



Freeport NY Rising Community Reconstruction Plan



March 2014
NY Rising Community
Reconstruction Program

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Foreword

Introduction

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

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

Program Overview

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

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

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

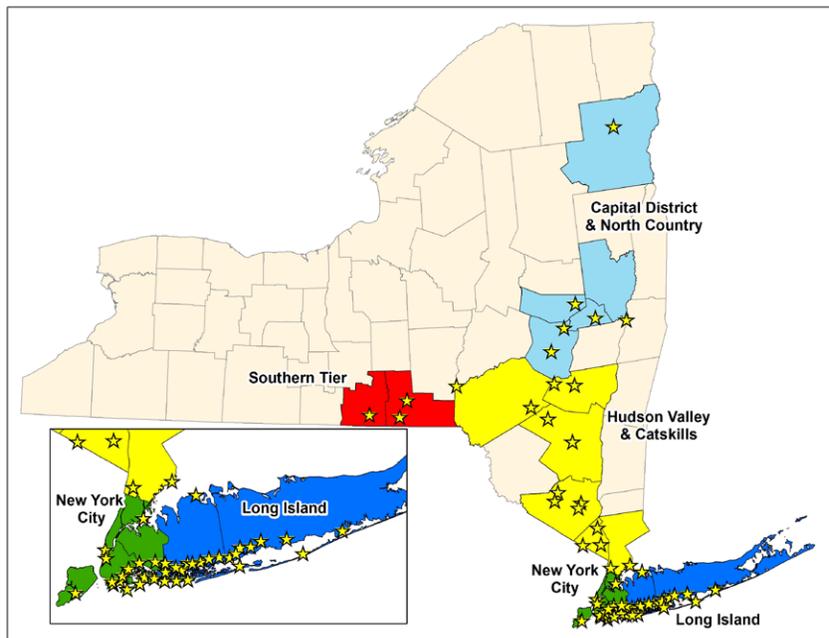
1. Five of the 102 localities in the program – Niagara, Herkimer, Oneida, Madison, and Montgomery Counties – are not funding through the CDBG-DR program.

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

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

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

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



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

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

The NYRCR Plan

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

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

NYRCR Freeport is eligible for up to \$17.8 million in CDBG-DR implementation funds.

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

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

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

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Executive Summary

Overview

New York State (NYS) established the NY Rising Community Reconstruction (NYRCR) Program to provide rebuilding and revitalization assistance to communities severely damaged by Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee. Through the creation of a Village of Freeport (Freeport) NY Rising Community Reconstruction Plan (NYRCR Plan), the NYRCR Program empowers the community to identify resilient and innovative reconstruction projects that consider current damage, future threats, and economic opportunities. Freeport's residents, business owners, first responders, and workers actively participated in the preparation of this NYRCR Plan from September 2013 until the end of March 2014. The State has allocated up to \$17.8 million of U.S. Department of Housing and Urban Development (HUD) funds through its Community Development Block Grant – Disaster Recovery (CDBG-DR) to NYRCR Freeport (Community) for implementation of these programs and actions.

Freeport is an incorporated village located in the Town of Hempstead (Town) on the south shore of Nassau County's (County) mainland on Long Island, New York. Its shoreline borders Middle Bay, an embayment of the South Shore Estuary. The geographic scope of the NYRCR Plan includes the entire incorporated area of Freeport. Its eastern border is formed by Meadowbrook State Parkway and the unincorporated hamlet of Merrick; Babylon Turnpike and the unincorporated hamlet of Roosevelt are to the north; Baldwin Bay, the unincorporated hamlets of Baldwin Harbor and Baldwin, and Milburn Creek form its western border; Middle Bay is to the south. Lands beyond the municipal boundary located to the southeast include private landholdings in the Town and the County's Cow Meadow Park and Preserve, which are addressed in the NYRCR Plan to the extent that Freeport provides municipal services.

Freeport is an industrious, sea-oriented, and artistic community with Colonial American roots dating to its settlement as an oystering community in the 1640s. By the late 1800s, it grew into a popular seaside resort and was incorporated as a village in 1892. Today, Freeport covers approximately four-and-a-half square miles of land and maintains its own municipal electric and water utilities, police, and fire

departments. Its government is made up of a mayor and four trustees, with one trustee serving in the capacity of deputy mayor.

A bedroom community of New York City, Freeport is home to more than 43,000 people. Freeport includes an attractive mix of inland and waterfront single-family neighborhoods interspersed with higher density condominiums, co-ops, apartments, and assisted living facilities offering residents a variety of housing options to suit a diverse range of household types and incomes. Freeport's canals and tributaries are lined with recreational boats, marinas, charter and commercial fishing fleets, restaurants, and maritime businesses. Its residents enjoy a wealth of amenities, including waterfront parks, the famous Nautical Mile, a Long Island Rail Road (LIRR) station, the Freeport Recreation Center, easy access to the barrier islands and Jones Beach State Park, and numerous retail and employment centers.

Storm Impacts

Hurricane Irene and Superstorm Sandy brought significant damage to public infrastructure, homes, businesses, and the estuary's environment. Both storms had different impacts on Freeport in terms of the type and intensity of damages. In August 2011, Hurricane Irene brought 13 inches of torrential rain, a storm surge that exceeded seven feet, and wind gusts up to 90 miles per hour, which caused flooding and downed trees that resulted in impassable roads and power outages. Flooding was primarily concentrated south of Merrick Road, while heavy winds and power outages affected the entire area.

In October 2012, Superstorm Sandy, an extraordinary large and slow moving storm with wind gusts up to 80 miles per hour, made landfall on a high astronomical tide that brought with it a storm surge height of 7.85 feet above the normal astronomical tide level. Located directly across from Jones Inlet, the shoreline of the Village of Freeport, and specifically the Nautical Mile, suffered a direct hit from the surge, which inundated large swaths of low-lying lands. With only one inch of rainfall, the majority of the storm's damage came from the high winds and the powerful surge, which flooded roads, compromised power lines, and caused boats and other debris to damage structures. First responders and residents could not

access evacuation routes and local roads. Freeport Electric contained the breadth and duration of power outages to three days or less, while surrounding areas that depended on Long Island Power Authority (LIPA) suffered outages for up to three weeks. Power outages also disrupted communication networks, hampering rescue and recovery efforts.

The Freeport Building Department determined more than 4,000 of Freeport's housing units and 130 homes were unsafe for habitation. Some businesses sustained flooding and storm damage, while others suffered power outages and reduced economic activity. Fortunately Freeport's gas stations had power restored more quickly than those in surrounding communities; but increased demand and limited production and distribution left many people unable to obtain gas for their vehicles. Tourist destinations such as the Nautical Mile and waterfront parks were badly damaged by floodwaters and electrical fires.

In addition to the storm damages, several vulnerabilities within Freeport were exposed. These issues directly and indirectly impact homes, businesses, sanitary sewer service, stormwater drainage systems, energy infrastructure, critical public facilities, and natural resources. The following were identified as Critical Issues during the NYRCR planning process, and directly informed the development of the strategies and projects presented in the NYRCR Freeport Plan:

- Flooding and drainage;
- Homeownership in higher risk areas;
- Shoreline protection;
- Energy infrastructure;
- Business continuity;
- Information, communication, and access to resources;
- Regional connections; and
- Resilient planning and design.

While local issues are the focus of the NYRCR Plan, it is helpful to recognize Freeport's regional context and relationship to neighboring communities and to the region. Communities on Long Island's south shore have experienced similar patterns of development, share interconnected infrastructure systems

and road networks, overlapping municipal service areas, and a common shoreline. These commonalities call for a regional perspective in addressing the challenges facing Freeport. Collectively, the local solutions can take into account and leverage regional considerations for reconstruction, recovery, and resiliency. Through a compilation and evaluation of regional plans and studies, meetings with neighboring communities, and sessions with Village, County, and State officials, regional considerations were identified and used to expand upon local projects and develop projects that could potentially be shared with neighboring communities.

Community-Driven Process

The NYRCR Planning Committee (Committee), which consists of fourteen dedicated community members and municipal liaisons, considered the Community's goals and aspirations for the future and aligned the Community goals with the goals of this NYRCR Plan in order to develop a NYRCR Plan. The NYRCR Plan seeks to creatively reduce potential storm- and climate change-related impacts, and leverage proposed investments from this NYRCR Plan by addressing other identified needs and opportunities in Freeport. Thus, while the NYRCR Plan addresses risks identified in this document, the same projects, if thoughtfully conceived, can also address long-standing future needs. The NYRCR Plan moves from asset identification to risk assessment to presenting strategies and projects that respond to critical issues, and which contribute to building a more resilient, safer, and sustainable future for the Community.

The Committee Co-Chairs and Committee Members met more than six times individually and joined two meetings with the neighboring NYRCR Communities of Baldwin/Baldwin Harbor, Bellmore/Merrick, Seaford/Wantagh, and Massapequas to guide the development of the NYRCR Plan. The Committee played an integral role throughout the planning process, providing overall direction and guidance; generating material; reviewing, revising, and responding to components of the NYRCR Plan; and deliberating on the initiatives that will bring the greatest recovery potential and resiliency value to the Community.

In addition to guidance from the Committee, more than 125 residents and stakeholders participated in three Public Engagement Events or shared their opinions and ideas through online surveys, business surveys, and key informant interviews. The strategies and projects outlined in the NYRCR Plan will ultimately impact the quality of life for those who live, work, visit, and play in the Community. As such, input from residents, business owners, and community leaders has been an important component of the planning process. The three Public Engagement Events provided Community residents the opportunity to participate in the shaping of the NYRCR Plan Vision Statement and goals, which helped to guide the planning process; community assets, needs,

opportunities and risks; and the projects put forth by the Committee to bolster reconstruction and improve community-wide resilience.

NYRCR Plan Development

Assessment of Risks and Needs

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

In Freeport, thousands of community assets are located in NYS DOS-identified high and extreme risk zones. Specific assets of concern to Committee Members and members of the Community include the Nautical Mile; Sea Breeze Park; the Department of Public Works (DPW) central garage, communication center, and fuel stations; Freeport Electric's Power Plant II; one school; three sanitary sewer lift stations; many marinas; the Industrial Park, and sections of the Merrick Road; Sunrise Highway; South Main Street; and Atlantic Avenue commercial corridors, including the section of Merrick Road adjacent to the Meadowbrook Parkway, a key County evacuation route. In addition to these individual assets, more than 3,600 homes are located in high and extreme risk areas. Detailed information on these analyses can be found in Section II of the NYRCR Plan.

NYRCR Freeport Plan Vision Statement

The Village of Freeport draws upon our independence, nautical commerce, and rich cultural past to create a resilient future with the economic, social, and recreational outlets that build upon our strong sense of community. The NYRCR Plan strives to:

- Revitalize the local economy and create opportunities for growth;
- Connect vulnerable and seasonal economic drivers with less vulnerable growth locations;
- Leverage and build upon infrastructure investments to maximize economic development potential;
- Build on a legacy of self-support, exploring new ways to deliver public amenities;
- Enhance parks and cultural assets so they serve multiple purposes, including recreation, resilience, and refuge;
- Provide a range of housing types for all Freeport residents that are resilient in design and location;
- Ensure proper health and social services are accessible to all residents on a daily basis and in emergency scenarios; and,
- Improve social resilience by establishing connectivity between communities and services.

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

- Improved communication, education and access to resources in the Community;
- Modernized workforce training and business centers for new and growing industries;
- Diversified housing choices for existing and future residents;
- Expanded community education and awareness programming centered around coastal living, climate change, and sea level rise;
- Increased energy safety, resilience, sustainability, and independence, building on Freeport Electric's strong foundation; and,
- Expanded and improved parks, preserves, and green spaces that aid or enhance storm protection and stormwater management, foster a sense of place and community, and improve recreational opportunities.

Strategies for Reconstruction and Resilience

Strategies included here are designed to support the goals of the NYRCR Program – reconstruction and resiliency. Reconstruction focuses on restoring, repairing, or replacing what was damaged or destroyed by Superstorm Sandy and Hurricane Irene. Resiliency is about strengthening the ability Freeport to rebound quickly when confronted with similar challenges in the future.

Reconstruction and Resilience Strategies for the Community are listed below and are described in detail in Section III of the NYRCR Plan:

- Invest in resilience enhancements for critical assets;

- Establish programs and policies for resilient planning and design;
- Improve transportation access and connectivity;
- Plan for business continuity and growth; and
- Improve stormwater management and drainage systems.

Proposed and Featured Projects

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

- **Proposed Projects** are discrete projects that are affordable within the Community's allocation of Community Development Block Grant Disaster Recovery (CDBG-DR) assistance.
- **Featured Projects** are innovative projects where an initial study or discrete first phase of the project is proposed for CDBG-DR funding or other funding resources. Featured projects may also include regulatory reforms and other programs that do not involve capital expenditure.
- **Additional Resiliency Recommendations** are resiliency projects and actions the Committee would like to highlight and are not categorized as Proposed or Featured Projects.

Table 01 on the following page lists Proposed and Featured Projects for NYRCR Freeport. The projects have not been ranked or prioritized. Detailed descriptions of each project can be found in Section IV of the NYRCR Plan and Additional Resiliency Recommendations can be found in Section V.

