following criteria: poverty/low income, immigrant status, education level, institutionalization, renter-occupied household status, single senior-citizen household status" (NYRCR Program Guidance to Firms Project Evaluation, 12/30/2013).