Figure ES-01: Geographic Scope



Legend

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

Data Sources

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



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Table 01: Proposed and featured projects

Strategy	Project Name	Short Description	Category	Regional
Invest in Resilience Enhancements for Critical Assets	Relocation Feasibility Analysis: Move Freeport Department of Public Works Away from Extreme Risk	Study opportunities to relocate DPW out of the SFHA while minimizing impact on existing neighborhoods - provide concept design for recommended solution and possible site acquisition.	Proposed	N
Invest in Resilience Enhancements for Critical Assets	Freeport Electrical Cable Channel Crossing Improvements	The project would extend the buried portion of the cables beyond the boat yard to protect the lines from freed boats and debris during storm surges.	Proposed	N
Invest in Resilience Enhancements for Critical Assets	Outage Management System	The system upgrade creates a web-based reporting and response system for outages or issues with essential services (power, water mains, gas). It would link directly to existing systems and enables asset protection before an event, incident mitigation during an event, and faster incident management and service restoration after an event.	Proposed	N
Invest in Resilience Enhancements for Critical Assets	Protection for Freeport's Power Plant II: Phase I: Study, Design, and Proof of Concept	This project would seek to study protection options, design flood protection, and identify further funding from NYS and US grant programs to implement and construct the design. A proof of concept would be constructed along the most vulnerable portion of the site.	Proposed	N
Invest in Resilience Enhancements for Critical Assets	Downtown Microgrid Phase I: Financial and Engineering Feasibility Study	This project seeks to identify funding and financing methods for the development of the microgrid - including State and Federal grant programs, capital budgeting, and contributions from benefitting private entities. In addition, it will explore preliminary engineering feasibility concepts for the development of the microgrid, examine costs and identify necessary construction.	Proposed	N
Invest in Resilience Enhancements for Critical Assets	Downtown Microgrid Phase 2: Redundant Energy Supply at Power Plant I	This project would purchase a dual-fuel (diesel/natural gas) generator with black-start capability and replace an outdated diesel generator at Freeport Power Plant I.	Proposed	N
Invest in Resilience Enhancements for Critical Assets	Backup Power for Sewer Lift Stations	This project seeks to install permanent backup natural gas generators at each of the Village of Freeport's three sewer lift stations located in a SFHA.	Proposed	N

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

Strategy	Project Name	Short Description	Category	Regional
Improve Transportation Access and Connectivity	Community Assistance Centers	Community Assistance Centers are places for residents to gather information about emergency preparedness under normal conditions. After a storm, these centers would become a place to gather, collect and distribute resources, charge cell phones, access the internet/TV, and seek comfort. This project would install backup power generation, dynamic electronic notification and alert signage, and additional charging and wifi capacity at each center. In addition, a Local Disaster Recovery Manager would be hired for two years.	Proposed	N
Establish Programs and Policies for Resilient Planning and Design	Operation SPLASH: Resilience Education Center	This project seeks to fortify and protect Operation SPLASH with innovative flood protection design and infrastructure (two passive self-closing flood barriers, sewage backflow preventers, and personnel door barriers). In addition, partnerships with Nassau County higher education institutions will be sought to raise awareness of climate related risks on the South Shore and promote environmental stewardship. Finally, surveillance cameras will be installed at high points along the coast and the video feeds will be displayed at Operation SPLASH as a scientific monitoring, community awareness, and educational tool.	Proposed	N
Plan for Business Continuity and Growth	Nautical Mile Buoyant Architecture	This project will design and construct a buoyant building along the Nautical Mile to demonstrate the ability to economically and resiliently maintain a coastal economy. In addition to improving resilience of coastal structures, this allows buildings and neighborhoods to maintain their character, retain access for elderly and disabled populations, prepare for sea level rise, and in some cases reduce the cost of construction to comply with new building elevation requirements.	Proposed	N

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

Strategy	Project Name	Short Description	Category	Regional
Plan for Business Continuity and Growth	Modernize the Industrial Park Study	<p>This project seeks to outline implementation steps for the formation of a local nonprofit development authority that is committed to transforming the Industrial Park into a modern, environmentally conscious, and resilient business center.</p> <p>The study will also propose design guidelines for safe, affordable, and environmentally conscious light industrial and commercial development. Short-term and long-term goals, strategies, actions, and design concepts will be developed.</p>	Proposed	N
Plan for Business Continuity and Growth	Business Continuity Program	<p>This program would help small businesses create their own business continuity plans, and provide a custom roadmap for businesses to continue operations under adverse conditions. This includes planning assistance and access to alternate spaces and facilities and grant assistance.</p>	Proposed	Y
Improve Stormwater Management and Drainage Systems	Meadowbrook Corridor Stormwater System Modeling, Analysis, and Pilot	<p>This project would include the reconstruction of five stormwater outfalls currently entering Freeport Creek and reconnecting the Creek with the natural floodplain.</p> <p>A floating wetland pilot and drainage study would also be conducted for East Meadow Pond to improve water quality and reduce future flooding.</p> <p>A daylighting study for Freeport Creek would examine the potential benefits of uncovering the current underground portion of the Creek.</p>	Proposed	Y
Improve Transportation Access and Connectivity	Lifeline Corridor Study and Pilot Implementation: Merrick Road Corridor	<p>Merrick Road is an important lifeline for many people, businesses and institutions. Due to the importance of the road, it is proposed that a study and subsequent pilot projects to improve its post-storm functionality take place. Based on the findings and results, the Lifeline Project could then be applied to additional streets that are critical at the neighborhood and community level.</p> <p>The study will identify best practices and develop design guidelines for resilient streetscapes and implement a pilot project.</p>	Proposed	Y

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

Strategy	Project Name	Short Description	Category	Regional
Invest in Resilience Enhancements for Critical Assets	Downtown Microgrid Phase 3: Redundant Distribution Surrounding Microgrid	Phase 3 of the Downtown Microgrid project involves the installation of four new underground circuits on the streets that border of the microgrid. These circuits increase redundancy and replace outdated circuits, while increasing capacity.	Featured	N
Invest in Resilience Enhancements for Critical Assets	Protection for Freeport Electric's Power Plant II Phase 2: Construction	This project would seek to construct the recommended design of protection options from Phase 1 of the Protection for Freeport Electric's Power Plant II project. Further funding from NYS and US grant programs for construction is required.	Featured	N
Establish Programs and Policies for Resilient Planning and Design	Convert Home Heating to Natural Gas in Extreme and High Risk Areas	This project will develop policy recommendations and an incentive program to convert home heating oil to natural gas in extreme and high risk areas. Temporary regulations to require proper anchoring of tanks in risk areas will be developed and incorporated. A deadline for all structures in extreme, high and moderate risk areas to convert to natural gas and/or other heat/hot water supply will be established.	Featured	N
Improve Stormwater Management and Drainage Systems	Regional Stormwater Drainage Cleanout, Survey, and Verification	This project seeks to clean out all storm drains in the Freeport area. While they are being accessed, it is recommended that a comprehensive survey is conducted to document and verify all missing stormwater infrastructure from the local data inventory. The data collected will feed into the hydraulic and hydrologic model to analyze the current drainage system and identify critical drainage projects. This will include the implementation of green infrastructure projects and will quantify the benefits of green infrastructure solutions.	Featured	N
Invest in Resilience Enhancements for Critical Assets	Street Tree Maintenance and Guidelines	This project seeks to recommend policy changes to identify roads for tree trimming, maintenance and/or replacement with more resilient trees.	Featured	N

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

Strategy	Project Name	Short Description	Category	Regional
Improve Stormwater Management and Drainage Systems	Green Infrastructure Plan	This Plan seeks to identify green infrastructure opportunities based on feasibility, level of impact, funding and street reconstruction schedules. Opportunities to manage stormwater on public and private properties will also be identified and recommended.	Featured	N
Improve Stormwater Management and Drainage Systems	Green Infrastructure Plan Implementation: Main Street Improvements	This project builds on the existing "Building a Better Freeport" plan, which recommends street improvement projects along North Main Street. This project would operate in tandem with the proposed improvements, ensuring that any pedestrian improvements incorporate bioswales or open channel infiltration areas to the extent possible. It also recommends reconstruction of areas along South Main Street that have been improved recently but missed opportunities to incorporate green infrastructure.	Featured	N
Establish Programs and Policies for Resilient Planning and Design	Public Bulkhead Repair	Publicly-owned bulkheads will be replaced at an appropriate height and with modern materials that are more resilient to erosion and wind. The reconstruction of the bulkheads will provide coastal protection in public areas, helping to maintain Freeport's open space and recreational areas. In addition, the bulkheads can reduce flooding impacts on local streets, helping to maintain access during and after flood events.	Featured	N
Improve Transportation Access and Connectivity	Key Intersection Streetlight Retrofit Pilot Project	This project seeks to provide solar powered lighting with backup power leading to key intersections, to ensure these roads always stay lit in the event of a power outage and residents can follow these lit streets toward safer areas and critical resources. In addition to providing solar power and backup energy for street lights, traffic signals at each of these intersections will also be provided.	Featured	N

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

Strategy	Project Name	Short Description	Category	Regional
Improve Transportation Access and Connectivity	Key Intersection Signage	This project provides wayfinding and destination signage to guide people toward critical assets, assistance centers and information after storms and during power outages. This will enhance route clarity and orient residents toward streets that should be used after future emergencies.	Featured	N
Improve Transportation Access and Connectivity	Public Communication and Education Gap Analysis	This project would begin with a gap analysis to determine additional emergency community needs in the region. Findings would guide the creation of a central website with a community-driven communication component, and eventually include education and outreach activities.	Featured	Y
Establish Programs and Policies for Resilient Planning and Design	Regional Transit Oriented Development, Access and Parking Study	This study will identify opportunities to combine parking areas and develop structured parking facilities in key areas, and provide recommendations on their best use based on community need. Guidelines for the design of resilient, sustainable and aesthetically pleasing parking structures will be identified. This study will also develop a concept for local public transportation that connects Freeport's key business, retail and recreational areas.	Featured	N
Establish Programs and Policies for Resilient Planning and Design	Neighborhood Preservation Guidelines	This project seeks to undertake a planning study and make recommendations to revise Freeport zoning, planning, and building code regulations for resilient design. The study will work with Freeport planning and building agencies to ensure that needs specific to the Community's rebuilding efforts are not omitted or overlooked.	Featured	N

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Welcome to the Nautical Mile

HURRICANE HARRY'S
ON THE MILE

PARKING FOR TWO COUSINS ONLY VIOLATORS WILL BE TOWED AT VEHICLE OWNERS EXPENSE

TWO LIVE L



Section I: Community Overview

The NYRCR Community Village of Freeport (Freeport) is the second highest populated village in New York State and one of the most diverse communities in Nassau County. It is located along the south shore of Nassau County on Long Island and occupies 4.6 square miles. The Village has a directly elected mayor and a Board of Trustees. As an incorporated village, Freeport has its own municipal electric and water utilities, police force, emergency management team, and fire department. The Village prides itself on its self-sufficiency, quality of life, and long history of sea-oriented activities. In 1659, a Hempstead cow keeper by the name of Edward Raynor started bringing cows to the shoreline's spacious meadows, and thus the Village of Freeport was born. Over the course of the next three centuries, Freeport transformed from a farming community into a fishing village. The relationship to the Hempstead Bays and the Atlantic Ocean for commercial, recreational, or aesthetic reasons always figured prominently in the identity of Freeport, including the daily lives of its residents and the character of its businesses. The South Shore Estuary Reserve Council recognized Freeport as a major maritime center for its maritime heritage and community character uniquely associated with the Estuary.

As early as the 1640s the settlement served as an oystering community, before becoming an incorporated village in 1892. Acknowledging its relationship to the sea, residents of the settlement voted to name it 'Freeport' in 1853.² The maritime heritage of Freeport continues to distinguish the Village; to this day Freeport has one of the largest networks of marinas in the State of New York and enjoys a vibrant waterfront as diverse as the people who live there, including commercial fishing, recreational boating, environmental education and outreach organizations, and numerous parks and open spaces.

Serving as home to the Long Island Good Hearted Thespian Society (LIGHTS) and recognized as a popular artists colony as far back as the early 1900s, Freeport draws on a rich cultural heritage. It was a popular amusement park destination in the 1920s and hosted stock car racing from the 1930s to the 1980s at the 10,000-seat Freeport Municipal Stadium. These cultural institutions have created a legacy of waterfront commercial and retail development that lives on to this day and which will be discussed throughout the following sections of the NY Rising Community Reconstruction (NYRCR) Freeport Plan. The residents remain committed to the history and legacy of the Village and the Freeport Historical Museum tells the story of Freeport's past, bringing to life how Freeport's unique heritage shapes the present and future life of the Village.

Freeport is an employment center with a variety of small and mid-sized businesses, including one of the south shore's largest concentrations of marine-related commercial businesses. Retail, restaurant, and commercial uses are present along the Woodcleft Canal (regionally known as the Nautical Mile), Merrick Road, Atlantic Avenue, and North and South Main Streets. The Industrial Park is one of few remaining concentrated industrial development areas along the south shore of Long Island. Many areas within Freeport, however, were already struggling before the Hurricane Irene and Superstorm Sandy and the Village and its residents are now even more committed in working towards a brighter future. The areas of Downtown Freeport, North Main Street, the Nautical Mile, and the Industrial Park are working to rebound from the aftermath of the storm events, but many storefronts and buildings sit underutilized. As a result, many NYRCR Freeport Committee Members have emphasized the need to support local businesses and merchants.³

With 9,378 people per square mile, more than double the average density of Nassau County, Freeport has one of the highest residential population densities on Long Island. In 2012, the population of Freeport was estimated at 43,138, making it the second largest village by population in New York State.⁴ Freeport's high population and high density add a layer of complexity to disaster planning, management, and response.



Downtown Freeport (source: Arup)

The complexity arises from two major aspects: the sheer number of people living in risk areas and the existence of a demographically diverse community.

According to the United States Census Bureau's 2012 American Community Survey estimates, 43% of the population identify themselves as "Hispanic or Latino," 31% as "Black or African American," 21% as "White," less than 1% as "American Indian and Alaska Native," and nearly 3% as "Asian," while no Freeport residents identify themselves as "Native Hawaiian and Other Pacific Islander." Two percent of residents identify with two or more races.⁵

The median age in Freeport is 38.5 years. Freeport's population is younger than the adjacent NYRCR Communities but, like most of Long Island, a growing proportion of the Freeport population is over age 65.⁶ The diversity of housing choices in Freeport allows many different types of households and demographic groups to settle in the Village. Apartments and multi-family buildings offer housing opportunity for younger households, low-income households, or seniors who wish to downsize to a smaller dwelling. Single-family opportunities are available for those who wish to have larger homes or yards, while those who prize a waterfront lifestyle can live in homes along the water. The mixture of housing typologies offers a variety of options to meet residents' needs at all stages of life, including single living, family development, and aging in Freeport.



Freeport's Milburn Lake Park (source: Arup)

The building stock and ownership patterns in Freeport diverge significantly from adjacent areas in Baldwin, Baldwin Harbor, and Merrick. Single-family homes represent just 62% of Freeport's housing stock, lower than the 77% county average.⁷ Freeport also offers publicly subsidized housing options for those residents who need housing support. The downtown area is characterized by commercial corridors with varying quality of retail stores, limited restaurants, stores, empty lots, and some multi-family and rental housing; the area is predominantly low-income with more than 10% of households below the poverty line.⁸

A part of the greater New York City metropolitan area, Freeport is approximately 22 miles east of Midtown Manhattan, and 7 miles east of the Nassau and Queens border. Sunrise Highway (New York State Route 27) and Merrick Road (Nassau County Route 27A) are the two major east-west thoroughfares serving the Freeport area. The NYRCR Freeport Community (Community) is bordered by the Meadowbrook State Parkway to the east, which intersects Merrick Road and Sunrise Highway and provides access to northern Nassau County, and to the south by the Long Beach and Jones Beach barrier islands. The Milburn Creek corridor creates the boundary between NYRCR Freeport and NYRCR Baldwin to the west. The municipality of Roosevelt borders Freeport to the north. North Main Street is the major north-south route through the Village, providing access to the Sunrise Highway and Freeport's Long Island Rail Road (LIRR) station.

The Community is served by the LIRR's Babylon Branch, which runs from Penn Station in Manhattan to the Village of Babylon in Suffolk County. It is a 45-minute express train ride to Penn Station from Freeport. Freeport Station averages 5,365 passenger trips daily and nearly 30% of the Village's residents live within a half-mile of the station.⁹ Eight Nassau Inter-County Express (NICE) bus routes also serve the Community, with the N40 and N41 lines providing important north-south transit access for residents.

Freeport's canals and waterfront grid were developed in the late 1800s and early 1900s by the developer John J. Randall. His most notable achievement was the Woodcleft Canal, now adjacent to the Nautical Mile.¹⁰ Waterfront development has been a mixed blessing for Freeport, attracting significant population and economic growth in 1900s when marshlands, which include wetlands (these terms are used interchangeably in this NYRCR Freeport Plan), were dredged and filled for development. People came to live on or near the water and Freeport benefitted from this growth and development. These marshlands and tidal wetlands, however, provided important ecological services and coastal protection and were naturally subject to periodic inundation. That natural protection was lost with the wetlands and now that development sits in these areas there is no natural defense against inundation. Consequently, the development that replaced these marshlands is now subject to repeated flooding during storm events and normal tidal cycles. As the effects of increasing sea level rise continue, greater portions of Freeport's developed areas are vulnerable to coastal inundation.

Freeport's southern edge is penetrated by a number of canals, which provide access through Middle Bay's marshlands and the Jones and East Rockaway inlets to the Atlantic Ocean. The Nautical Mile, a commercial and recreational waterfront strip west of Woodcleft Canal, is a popular regional summer destination for boating, dining, and nightlife. It features a variety of restaurants and bars, retail stores, boat sales and services, charter boats, and seafood markets. Many, if not all, of these stores and restaurants depend on their waterfront location for success, particularly places like the Fiore Brothers Fish Market, which burned down in the immediate aftermath of Superstorm Sandy, and the former Schooner

Restaurant, which closed after repeated damages sustained during Hurricane Irene and Superstorm Sandy. The Village's four-acre Sea Breeze Waterfront Park, located at the foot of the Nautical Mile, includes a transient boat dock, rental boat slips, and a public building with rest facilities.

Recent community revitalization efforts have acknowledged the increasing impact of coastal flooding. The Nautical Mile, which was redeveloped in the late 1990s, incorporated road and private property raising, undergrounding of power lines, construction of a new drainage system to minimize upstream impacts, and the installation of tide valves to prevent tide waters from entering the drainage system.^{11 12} However, recent storms, such as Superstorm Sandy and Hurricane Irene, have had significant impact in coastal areas despite the strengthening of defenses that was incorporated into the redevelopment plans from the 1990s. Specific impacts of these storms are discussed in Section I.B.

This Community Overview section of the NYRCR Freeport Plan (NYRCR Plan) includes the following sub-sections:

- **Geographic Scope of the NYRCR Plan** defines the “planning boundary” of the study area, as defined by the NYRCR Freeport Planning Committee (Committee);
- **Description of Storm Damage** summarizes the impacts of Superstorm Sandy and Hurricane Irene on residents, homes, businesses, services, and public and government facilities;
- **Critical Issues** briefly describes the key concerns facing the community as it relates to major storm events. These issues are further detailed in Section II: Assessment of Risks and Needs;
- **Community Vision** includes the Committee's aspirations for a more resilient future; and,
- **Relationship to Regional plans** describes the regional perspectives considered in the preparation of this plan to address shared challenges and issues.

Material presented in this NYRCR Freeport Plan was developed collaboratively among residents of the Community, a range of state and local agencies, and the Consultant Team of Ove Arup and Partners, P.C., Sasaki Associates, Urbanomics, HealthxDesign, and CAS Group (the Consultant Team). Fourteen community representatives dedicated their time, passion, and expertise as the Co-Chairs and Committee Members of the NYRCR Freeport Planning Committee to guide the development of the NYRCR Freeport Plan from its inception. Residents and businesspeople participated in three Public Engagement Events and shared their opinions and ideas through online platforms and business surveys. The Consultant Team provided technical expertise and supported the evolution of the NYRCR Plan content, at the direction of the Committee, to reflect best practice, local conditions, and Community input in development of the projects discussed in Section IV.

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A. Geographic Scope of NYRCR Plan

The Village of Freeport has a strong community identity; while the population of the Community is very diverse, it is also inclusive and welcoming. The Committee and public discussed limiting the scope of the project to the areas that are most vulnerable to future storms and coastal flooding, however, it was ultimately decided that the entire Village should be considered as the Community chose to embrace the “we are all in this together” attitude.

As shown in Figure 01, the geographic scope of the Community area extends north from the Middle Bay to Babylon Turnpike and the southern border of Roosevelt. The geographic scope of the NYRCR Freeport Plan follows the existing Village boundaries except where, for planning purposes, it extends into a small, unincorporated area in the Town of Hempstead. This additional area includes several private landholdings and Nassau County's Cow Meadow Park and Preserve, which receive electric, water, and some emergency services from the Village of Freeport.

The Community is generally bounded on the east by the Meadowbrook State Parkway and the Cow Meadow Park and Preserve. The western boundary begins from the south at Baldwin Bay and extends north along Milburn Creek, intersecting the Sunrise Highway and the LIRR Babylon Branch. The Village

shares borders with the unincorporated areas of Baldwin to the west, Merrick to the east, and Roosevelt to the north.

Only 25% of the Community's land area is located outside of a risk zone and nearly 34% of the Community is located in an ‘extreme’ or ‘high’ risk zone (risk zones are defined in Section II.A). As noted in subsequent sections, opportunities exist in the central and northern portions of the Community to potentially relocate or accommodate new critical infrastructure, commercial businesses, and residential properties farther removed from the low-lying areas that are prone to coastal inundation.



Freeport's downtown area (source: Arup)



Homes along the Community's southern canals (source: Urbanomics)

Figure 01: Geographic Scope



Legend

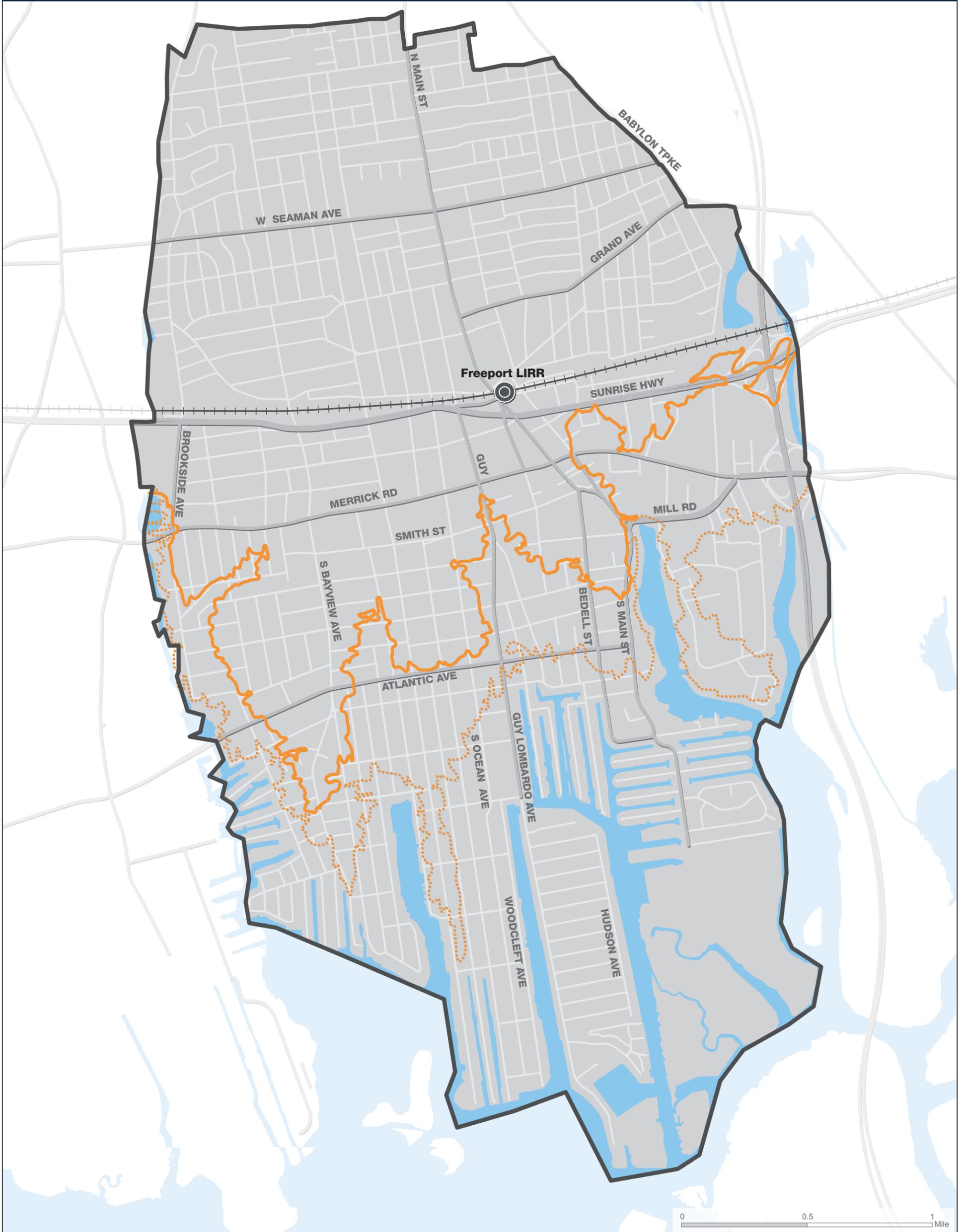
- NYRCR Boundary
- Water
- Long Island Rail Road
- Main Roads
- Local Roads
- LIRR Rail Station

Data Sources

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



Figure 02: Extent of Flooding



Legend

- NYRCR Boundary
- Long Island Rail Road
- LIRR Station
- Water
- Superstorm Sandy extent of storm surge
- Hurricane Irene extent of storm surge

Data Sources

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



B. Description of Storm Damage

Both Superstorm Sandy and Hurricane Irene had significant impacts on the Community. The following sections describe why, how, and when the storms happened, followed by the specific damages sustained by the Community.

Hurricane Irene

Hurricane Irene made landfall in New York on August 28, 2011 as a Category 1 Hurricane and was immediately downgraded to a Tropical Storm upon arrival. The storm brought heavy rainfall to NYRCR Freeport and a storm surge of more than seven feet.¹³ Flooding of this extent equates to a one-in-one hundred year event; or a 1% chance of occurrence in any given year.¹⁴

Hurricane Irene caused significant damage to homes, businesses, infrastructure, and natural systems. Superstorm Sandy was a unique occurrence and a stronger storm than Hurricane Irene; this is reflected in the extent of damages and impacts described below.

Superstorm Sandy

On the night of October 29, 2012, Superstorm Sandy, the most destructive storm of the 2012 Atlantic Ocean hurricane season, devastated New York and the tri-state region, which includes New Jersey and Connecticut as well. At the time of landfall, the storm was classified as post-tropical.¹⁵ However, several characteristics led to the especially high level and breadth of flooding, including:

- Daily high tide cycle;
- The gravitational pull of a full moon which increases sea surface elevation, exacerbating the regular high tide;
- Strong winds related to Superstorm Sandy, which pushed greater quantities of water onshore during the surge; and,
- Precipitation received in the upper watershed areas, which then drained through Freeport and converged with the incoming storm surge.¹⁶

In addition to the unusual characteristics of Superstorm Sandy, long-term sea level rise has added roughly one foot to local water levels since 1900.¹⁷

What causes coastal flooding?

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

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

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

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

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

The south shore of Long Island, which includes the Village of Freeport, suffered massive storm damage, power outages, sewer line and stormwater drainage system overflows, and utility and transportation disruptions during the storm event. Few were prepared for the extent of Superstorm Sandy's impacts. Directly or indirectly, the lives and well being of virtually everyone in the region were, and continue to be, affected by the storm's aftermath. It is important to note that while the full moon enhanced the daily high tide, had the Superstorm Sandy reached local shored the following morning during high tide, the storm surge could have been seven inches higher.

Freeport's Ongoing Recovery

Recovery and reconstruction in Freeport started in the immediate aftermath of Superstorm Sandy and is an ongoing process at both the individual level and community-wide. With the introduction of the NY Rising Community Reconstruction (NYRCR) Program, the Village of Freeport and the NYRCR Freeport Planning Committee (Committee) have been actively identifying issues and developing strategies to enhance the long term resiliency of the Village against future disasters. In addition to the Committee members, more than 100 residents and stakeholders from the community actively participated in the NYRCR Planning Process to address storm-related impacts that affect their community as a whole. The result of their efforts is the NYRCR Freeport Plan, which presents a series of strategies and projects that respond to critical issues and Community aspirations that will contribute to building a more resilient, safer, and sustainable future for Freeport.

Had the gravitational impacts on high tides resulting from a new moon experienced two weeks earlier been a factor, the storm surge could have been an even more devastating or 17 inches higher.¹⁸

The Village of Freeport, situated directly across from the Jones Inlet, suffered a direct hit as Superstorm Sandy came ashore, experiencing a storm surge combined with high tide that was in excess of 10 feet. In parts of Freeport the Federal Emergency Management Agency flood zone was exceeded by 250 horizontal feet.¹⁹ Flooding at this level of severity equates to a one-in-five hundred year event – or a 0.2% chance of occurrence in any given year.²⁰

As Superstorm Sandy moved across Freeport, a rush of water entered its waterways, including Hudson Bay, Woodcleft Bay, Woodcleft Basin, Randall Bay, Baldwin Bay, Grover's Canal, Albert Canal, Freeport Creek, and Milburn Creek. The storm surge and resultant damage decimated the historic Nautical Mile and other marine commercial areas, as well as the Industrial Park, homes, businesses, and public infrastructure, with Atlantic Avenue marking the

northern boundary for most of the severe damage. Committee Members and Village employees reported widespread flood damage in areas where flooding events are less common. The northern extent of flooding in eastern Freeport impacted Sunrise Highway and roads like Merrick Road, Mill Road, Buffalo Avenue, and South Main Street. In central Freeport, the northern extent of flooding fluctuated significantly, but the northernmost point affected by floodwaters was just south of Merrick Road on Guy Lombardo Avenue. All roads south of and including Atlantic Avenue flooded, including all of Freeport's finger canals, marinas, and the Nautical Mile. In western Freeport, floodwaters followed the Milburn Creek corridor (the border between Freeport and Baldwin) north to Milburn Pond. The northern extent reached just south of Freeport High School. Notable roads that flooded in the east include Merrick Road, Atlantic Avenue, South Bayview Avenue, and South Brookside Avenue.

Community Response

A close-knit community, NYRCR Freeport responded quickly and vigorously to Superstorm Sandy and Hurricane Irene. Institutional, civic, and Community leaders came together to help each other recover and rebuild from the storms. Freeport's response to Superstorm Sandy's approach began on October 25, 2012, three days before the storm made landfall on Long Island. The then-Mayor of Freeport, Andrew Hardwick, and the Director of Freeport's Office of Emergency Management (OEM), Richard Holdener, met daily and provided briefings to all other Village departments. Mayor Hardwick ordered a mandatory evacuation of all Freeport residents south of Merrick Road (approximately 7,000 homes) on October 28 at 1:00pm, seven hours before Superstorm Sandy started impacting Long Island and several hours before other Nassau County Communities were ordered to evacuate by the Nassau County Executive Order.²¹ Only one-third of residents ordered to evacuate actually left their homes.

Between October 28 and November 6, Freeport OEM answered 2,500 calls for help with downed trees and wires, 5,000 requests for information and 500 calls for Fire Emergency Responses. In addition, 34 bilingual Code Red (an emergency alert company

hired by Freeport OEM four years ago) phone messages were sent to residents after Superstorm Sandy to provide updates. The Emergency Operations Center at 76 Church Street was activated and staffed around the clock for 12 days, from October 27 to November 8, 2012.

Five days after Superstorm Sandy, Freeport Electric had restored power to 98% of the Village, which was several days before the Long Island Power Authority (LIPA) had restored power to other storm damaged areas beyond the Village. Community Members reported being impressed with both the preparation of Freeport OEM and with the quick and efficient response of Freeport Electric.

The Leo F. Giblyn Elementary School, located along South Ocean Avenue in a Federal Emergency Management Agency (FEMA)-designated Special Flood Hazard Area (SFHA), suffered significant storm surge damage and 564 students were temporarily relocate to neighboring schools in the district. The students were displaced for six weeks as repairs were made, returning to Giblyn Elementary on December 10, 2012.

The Village's Recreational Center served as a temporary location for displaced Freeport Department of Public Works workers and Village vehicles prior to inundation. The Center suffered damage during the storm, but repairs were made quickly and following the retreat of floodwaters, it became a charging, communicating, drying, warming, and showering center for residents.

Home and Business Impacts

Approximately 4,000 homes in Freeport, including 213 that are located outside the flood zone, were affected by seawater as a result of Superstorm Sandy.²²⁻²³ Flooding caused a wide range of damage to individual buildings' mechanical, electrical, and structural components.

More than 130 homes were "red tagged" (a label marking them as unsafe for habitation) by the Village of Freeport Building Department.²⁴ More than 200 additional properties were deemed substantially or heavily damaged by the flooding. One year after the storm, approximately half of the red-tagged

What makes storm events so damaging?

Coastal communities are subject to a higher degree of risk due to their proximity to water; development is generally in former wetland and marshland environments where natural flooding occurs, making them difficult to protect from the vicissitudes of nature. Freeport has long lived with the challenges of a coastal environment and learned to find ways to address these risks. Hurricanes, tropical storms, and other weather events can have wider and more devastating impacts for places like Freeport. The direct impacts experienced by Freeport during Hurricane Irene and Superstorm Sandy included:

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

It is important to acknowledge that these weather systems continue to impact communities long after a storm has passed. Secondary, or indirect impacts, can be equally as damaging and further destabilize recovering communities. Secondary impacts experienced by Freeport included:

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

Homeowner Assistance

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



Many homes in Freeport were flooded during Superstorm Sandy (source: Urbanomics)



Some homes were damaged beyond repair (source: Urbanomics)

structures were repaired and the Village has reported that a majority, if not all, of such residences will be safe to inhabit by 2015.

As of July 2013, some 3,900 Freeport homeowners (approximately 45% of all homes in the Village) had registered claims with FEMA. From those claims, FEMA assessed total damages to owner-occupied housing at \$65.4 million and approved assistance to 2,750 property owners. Over 1,300 renters (roughly 40% of all renters in Freeport) also filed claims. FEMA assessed an undisclosed amount of rental housing damage and provided assistance to little more than half of those renters registered. The total amount of approved funds dispersed to Freeport residents by FEMA under the Individuals and Households Program (IHP) was \$24.1 million to homeowners and \$4.0 million to renters. As of September 2013, an additional \$39.1 million was lent to homeowners by the federal Small Business Association (SBA) disaster loan program. It is unknown, however, how much of these funds have been, or will be, received by Freeport property owners. It is also unknown what funds have specifically been disbursed to the Community from the NYS Homeownership Repair and Rebuilding Fund (HRRF), the Empire State Relief Fund, the NY Rising Housing Recovery Program, or the NY Rising Acquisition program to supplement FEMA aid. Aid to south shore communities amounted to \$2.9 million under HRRF and \$1.2 million under ESRF.

According to data from the U.S. Small Business Administration (SBA), 234 Freeport businesses, representing 1,053 employees, applied for disaster management assistance after Superstorm Sandy. These applications represent claims totaling \$14.7 million in real property damage, \$8.3 million of machinery damage, an inventory loss of \$2.4 million, and a leaseholder improvement loss of \$2.2 million. Of these applications, 49 (20.9%) were approved for an amount totaling slightly less than \$6.7 million, roughly one quarter of the \$27.6 million in verified damage assistance applied for.²⁵

Stores and restaurants along the Nautical Mile and in other waterfront areas experienced direct and indirect damages. Seven structural fires occurred during or immediately following the storm. One Nautical Mile business, Fiore Brothers Fish Market, burned down in the immediate aftermath of Superstorm Sandy and

Socially Vulnerable Populations

More than \$207,000 was expended by the Village of Freeport Housing Authority to make critical repairs to the Moxie Rigby, South Main, and 100 North Main Street public housing developments. Many of the buildings' power and heating systems that were repaired were compromised during Superstorm Sandy as well as Hurricane Irene. The Housing Authority, therefore, is seeking financial assistance from FEMA to elevate and relocate mechanical equipment to prevent future damage. The Authority, working with engineers, has provided a pre-engineering estimate of \$342,000 to address these repairs.

sustained \$3.5 million in damages. Tropix Bar and Restaurant also burned down and has since been rebuilt, while The Schooner Restaurant, located at the southern tip of the Nautical Mile, was forced to permanently close its doors after sustaining damages from both Hurricane Irene and Superstorm Sandy.

Many gas stations throughout Long Island were left without power for their pumps and/or lacked fuel to sell, as the storm prompted the shutdown of two east coast refineries. While a majority of gas stations in Freeport did not lose electrical power, enabling them to remain operational and thus serve the greater south shore region, many wholesale gasoline suppliers did lose power, and were unable to pump fuel into tanker trucks for distribution. Wholesalers that did have power had difficulty keeping up with demand, as service stations that were able to open had to be replenished much more frequently.

Environmental Impacts

Wetlands and parks across the south shore were washed away or severely damaged by both Hurricane Irene and Superstorm Sandy. The Freeport-based nonprofit organization Operation SPLASH (Stop Polluting Littering and Save Harbors) estimates that the storm deposited over one million pounds of garbage into the wetlands, from car tires and boats to building components and furniture. Saltwater marshlands off the Freeport waterfront remained covered with debris for months after the storm, while household chemicals, fuel from damaged boats, and gas



The Crows Nest Cove on Freeport's Nautical Mile (source: Arup)

and oil tanks were carried away by flood waters and were also deposited in wetland areas, coating the water and wildlife in leaked fuel and other contaminants.

Freeport Department of Public Works (DPW) structures located in John J. Randall Park and Sea Breeze Waterfront Park, in particular, sustained substantial flood damage.²⁶

Storm events also often result in hazardous material spills, further damaging the environment. During 2012, approximately 170 of the 302 total hazardous material spills in Freeport were a result of Superstorm Sandy.²⁷

Many of the storm's impacts on natural resources were felt at the regional level in the South Shore Estuary. Debris, oil, and other toxic substances that were released were carried to various parts of the Community. This will cause long-term impacts to trees, wetlands, watersheds, and waterways, as well as to the fish and wildlife that depend on a healthy ecosystem. Flooding and wind damage created a significant amount of debris, including damaged bulkheads, pilings and other marine structures, unmoored boats, and building fragments carried by the storm surge.

Infrastructure Impacts

The high tide and surge waters infiltrated as far north as Sunrise Highway and left roadways flooded throughout the southern portion of Freeport. Streets



Freeport Electric's Power Plant II (source: Arup)



During Superstorm Sandy, water levels came close to reaching Freeport Electric's Power Plant II (source: Arup)

in low-lying areas were completely inundated, and receding floodwaters left roadways littered with debris. Heavy winds knocked down trees, traffic signals, and utility lines. Superstorm Sandy was responsible for causing 12 fires, several of which were located in heavily flooded areas and could not be reached by the Freeport Fire Department. In the storm's immediate aftermath, Nassau County officials closed all roads, declaring them impassable and unsafe. While the New York State Police were able to reopen Long Island's major highways north of Merrick Road within the day, several roads to the

south remained closed until they could be cleared of obstructions, such as downed trees and live electrical wires.

The LIRR began suspending service the night before Superstorm Sandy was expected to make landfall. In order to avoid damage, substations feeding the track's third rail had to be powered off. The storm left tracks covered in debris, however partial service was restored to the Babylon Branch on Friday, November 2, 2012, four days after the storm. By Monday, November 5, 2012, trains were operating on a modified weekday schedule and service was almost completely restored within the next week.²⁸

Freeport is served by a municipally owned utility, Freeport Electric. Freeport Electric has instilled many management practices designed to diminish damages, such as the use of spacer cables to stabilize overhead wires and reduce the risk of downed wires during heavy winds. Freeport has primary and secondary power generation capability, enabling the community to generate power locally or pull from the regional grid. While this makes Freeport's electrical supply more resistant to widespread outages, it also means that critical electricity generating facilities are located in the Village, one of which – Power Plant II – is at the water's edge. Although Superstorm Sandy did not significantly damage Freeport Electric's Power Plant II, water levels rose to the control room's doorstep making the exposure of its fuel storage tanks to open water a major concern and highlighting the potential for considerable damage in future storm events. While the Power Plant is located in a high risk area directly adjacent to the water, local topography placed it high enough to avoid damage. The same was not true for the Department of Public Works, where water surrounded the 250,000, 500,000 and 1,000,000 gallon fuel storage tanks during Superstorm Sandy. Despite being bolted down, the force of the surge water moved the fuel storage tanks on their foundations. It is clear that in the future, a larger storm surge could completely destroy a majority of the facility's power generation infrastructure.

Freeport's 13 kV and 4 kV electrical distribution system suffered extensive damage from Superstorm Sandy and many assets were powered down to avoid additional damage. The 13 kV Tie Line #1 tripped and locked out, along with three 13 kV circuits. Flooding



Flooding at the Village of Freeport Department of Public Works (source: Freeport DPW)

surrounding Substation A and Substation D forced the system operator to trip the breakers and safely power down to limit damage. Additionally, drifting boats and debris threatened the aboveground transition point for a critical submarine transmission cable that provides 24% of Freeport's electricity supply. On October 30, 2012, the day after the storm, approximately 73% of Freeport Electric's customers were without power, yet by November 3, only 2% of the utility's customers remained in the dark. Residents of the Village and residents in adjacent hamlets repeatedly noted how impressive they found Freeport Electric's quick return to operation.

Cellular communication networks were down for days after the storm, as many cellphone towers had insufficient backup power to maintain service. Flooding also affected numerous cell towers and Internet switching centers; Facilities that did have reserve power capacity were forced to go offline to prevent damage. Heavy winds and falling trees took out aboveground communication lines on shared utility poles, which could then only be accessed for repair after initial utility line repairs were made. These outages rendered emergency notification systems ineffective for many Freeport residents.

Power outages and storm surge waters also affected a number of other critical infrastructure systems. Although Freeport's drinking water supply

and distribution system was unharmed, all three of its sanitary sewer lift stations sustained damage to the electrical panels and compressors. Once the floodwaters dispersed, work began to replace and elevate electrical panels in order to keep the system operational.

Freeport's Department of Public Works (DPW) facility houses a majority of the communication equipment, dedicated fuel pumping stations, storage, and maintenance facilities for the Village's vehicle fleet. The DPW facility was inundated with approximately 3.5 to 4 feet of surge water during Superstorm Sandy and it remained unusable for approximately two months after the storm. Due to the facility's low-lying waterfront location, it sustained more than \$100,000 in damages during Hurricane Irene and nearly \$1.6 million in damages, repairs, and vehicle replacements in Superstorm Sandy.²⁹

Some residents suffered natural gas outages and damaged equipment and gas lines created potentially dangerous situations. Seawater entering residential fuel tanks displaced the oil inside, forcing it out and into surrounding yards and homes. Aboveground tanks were ripped off of their foundations and carried into nearby properties, while in some areas flooding caused buried fuel tanks to float up out of the ground.³⁰

The Village incurred approximately \$4.5 million in Superstorm Sandy related damage expenditures, of which \$3.3 million are attributable to the Village's General Fund and almost \$1.2 million to its Electric Fund, which helps fund municipally-owned Freeport Electric. Approximately \$2 million was expended on debris removal, of which \$575,000 was for non-capital equipment and materials, \$820,000 for Village labor overtime costs, and \$1.1 million for contractual costs. In total, an estimated 13,347 tons of debris was removed.³¹

C. Critical Issues

The damage caused by Superstorm Sandy and Hurricane Irene directly and indirectly impacted homes, businesses, sanitary sewer, stormwater and energy infrastructure, public facilities, and natural resources in the Community. These impacts revealed several critical issues facing the Community and it is crucial moving forward that these issues are addressed in a way that allows the Community to be more resilient when faced with future natural disasters. The following are critical issues facing Freeport (a more detailed description of issues exists in Section II: Assessment of needs and opportunities):

- **Flooding and Drainage:** Drainage infrastructure is aged and optimal system performance is diminished by different maintenance protocols across municipal boundaries. Drainage infrastructure improvements have not been made in concert with increases in population. Seemingly minor instances of precipitation can destabilize areas downstream, like Freeport, when discharge areas converge with incoming storm surges. A significant amount of the stormwater that drains through Freeport is generated in upland areas and stresses the system's capacity. Debris and sediment from both Hurricane Irene and Superstorm Sandy left drains clogged in many areas.
- **Homeownership in Higher Risk Areas:** More than 3,600 homes in Freeport are located within extreme or high risk areas (risk zones are defined in Section II). Many rental residences and those occupied by lower income households also sit in higher risk areas. Home values were destabilized and many have decreased, primarily in areas closer to the bays. The cost of home ownership has, and will continue to increase for many due to increases in repair, maintenance and flood insurance costs.
- **Shoreline Protection:** Freeport's development has always been oriented towards the water. Historic development patterns, coupled with more recent suburbanization, diminished wetlands around the Village. Wetlands loss reduced or eliminated the "transition area," which offers protection from regular tidal flooding and filtration of toxins from stormwater runoff. As waterfront



Many homeowners in high risk areas face increased costs from insurance premiums and repairs (source: Arup)



Development has changed waterfront areas from wetlands into residential and commercial areas (source: Arup)

areas developed, bulkheads were introduced to reduce soil erosion and provide water access. While people have come to rely on bulkheads to prevent inundation, this was not the intended function. Further, their varying height, composition, maintenance, and age create gaps and inconsistencies in the coastline.

- **Energy Infrastructure:** More than 70% of Freeport experienced power outages due to failures in the energy infrastructure, but power was restored quickly following the two storm events. While Freeport bounced back quickly, the experience during Superstorm Sandy brought a



The submarine cable crossing is vulnerable to damage from unmoored boats and debris (source: Arup)

higher degree of awareness to the vulnerabilities of the Freeport Electric Network. The lack of ‘black-start’ capability at Power Plant I, Freeport Electric’s main generation facility, puts at risk the ability to restart quickly after a service disruption. Outdated circuits in the downtown Freeport area limit economic development potential and restrict the ability to develop system redundancy. A cable channel crossing in south Freeport that is responsible for transmitting 24% of Freeport Electric’s load transitions to overhead wires that pass through a boatyard, presenting a critical fire hazard and therefore creating system vulnerability. Power Plant II is located in a high risk area directly adjacent to the water.

- **Business Continuity:** Local businesses suffered significantly; many were closed for extended periods and a few did not reopen after Superstorm Sandy. The loss of revenues, combined with the financial investment required to reopen storefronts, created a significant financial loss for business owners. Two of Freeport’s economic drivers, the Industrial Park and the Nautical Mile, are located in coastal flood risk areas, representing 35% of total commercial property value located in extreme and high risk zones.

- **Information, Communication, and Access to Resources:** A majority of residents south of Merrick Road did not heed mandatory evacuation orders until it was too late, which put emergency responders at risk. During and after the storm, with power loss, downed communication lines, and inoperable cellular towers, residents were unable to access information. There was uncertainty on where to go to find help centers, temporary accommodations, or locations for the distribution of supplies.

- **Regional Connections:** The Meadowbrook State Parkway was covered with debris rendering it unavailable for use for two weeks following Superstorm Sandy. Long Island Rail Road service was quickly restored and many of the regional roadways were available after a short period. Most local roads were inundated and blocked with downed trees or power lines, making them impassable for several days after the storm.

- **Resilient Planning and Design:** Existing land use, buildings, infrastructure networks, and marinas – many of which were planned, designed and built more than 50 years ago – are not well suited to dealing with climate change and extreme weather patterns. They do not reflect current best practice regarding energy resilient buildings. Many support centers designated to provide shelter and assistance to storm victims lacked reserve power or other necessary services to support displaced residents. During Superstorm Sandy many residential heating oil tanks in low-lying areas were displaced due to the force of floodwaters. In addition, home and business electrical and communication systems, often located in basements and on groundfloors, were also damaged.

D. Community Vision

Through input received from the Community during Public Engagement Events and the work of the NYRCR Freeport Planning Committee (Committee), a vision statement and goals were developed reflecting the Community's aspirations for the future. These statements provide the foundation for the NYRCR Freeport Plan. They were used to guide the development of the NYRCR Freeport Plan's strategies and projects and should serve as an ongoing reminder of what the Community aims to achieve.

Community Vision

Vision for a Resilient Future

The Village of Freeport draws upon our independence, nautical commerce, and rich cultural past to create a resilient future with economic, social, and recreational outlets that build upon our strong sense of community.

Goals for the Future

- Revitalize the local economy and create opportunities for growth.
- Connect vulnerable and seasonal economic drivers with less vulnerable growth locations.
- Leverage and build upon infrastructure investments to maximize economic development potential.
- Build on a legacy of self-support, exploring new ways to deliver public amenities.
- Enhance parks and cultural assets so they serve multiple purposes: recreation, resilience, and refuge.
- Provide a range of housing types that are resilient in design and location for all Freeport residents.
- Ensure proper health and social services are accessible to all residents on a daily basis and in emergency scenarios.
- Improve social resilience by establishing connectivity between communities and services.

E. Relationship to Regional Plans

Regional plans and studies previously conducted raise many of the issues and challenges expressed by Committee Members and the public in the Community. The *LI 2035 Visioning Initiative (2009)*³² discusses the risks faced in coastal areas from hurricanes and major storms, while also documenting infrastructure needs in the Community. The *South Shore Estuary Reserve Comprehensive Management Plan (2001)*³³ deeply examines the needs of wetlands and bay ecosystems. These plans and others formed a foundation of needs and opportunities that were then used to frame strategies, projects, and programs to respond to those needs.

What was learned from reviewing these plans is that the Communities along the south shore in proximity to NYRCR Freeport share common issues and concerns related to reconstruction, recovery, and resiliency. They inhabit one natural ecosystem along the Great South Bay and also share similar physical attributes. Further, these Communities share similar patterns of development, interconnected infrastructure systems, common road networks, overlapping municipal service provision areas, and a common coastline. This dynamic demands a regional perspective on the challenges facing the Community, ensuring local solutions take into account and leverage regional considerations, as well as grounding regional strategies in local context.

The NYRCR Freeport Plan is therefore informed by numerous existing planning documents and efforts, several of which offer relevant strategies, projects, and actions. A list of the regional and sub-regional plans reviewed can be found in Table 02. Although the geographic scope covered by some of these documents is beyond the boundaries of the Community, many of the strategies identified can be applied at a local level.

In addition to the documents reviewed, there were two Joint Committee Meetings held with the NYRCR Planning Committees from the neighboring NYRCR Communities of Baldwin, Bellmore/Merrick, Massapequa, and Seaford/Wantagh. These Joint Committee Meetings promoted understanding of regional issues and developed shared projects.

Freeport, as an incorporated village, is unique along Nassau County's south shore due to its direct control over zoning and building codes, emergency management, water and sanitary sewer system, and power generation and distribution. As such, it can quickly adapt to meet local needs and respond to local issues.

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

- Infrastructure Investment:** Long Island's aging infrastructure is struggling to accommodate previous population growth and changing demographics while adapting to the increasing threat of storm events and sea level rise. Infrastructure systems, such as roadways, bulkheads, and utility lines, have been particularly affected by flooding and storm damage. Additionally, the transportation network no longer best serves Long Island's present-day commuting patterns and should be re-evaluated to better accommodate trips that are not bound for New York City.³⁴ Infrastructure investment has consistently been identified as critical to Long Island's regional growth and economic viability. The recent storms exposed many of the vulnerabilities inherent in aging infrastructure and further confirmed the need to make upgrades and improvements.
- Water Resources:** Groundwater contamination from polluted recharge waters and saltwater intrusion is an issue in Nassau County where potable water is supplied solely by aquifers. Real estate development to facilitate and attract population growth, combined with sea level rise, threatens future drinking water and consumptive water resources (those removed from the system without a return, such as manufacturing and food preparation) on Long Island. The *South Shore Estuary Reserve Comprehensive Management Plan (2010)*³⁵, the *NYS Coastal Management Plan (2006)*³⁶, and the *2010 Draft Nassau County Master Plan (2010)* address these issues, in addition to flood management, water conservation, and environmental

protection concerns.³⁷ Stormwater management is of special concern to Long Island. As runoff moves across roofs, parking lots, and streets, as well as through pipes, it picks up and transports pollutants - bacteria, trash, oil, road salt, soil, and chemicals - into the South Shore Estuary and Atlantic Ocean. Freeport is at the receiving end of upland drainage systems and must process stormwater and associated pollutants from a much wider area. As discussed in *Cleaner Greener Long Island Regional Sustainability Plan* (2013), implementing green infrastructure practices, or replacing impervious surfaces, such as roads, parking lots, and roofs, with vegetated areas, is one way to increase groundwater supplies, filter toxins, and combat saltwater intrusion of aquifers.³⁸

- **Energy Rates:** As an incorporated village, Freeport generates, purchases, and distributes its own energy through Freeport Electric. This makes Freeport's energy supply more affordable, reliable, and diverse than other areas of Long Island. Many of the documents reviewed, including the *2010 Draft Nassau County Master Plan* (2010)³⁹ and the *Cleaner Greener Long Island Regional Sustainability Plan* (2013),⁴⁰ favored investment in energy efficiency and conservation, renewable energy sources, and distributed energy generation strategies to reduce greenhouse gas emissions, improve air quality, increase energy independence, and reduce ratepayer costs. Freeport Electric is a leader in providing reliable and affordable electricity and continues to explore ways to reduce costs, increase resiliency, and identify more sustainable forms of energy.
- **Housing:** The Village of Freeport has a broad range of housing types, from single-family to multifamily homes and from stand-alone to mixed use, multi-story developments – a diversity that separates Freeport's housing stock from much of the rest of Nassau County. Much of the building stock in Freeport is over 50 years old. Before Superstorm Sandy, unstable home prices and a reduction in lending due to the Great Recession, as well as increasing property tax levels, limited



Transportation infrastructure has been the subject of many regional studies (source: Arup)



Multifamily housing in Freeport (source: Arup)

the stock of housing available for the young and aging population, low-income residents, and those displaced by previous storms. Several plans, including the *Building a Better Freeport* (2010),⁴¹ *2010 Draft Nassau County Master Plan* (2010),⁴² the *Nassau County Consolidated Plan* (2010),⁴³ the *Sustainable Strategies for LI 2035* (2010),⁴⁴ the *New Vision for the Long Island Economy* (2011),⁴⁵ the *Long Island 2035 Visioning Initiative* (2009),⁴⁶ the *Cleaner Greener Long Island Regional Sustainability Plan* (2013),⁴⁷ the *Strong Island* (2013) report,⁴⁸ and the *Nassau County Infill Redevelopment Study* (2013),⁴⁹ have recommended an increase in smaller, affordable housing and rental unit developments. These plans can complement efforts to increase resilient housing by creating housing opportunities outside of coastal flood risk areas. However, following the impacts of Superstorm Sandy, it is uncertain if home prices will remain at their current level due to increasing insurance costs that reflect the risk associated with living on the coast and in blighted areas where there are a number of abandoned or dilapidated houses.

- **Governance:** As described in the *Long Island 2035 Visioning Initiative* (2009)⁵⁰ and the *New Vision for the Long Island Economy* (2011),⁵¹ Long Island's mesh of municipal and administrative jurisdictions can reduce public sector efficiency and limit coordination, while creating an inconsistent regulatory landscape for residents and businesses. The Village of Freeport's governance structure streamlines many of these issues and does not have the same layers of complexity other areas in Nassau County.
- **Transit-Oriented Development:** The Village of Freeport has a vision for Transit-Oriented Development in downtown and along Main Street. The *Building a Better Freeport – The Master Plan for the North Main Street Corridor and Station Area for the Village of Freeport, NY* (2010)⁵² study focuses on TOD and makes recommendations for creating a walkable Main Street Corridor. The Master Plan recommends a link to the LIRR station area and downtown Freeport via the Main Street corridor to create a

walkable and transit-friendly area. By implementing recommendations, Freeport has the potential to become a regional leader in suburban redevelopment, begin to reverse the 40 years of economic decline it has experienced, and establish a new opportunities within the existing industrial and auto-oriented uses that are characteristic of the area. Recent developments in places such as Farmingdale and Glen Cove have incorporated transit-oriented development (TOD) and transit-supportive development (TSD) elements to preserve the quality of life for residents while allowing for future growth. Freeport has a TOD plan for its Downtown and recently approved the first project to emerge from that planning initiative. The proposed development includes retrofitting an abandoned bank building adjacent to the LIRR Freeport Station to provide apartment-style housing, hotel rooms, retail space, and public open space. The NYRCR Freeport Plan builds on Freeport's existing planning initiatives and adds support and momentum to the redefinition of the Downtown and LIRR station areas, with the goal of increasing economic development and housing opportunities in lower flood risk areas.

- **Equitable and Supportive Communities:** Regional plans, such as the *Long Island 2035 Visioning Initiative*, call for greater social equity in the communities of Long Island and recognize that more can be done for the growing numbers of socially vulnerable populations. Many of the calls for action in these reports are reflected in Freeport.

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

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

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

Document Name	Date Published	Author
Places to Grow – An Analysis of the Potential for Transit-Accessible Housing and Jobs in Long Island’s Downtowns and Station Areas	January 2010	Regional Plan Association
Progress and Promise – Building a Foundation for Long Island’s Future (Update)	September 2012	Long Island Regional Economic Development Council
Significant Coastal Fish and Wildlife Habitat Assessments Narrative	2008	New York State Department of State
South Shore Estuary Reserve Comprehensive Management Plan	2001	South Shore Estuary Reserve Council with assistance provided by New York State Department of State
South Shore Estuary Reserve Workplan Implementation- Estuary Public Use and Tourism Study	September 2010	Cashin Associates for Town of Oyster Bay, New York State Department of State
Strong Island – Recovery & Resurgence – Strategic Economic Development Plan for Nassau and Suffolk Counties (Update)	September 2013	Long Island Regional Economic Development Council
Sustainable Strategies for Long Island 2035	December 2010	Long Island Regional Planning Council
Village of Freeport Draft All Hazard Mitigation Plan	2012	Village of Freeport



Section II: Assessment of Risk and Needs

As part of developing the Freeport NY Rising Community Reconstruction (NYRCR) Plan, an inventory and risk assessment evaluated the vulnerability of Community Assets to future storm damage, specifically flooding, in the NYRCR Freeport Community (Community). The aim of the assessment process was to provide a quantitative risk analysis of Community Assets to supplement the qualitative information collected at NYRCR Planning Committee (Committee) Meetings and Public Engagement Events.

An additional assessment of needs and opportunities provides a basis for Community strategies and projects proposed in the NYRCR Freeport Plan. Many of the needs and opportunities addressed are a result of recent storm damage to the Community and consider the ongoing risk to Community Assets. This includes lost economic opportunities attributed to Superstorm Sandy and Hurricane Irene-related damages, opportunities for rebuilding or expanding the local economy, and opportunities for creating a more resilient future for the Community.

A. Description of Community Assets and Assessment of Risk

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

Asset Class Categories

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

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

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

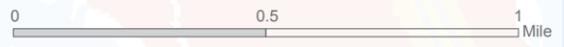
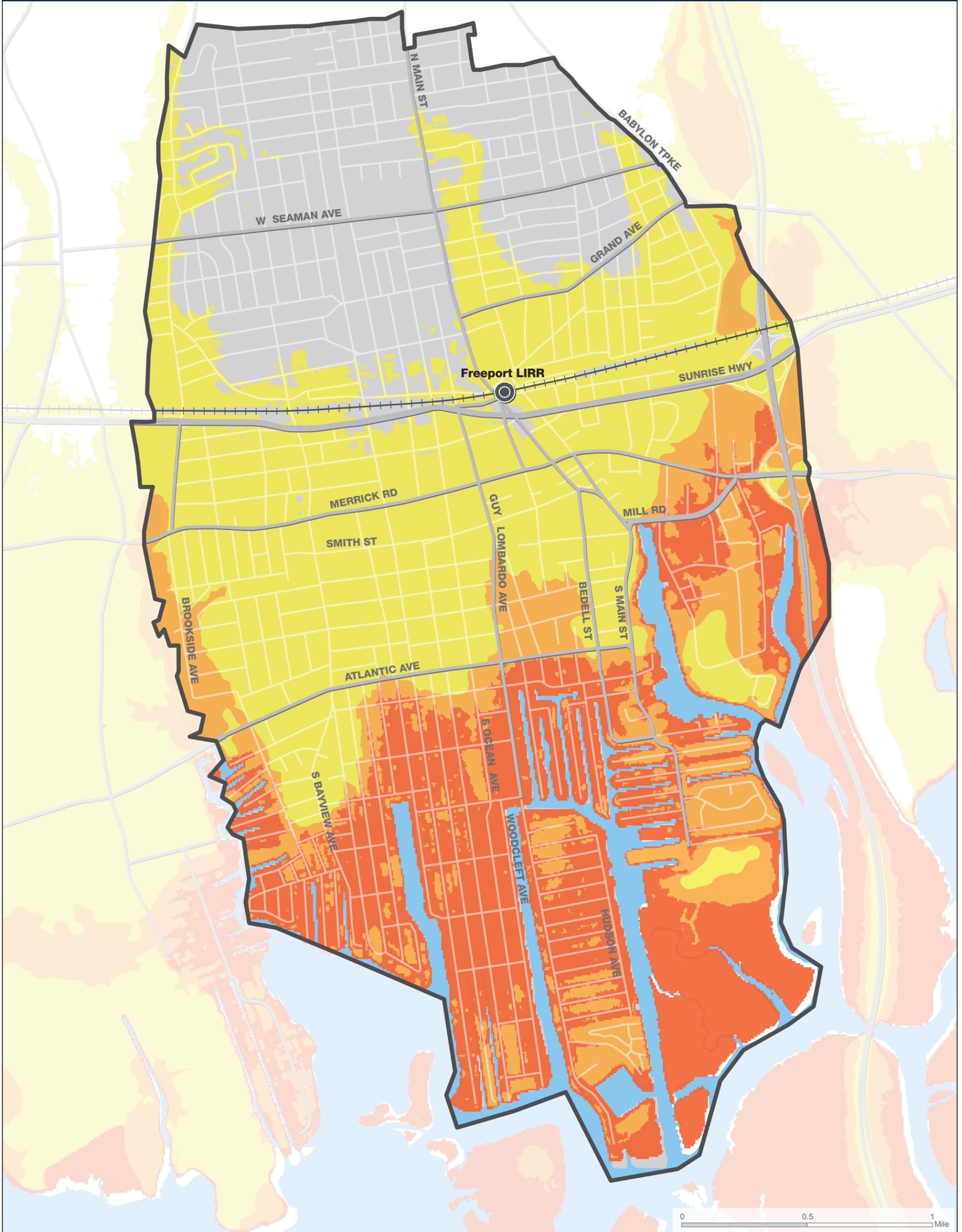
Infrastructure Systems: Includes pedestrian, bicycle, and vehicular ways, transit, bridges, airports, rail, ferries, gas stations, water distribution and supply, stormwater and wastewater systems, and solid waste and recycling services.

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

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

- **Extreme Risk Areas:** Areas currently at risk of frequent inundation, vulnerable to erosion in the next 40 years, or likely to be inundated in the future due to sea level rise. This includes FEMA designated Zone V Coastal High Hazard Areas (CHHA), areas subject to Shallow Coastal Flooding per the National Weather Service's (NWS) advisory threshold, areas prone to erosion or natural features susceptible to erosion, and areas subject to future sea level rise.
- **High Risk Areas:** Areas outside the Extreme Risk Area that are currently at frequent risk of inundation or at future risk from sea level rise. High Risk areas include geography within FEMA Zone V and Zone A Special Flood Hazard Areas (SFHA), also known as 1% annual risk (100-year) flood zones, and areas subject to future sea level rise.
- **Moderate Risk Areas:** Areas that are outside the Extreme and High Risk Areas but are currently at moderate risk of inundation from infrequent events or at risk in the future from sea level rise. This includes areas within 0.2% annual risk (500-year) flood zones and areas within NOAA's Sea, Lake and Overland Surges from Hurricanes (SLOSH) category 3 hurricane inundation zones.

Figure 03: New York State Department of State Risk Areas



Legend

- NYRCR Boundary
- Long Island Rail Road
- LIRR Station

New York Department of State Risk Areas

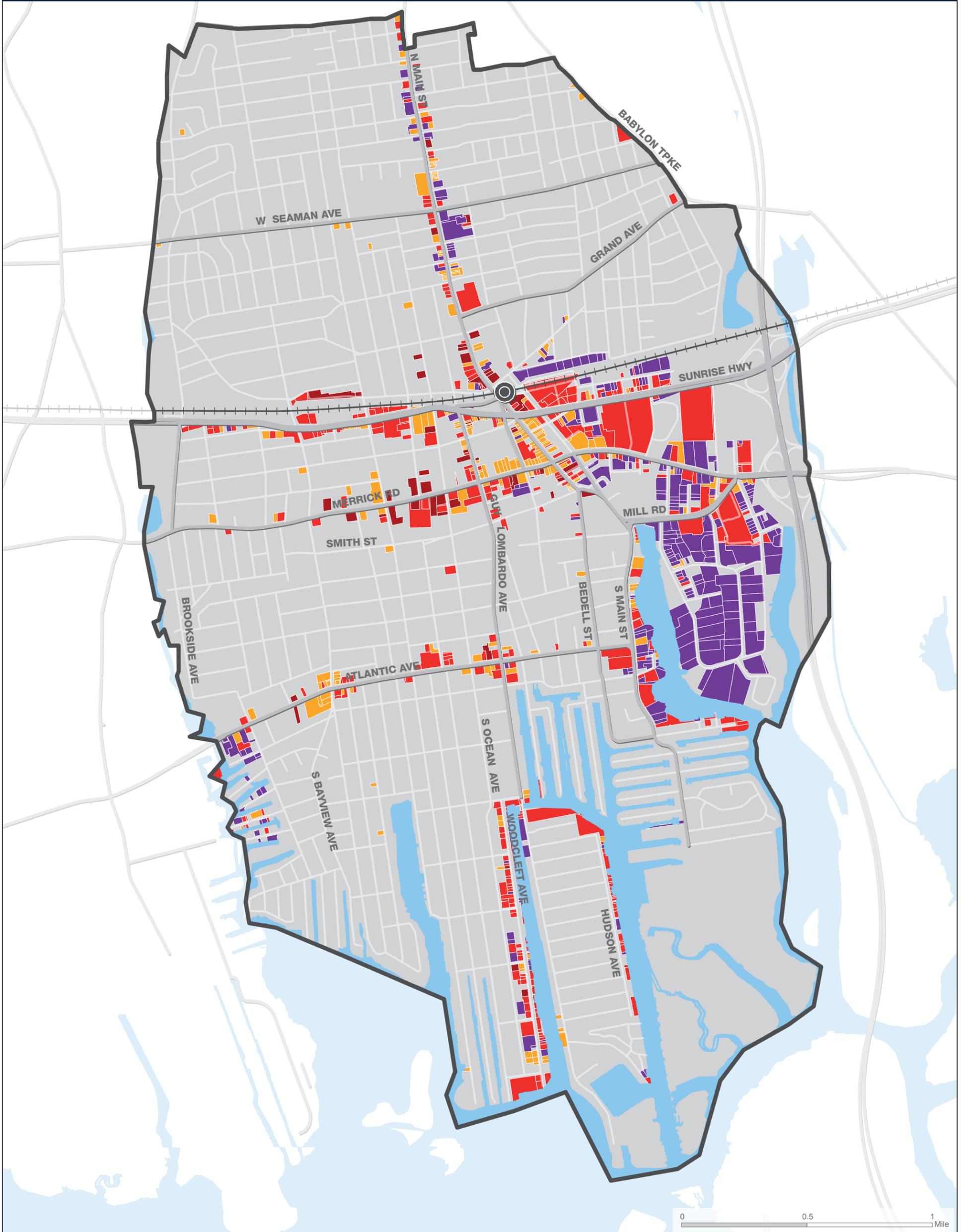
- Extreme
- High
- Moderate

Data Sources

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



Figure 04: Economic Land uses



Legend

- NYRCR Boundary
- Long Island Rail Road
- LIRR Station

Land Uses

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

Data Sources

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



i. Description of community assets

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

During the first two Public Engagement Events, residents were asked to annotate or amend asset maps organized in these asset classes. Further information about the public engagement process is located in Section V. Table 06 and Table 07 at the end of this section and identifies the number of assets in each asset class located in the extreme, high, and moderate risk zones.

Economic

The Nautical Mile, downtown Freeport, the Industrial Park, Sunrise Highway, and North Main Street represent the key nodes and corridors for economic activity in Freeport. The majority of commercial and industrial property value in Freeport (56.4%) is located in moderate risk zones, with 16.6% in high risk zones, 18.4% in extreme risk zones, and 8.5% located completely outside of hazard areas. Industrial land uses are most at risk, constituting over half the total assessed property value in extreme (25.6%) and high (26.7%) risk zones. The uses in these areas provide higher paying industrial-related jobs and offer a diverse range of employment choices. Some of the economic activities rely upon materials that present pollution risks and their proximity to water poses risks to business operation as well as the environment. During Superstorm Sandy, the 126-acre Freeport Industrial Park was unevenly inundated due to the Park's size and varied elevation. The Park has a high vacancy rate, which is primarily the result of international competition in the manufacturing sector. The vacancies, plus the vulnerability of the Industrial Park, made it a key focus for the Committee.

Retail uses are also vulnerable, with 15.6% in high risk zones and 18.5% in extreme risk zones. Similarly, less than 20% of the property values associated with office and mixed-use properties in particular

are within an extreme or high risk zones. Freeport's Nautical Mile is home to approximately twenty restaurants and clubs, as well as fish markets, small shops, an esplanade, parkland, and several marinas. The Nautical Mile was completely inundated by Superstorm Sandy and many of its businesses suffered severe damage from flooding and floating debris.

The Nautical Mile and Industrial Park were key areas of economic interest for the Planning Committee and thus were two of the main focus areas for intervention. While marinas represent a large portion of the Community's waterfront land use, they were not specifically identified as an area of interest by the NYRCR Freeport Committee or Community Members.

While a majority of businesses have reopened, a number of properties at the southern end of the Nautical Mile have been abandoned due to the extent of repair work needed, or the repeat damage experienced from Hurricane Irene and Superstorm Sandy. Three commercial properties on the Nautical Mile experienced significant damage from Superstorm Sandy, or repeat damage from Superstorm Sandy and Hurricane Irene, and either closed for a period of reconstruction or for good. In addition, Operation SPLASH, a critical Community Asset and the steward of Nassau County's waterways, operates out of a former marina building now owned by the Freeport Community Development Agency that sustained 4.5 feet of flooding during Superstorm Sandy, and 16 inches of flooding during Hurricane Irene.



South Main Street in Downtown Freeport (source: Joe Mabel)

Health and Social Services

Health and social service assets within the Community encompass both emergency and life-saving assets, such as police and fire stations, together with administrative assets, such as schools and government facilities, libraries, and community centers. Additionally, there are a number of senior care facilities and health-related offices, including a dialysis center. Only one of the Village's schools sits within the extreme or high risk areas – the Leo F. Giblyn School on Cedar Street. Freeport Memorial Library, along with the Village's Recreation Center and fire stations are located in the moderate flood risk zones.

Housing

At NYRCR Freeport Committee Meetings representatives from the Freeport Building Department explained that the Village of Freeport participates in the National Flood Insurance Program's Community Rating System, which incentivizes community floodplain management activities with discounted flood insurance premium rates.⁵³ The vast majority of housing is not constructed to modern building standards nor does it incorporate resilient designs that would allow them to survive with minimal damage during a hurricane or storm. One in every three housing units built in Freeport was constructed in the decades before World War II (1945). Most of the remaining two-thirds were built before 1980, when new



A residential neighborhood in Freeport (source: Arup)

development essentially stopped until 2005, when several new units were built. The Village of Freeport's building codes date back to the 1940s and the majority of the codes have not been amended since the 1970s.

The most common residential structure type in the Community is detached single-family housing, which represents 8,923 homes out of the Community's total of 14,589 units, or 61.2%. Freeport also has a significant proportion of residential dwellings in buildings of 20 units or more, comprising 3,360 apartments, or 23.0% of the Village's housing stock. Compared to neighboring communities, a larger share of Freeport's housing is multifamily buildings, but even so, single-family homes are almost three times as common. Homes located north of Sunrise Highway usually sit on larger parcels than those south of the Highway. Many houses on the southern edges of Freeport are located on canals with direct access and exposure to the bays.

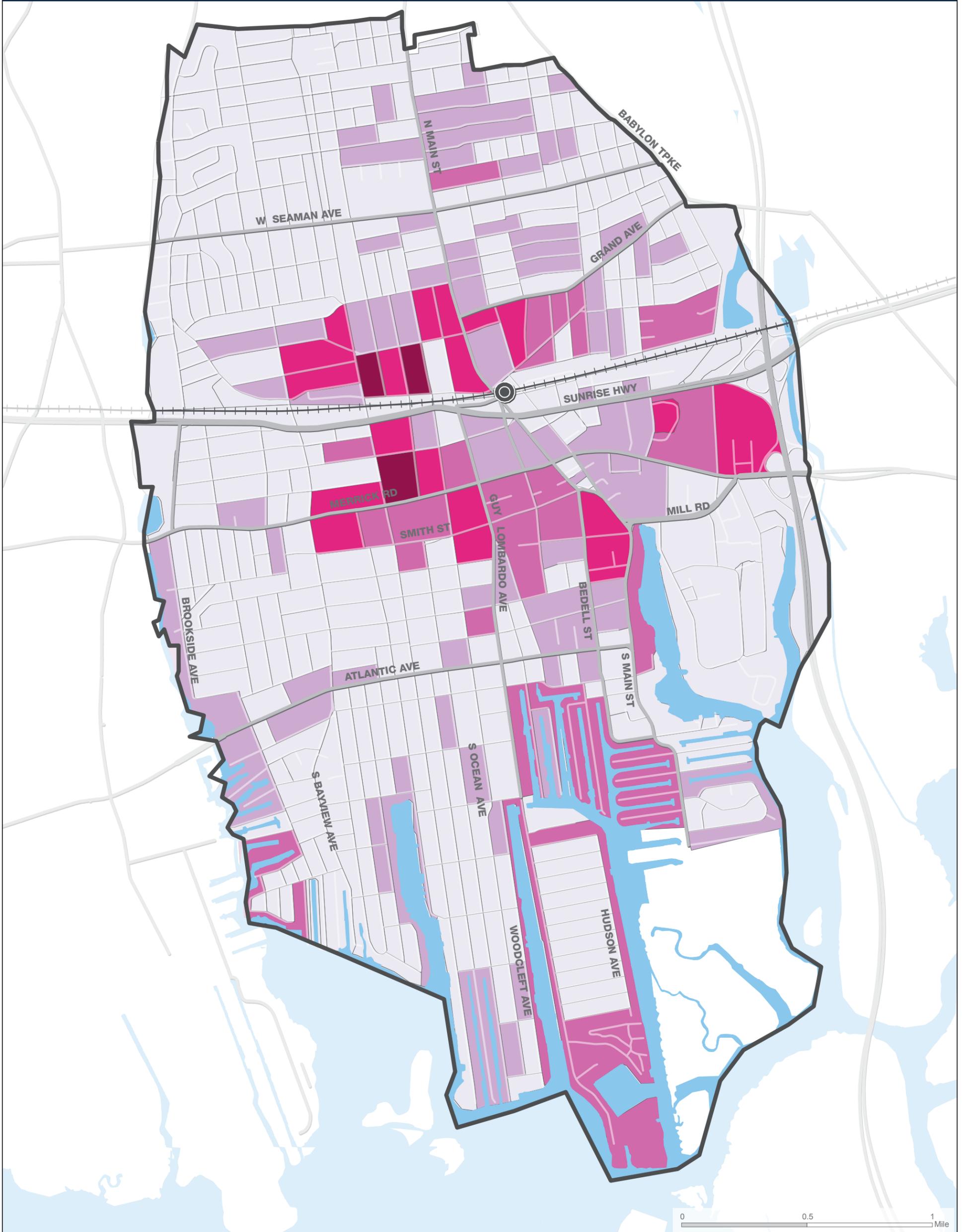
During the five-year period for which data is available, from 2007 to 2011, 13,840 households occupied Freeport's 14,589 units of housing, leaving 749 units, or 5.1% of the total, vacant. In Freeport, buyers can find single-family homes, condos, and co-ops, while rental apartments can be found in both multistory buildings and garden apartment developments.

In addition to damages sustained during Superstorm Sandy and Hurricane Irene, recent flooding events have brought regional attention to the number of housing units that are located in highly vulnerable areas. In Freeport, 2,596 housing units (18.7%) are located in extreme risk zones, 1,342 (9.7%) are located in the high risk zones, and 26.7% of all Freeport housing is located completely outside of risk areas.

The Village of Freeport Housing Authority's Moxie Rigby Apartments, a publicly owned apartment complex, is located in the high flood risk zone. It experienced significant damage in Superstorm Sandy and Hurricane Irene.

According to the U.S. Department of Housing and Urban Development (HUD), 4,003 houses were damaged in Freeport as a result of Superstorm Sandy. This represents over 27% of Freeport's total housing stock and almost 9% of all Superstorm Sandy-damaged

Figure 05: Rental Housing



Legend

- NYRCR Boundary
- Long Island Rail Road
- LIRR Station

US Census Blocks, 2010

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

Data Sources

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



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housing units in Nassau County. Nearly 88% of the homes damaged experienced heavy damage, defined as exceeding 50% of the pre-storm housing value. Damage was mostly caused by flooding, which exceeded 4 feet in 700 units, ranged between 1 and 4 feet in nearly 1,800 units, and was less than 1 foot in more than 500 other units.

As of July 2013, some 3,900 Freeport homeowners (approximately 45% of all homes in the Village) had registered claims with FEMA. From those claims, FEMA assessed total damages to owner-occupied housing at \$65.4 million and approved assistance to 2,750 property owners. Over 1,300 renters – or roughly 40% of all renters in Freeport – also filed claims. FEMA assessed an undisclosed amount of rental housing damage, and provided assistance to little more than half of those renters registered. The total amount of approved funds disbursed to Freeport residents by FEMA under the Individuals and Households Program (IHP) was \$24.1 million to homeowners and \$4.0 million to renters. As of September 2013 an additional \$39.1 million was lent to homeowners by the federal Small Business Association (SBA) disaster loan program. It is unknown, however, how much of these funds have been, or will be, received by Freeport property owners. It is also unknown what funds have been disbursed specifically to the Community from the NYS Homeownership Repair and Rebuilding Fund (HRRF), the Empire State Relief Fund, or the NY Rising Acquisition program to supplement FEMA aid. Aid to south shore communities amounted to \$2.9 million under HRRF and \$1.2 million under ESRF.

Infrastructure Systems

The key infrastructure assets that sit within the extreme and high risk zones are located on the site adjacent to the Industrial Park, including Freeport Electric's Power Plant II, Village of Freeport DPW buildings, garages and storage, and Town of Hempstead Department of Conservation and Waterways facilities. Elsewhere there are three sanitary sewer pump stations and a sewer lift station.

The Meadowbrook State Parkway, a County-designated evacuation route, runs through an extreme flood risk corridor and during both Superstorm Sandy

and Hurricane Irene the combined effects of coastal flooding and stormwater runoff obstructed access at the Merrick Road and Sunrise Highway on/off ramps.

Natural and cultural resources

Freeport's bay and tidal marshlands are important natural features that sustain plant and wildlife, while also offering attractive shoreline areas and recreational opportunity. The bay and tidal marshlands are important for their inherent natural resource and habitat values, while tidal wetlands provide coastal protection in addition to many other crucial ecosystem services – flood water retention and treatment of stormwater runoff and other non-point sources of water pollution. Marshlands also provide aesthetic values and air quality benefits.

Over the last 80 years, significant areas of coastal wetland were filled to create land for residential development. This infill has resulted in the degradation and loss of wetlands. Consequently, the Community's natural protection against storm events has been reduced.

The Community has a number of public parks, including the Village's Sea Breeze and John J. Randall Parks, located at the southern and northern ends of the Nautical Mile, and Waterfront Park. The Town of Hempstead's (Town) Guy Lombardo Marina and Nassau County's Cow Meadow Park are located on Hempstead's Middle Bay. These parks are located in extreme and high risk zones. The Community also has its own recreation center that contains an ice skating rink, swimming pools, indoor sporting facilities and multi-purpose rooms that are used to hold classes and courses in a variety of subject areas.

The Freeport Memorial Library is an important Community Asset that offers access to reading and educational materials. It also functions as a community center with meeting rooms and other facilities for groups and organizations to meet and conduct business. The Library is located in a moderate risk area and is easily accessible by car and public transportation. Along with the Historic Society, The Library is well known within the Community and both are important information clearinghouses.

Several nature preserves are located along ponds and tributaries, including the Milburn Creek corridor, which is shared with the Baldwin Community along the Village's western boundary, and the Meadowbrook State Parkway corridor, shared with the community of Merrick along the Village's eastern boundary. Both of these areas are extreme flood risk zones and these assets contribute to stormwater retention.

Table 03: Community assets located in risk areas

Asset Class	Asset Sub-Class	Moderate	High	Extreme
Health and Social	Assisted Living	8	0	0
	Community Center	2	0	0
	Day Care Facilities	37	8	5
	Emergency Services	10	1	0
	Government	15	3	2
	Hospital	1	0	0
	Library	1	0	0
	Other Medical	11	3	1
	Pharmacy	6	1	0
	School	18	1	0
	Veterinary	2	0	0
Natural and Cultural	Beach	1	0	1
	Cultural	2	1	0
	House of Worship	19	2	0
	Parks	4	2	2
	Recreation	4	2	3
	Wetlands (acres)	8	28	0
Infrastructure Systems	Power Facilities	2	0	0
	Rail Bridges	7	0	0
	Rail Stations	1	0	0
	Roads (miles)	47	11	26
	Road Bridges	2	2	0
	Sewer Pump/Treatment	0	0	3
	Transmission Cable	0	0	1
	Water Treatment Plants	2	0	0
Water Wells	7	3	0	

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

Asset Class	Asset Sub-Class	Moderate	High	Extreme
Housing	Low Density Residential	2,763	536	2,587
	Medium Density Residential	283	48	110
	High Density Residential	59	3	222
	Assisted Living	8	0	0
Economic	Commercial Parcels	138	9	162
	Industrial Parcels	68	23	92
	Mixed Use Parcels	93	11	46
	Retail Parcels	110	9	13
	Bank/ATM	16	1	0
	Industrial Facility	13	2	2
	Lodging	1	0	1
	Marina/Boat/Pier	2	7	16
	Office	2	0	1
	Post Office	1	0	0
	Restaurant/Food/Caterer	21	10	21
	Retail	63	17	18

Table 04: Summary of community assets located in risk areas

Asset Class	Moderate	High	Extreme	Total
Health and Social	111	17	8	136
Natural and Cultural (wetland acres)	30 (8)	7 (23)	6 (0)	43 (35)
Infrastructure (road miles)	21 (47)	5 (11)	4 (26)	29 (84)
Housing	3,113	587	2,919	6,619
Economic	528	89	372	989

Asset Inventory

As the Community has more than 6,000 at-risk assets, it was considered impractical to run a quantitative risk assessment for each one. For this reason, the inventory used for risk assessment was refined to consider key assets, identified using the critical asset criteria established by FEMA, or those which were highlighted through Committee feedback and Public Engagement Events.

Assets defined by the Committee include schools, pharmacies and medical centers, and cell towers. Critical assets defined by FEMA guidelines include buildings, infrastructure and facilities deemed essential to the health and welfare of the Community's population, and those assets whose protection is important during and following hazard events.⁵⁴ Key asset locations are identified in Figure 06. The complete key asset inventory is located in Section V.

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

- **High:** Assets that provide multiple important services or functions, which could not be easily and quickly replicated in whole or in part, or assets whose loss would impact both long and short term Community function.
- **Medium:** Assets whose function could be duplicated or replaced by similar assets in adjacent areas, or whose loss could be temporarily tolerated.
- **Low:** Assets that play an important role in the Community, but whose loss could be tolerated in the short to mid-term.

ii. Assessment of Risk to Assets and Systems

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

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

- **Hazards:** Hazard is a measure of the likelihood and magnitude of future storm events. Hazards are based on the aggregated risk maps used for the asset inventory and identification, which identify and rate geographic areas susceptible to future inundation or erosion. Risk areas are categorized as Extreme, High, or Moderate based on the frequency and magnitude of coastal threats.
- **Exposure:** Local topographic and shoreline conditions can increase or decrease the effect of hazards on assets. Exposure is the measure of this influence on potential storm impacts. The tool assesses landscape attributes, such as erosion rate, beach width, and the presence and condition of natural or engineered protective features, which will be considered when determining asset exposure.
- **Vulnerability:** Vulnerability is the level of impairment or consequences that assets may experience during and after a storm event. It is the measure of an asset's ability to resist damage. In context of vulnerable populations, it reflects the difficulty of evacuation or relocation relative to population size. Vulnerability will be determined by studying previous storm impacts and using local knowledge to develop an estimate of future effects.

The hazard and vulnerability scores for each asset were assessed based on guidance from the New York Department of State, combined with information from the risk assessment tool, and augmented with input from the NYRCR Freeport Planning Committee.

The risk assessment tool was also modified slightly to reflect the facts that the Community does not have significant beach-type coastal defenses and the tool's designated landscape attributes could not be applied to individual assets. More information on the New York State Risk Assessment Tool is contained in the *Guidance for New York Rising Community Reconstruction Plans: A Planning Toolkit for CR Planning Committees* (2013).

Risk scores help to identify Community assets with increased potential for storm damage and were used to develop and identify projects for the NYRCR Freeport Plan. It should be noted that Risk Scores include some subjective analysis and rely on previous experience to determine future risk. The Risk Score calculated for each key asset represents risk relative to other assets in the Community, and can range from 1.5 (negligible) to 75 (severe). Table 05 presents the condensed findings of the risk assessment, categorized by asset class. The location of at-risk assets and their respective risk scores is in Figure 07.

Through the Community Public Engagement Events, more than 60 key assets were identified, 29 of which were categorized as being at greater than high risk. Table 03 presents these assets, categorized by asset class. Where assets are not at significant flood risk, but are critical to the Community during emergency events (e.g., fire departments, Power Plant I, certain schools, the Freeport Library, and the Recreation Center), additional resilience measures should be considered, such as backup power generation.

Findings

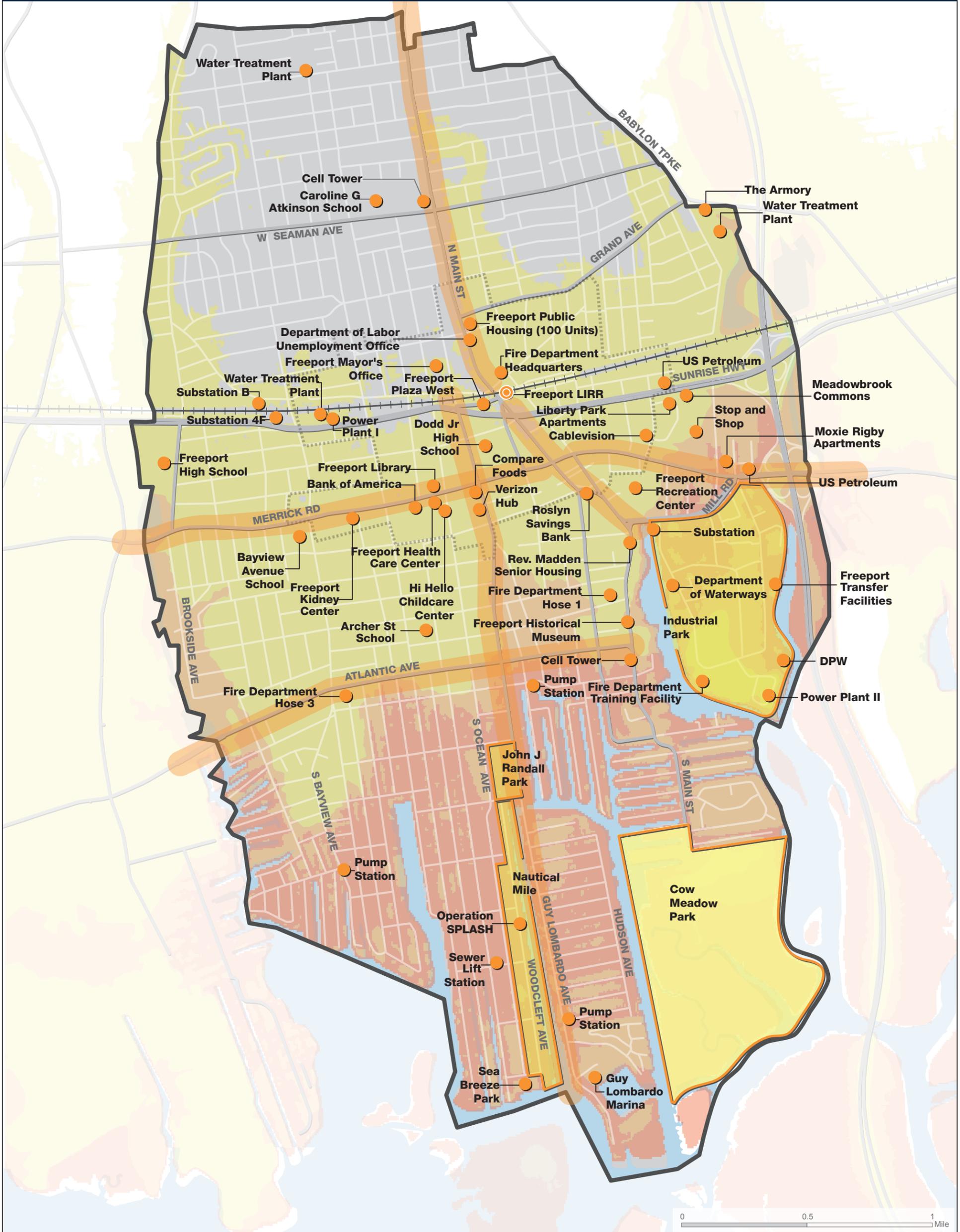
While initially developed on the water as a hub for fishing and maritime activities, today Freeport is home to more than 43,000 people who enjoy that same waterfront setting for commercial or recreational boating and other activities, such as dining, walking in the park, or observing nature, all of which make the Village a highly desirable place to live and work. As a result, the Village is densely populated. The dense development patterns, high number of assets in flood zones, and age of the building stock in the Village create risks for the range of Community assets of concern in this NYRCR Plan.

Flooding is a significant risk for much of the southern part of Freeport, especially south of Merrick Road. This is a situation that is exacerbated by the tributaries, canals, and variable elevations that characterize the area and put development at risk for flooding. Nearly 75% of the Village is in a moderate, high, or extreme risk flood zone. The Community has 4,000 assets in the high and extreme risk areas, most of which are housing structures, but also include assets such as the Industrial Park, Power Plant II, the Department of Public Works (DPW) headquarters and central garage, three sewer lift stations, the the Nautical Mile, Operation SPLASH, Sea Breeze Park, and Guy Lombardo Marina. Freeport is fortunate that the Downtown and area around the LIRR, where the Village hopes to grow, is in a moderate risk area. While the Industrial Park and Nautical Mile are both in high or extreme flood risk areas, their locations are fixed. The Nautical Mile location adjacent to the water is good for maritime related activities, local restaurants and bars, and essential for the mission of Operation SPLASH. In these areas, retrofit and redesign of buildings will help mitigate flooding, avoid property loss, and facilitate a faster return to operations. Design measures, guidelines, and application of flood-proofing techniques will help buildings in the area to become more resilient.

The Village's DPW facility is at a much lower elevation in comparison to Power Plant II, which sits adjacent to DPW. For this reason, while Power Plant II had minimal damage, DPW was significantly affected and out of operation for two months. Additionally, the roads towards DPW, through the Industrial Park, are in high or extreme flood risk areas, which further complicates matters. Even if the DPW could be protected from flooding, its accessibility would be compromised if the roads were impassable.

Freeport Electric and Community members both expressed concern about the cables crossing the Freeport Channel from Power Plant II and the subsequent vulnerability they face during flooding events. The risk comes from untethered debris or boats that move with floodwaters. The debris

Figure 06: Community Assets



Legend

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

New York Department of State Risk Areas

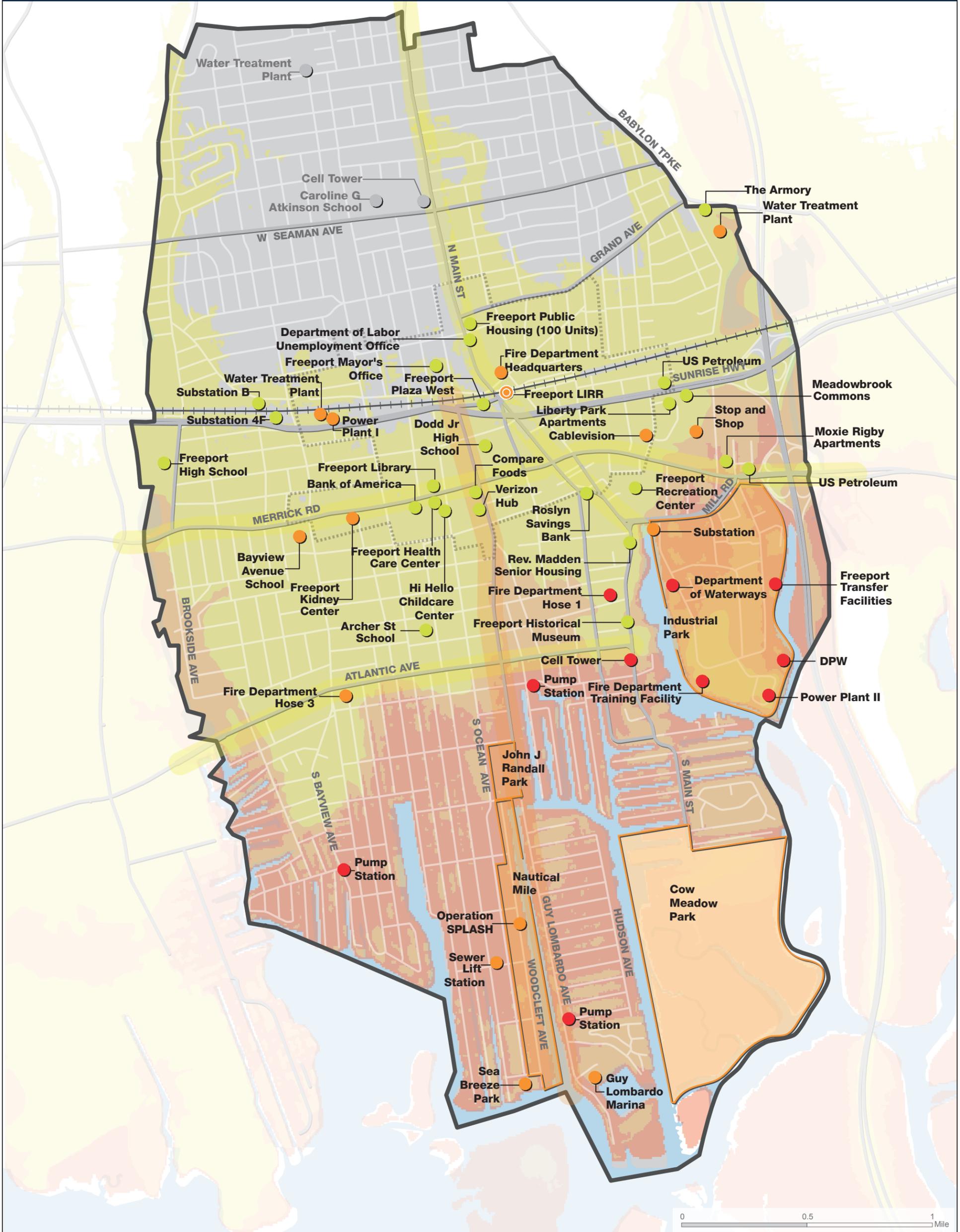
- Extreme
- High
- Moderate

Data Sources

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



Figure 07: Risk Assessment Map



Legend

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

New York Department of State Risk Areas

- Extreme
- High
- Moderate

Asset Risk Scores

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

Data Sources

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



has the potential of impacting and downing support structures for the cables that provide power to one-quarter of Community residents.

Cultural and natural resources are spread throughout the flood zone with Operation SPLASH, the Freeport Historical Society, and the Recreation Center in moderate to extreme flood zones.

Some of Freeport's prized parks and open spaces sit along the shore. Sea Breeze Park and Cow Meadow Park are both in extreme flood risk while John Randall Park, situated further away from the shoreline, sits within an extreme risk zone due to its elevation and adjacency to water.

Living on the shoreline is a part of the heritage and culture of Freeport. Community members understand the risks they face, but also share the hope that with the introduction of strategic infrastructure measures, along with studies of conditions to find other solutions and the introduction of additional resiliency measures, the lifestyle and heritage of Freeport can be maintained and improved.

Table 05: Key asset risk assessment

Asset Name	Risk Zone	Asset Class	Critical Facility	Community Value
Industrial park Inner Loop	High	Economic	No	Medium
Industrial park Outer Loop	Extreme	Economic	No	Medium
Nautical Mile	Extreme	Economic	No	High
Schooner	Extreme	Economic	No	Medium
Stop and Shop	Extreme	Economic	No	Low
Freeport Kidney Center	Moderate	Health and Social	Yes	High
Cablevision	Moderate	Infrastructure	Yes	Medium
Cell Tower - Ray St & S Main St	High	Infrastructure	Yes	High
Cell Tower - W Seaman & N Main St	Moderate	Infrastructure	Yes	High
Dept of Waterways	Extreme	Infrastructure	Yes	High
DPW	Extreme	Infrastructure	Yes	High
Fire Department 1	Moderate	Infrastructure	Yes	High
Fire Department 3	Moderate	Infrastructure	Yes	High
Fire Department Headquarters	Moderate	Infrastructure	Yes	High
Freeport Fire Department Training Facility	High	Infrastructure	Yes	Medium
Freeport LIRR	Moderate	Infrastructure	Yes	High
Freeport Transfer Facility	Extreme	Infrastructure	Yes	High
Guy Lombardo Ave	Extreme	Infrastructure	Yes	High
Guy Lombardo Marina	Extreme	Infrastructure	No	Medium
Operation SPLASH	Extreme	Infrastructure	Yes	High
Power Plant I	Moderate	Infrastructure	Yes	High
Power Plant II	Moderate	Infrastructure	Yes	High
Pump Station - Howard & Guy Lombardo	Extreme	Infrastructure	Yes	High
Pump Station - Ray & Sportsman Ave	Extreme	Infrastructure	Yes	High
Pump Station Meister & Stirling	Extreme	Infrastructure	Yes	High
Sewer Lift Station (Suffolk & Miller)	Extreme	Infrastructure	Yes	High

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

Asset Name	Risk Zone	Asset Class	Critical Facility	Community Value
Substation - Mill Rd & South Main St	Extreme	Infrastructure	Yes	High
Transmission Cable	Extreme	Infrastructure	Yes	High
WTP	Moderate	Infrastructure	Yes	Medium
WTP (Prince Ave)	Moderate	Infrastructure	Yes	Medium
WTP (Sunrise)	Moderate	Infrastructure	Yes	Medium
Cow Meadow park	Extreme	Natural and Cultural	No	Medium
John J Randall Park	Extreme	Natural and Cultural	No	Low
Sea Breeze Park	Extreme	Natural and Cultural	No	Medium

B. Assessment of Needs and Opportunities

Freeport once is a thriving seaport and vibrant cultural community, which in recent years has struggled in recent years with declining industries and associated job losses, high vacancy rates in retail and commercial uses, an aging infrastructure, and the challenges presented by frequent storm damage. Hurricane Irene and Superstorm Sandy have also brought to light the increasing obligation to prepare for, respond to, and learn from natural disasters. For many years, the Village has sought ways to strengthen its Downtown and Industrial Park, while preserving the treasured and often-visited Nautical Mile. In the late 1990s and early 2000s, Freeport participated in FEMA's national pilot program "Project Impact," elevating a number of homes and roads in flood-prone areas. This work mitigated, but did not eliminate, flood damage from the two major storms. The opportunity presented by this NYRCR Plan has refocused these efforts and given them new momentum.

Needs and opportunities were identified through a combination of research, analysis, site visits, workshops with peer communities elsewhere, NYRCR Planning Committee (Committee) feedback, and Community member feedback from Committee Meetings and Public Engagement Events. The plan of action embodied in this NYRCR Plan (i.e., strategies and projects) is designed to address needs and leverage opportunities.

These needs and opportunities are presented using FEMA's National Disaster Recovery Framework's Recovery Support Functions (Community Planning and Capacity Building, Economic Development, Health and Social Services Housing, Infrastructure, and Natural and Cultural Resources).

Recovery Support Functions

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

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

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

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

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

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

Natural and Cultural Resources: Addresses damage to natural and cultural resources, and the actions that should be taken to preserve, rehabilitate or restore these assets or services to their initial state. Natural systems also can provide offer significant environmental and commercial benefits such as stormwater management and recreational opportunities.

Community Planning and Capacity Building

Community planning and capacity building concerns Freeport’s ability to implement recovery actions, while planning for future storm events. It addresses the need for public education and preparedness, legislative and regulatory reform, and building code and land use regulations that reflect current vulnerabilities and recent storm experience.

Community Planning and Capacity Building Needs

Emergency communication and response issues were frequently brought up in Freeport Public Engagement Events. Although the local and county governments rely primarily on media outlets to disseminate evacuation zone information and shelter locations, Nassau County, the Town of Hempstead, and the Village of Freeport have established independent emergency notification systems to deliver information by email, phone, and text message to individuals in affected areas. These notification systems are based on publicly listed telephone numbers and require residents to register for text message or email updates.

In addition to these systems, the Village of Freeport disseminates information through ‘Code Red’ alerts, annual mailings, and educational sessions. Even with this program, many residents reported they were not aware of emergency evacuation routes and shelter locations within the Community, nor did they know how to secure their properties against damage prior to evacuation. Home and business owners did not, and still may not, understand the degree to which they are at risk from a disaster like Superstorm Sandy or Hurricane Irene, and may not take the appropriate measures to protect themselves and their property in future storm events. This is evidenced not only by stories shared at Public Engagement Events and at Committee Meetings, but also by how the rebuilding process was undertaken and what measures were or were not followed to ensure a home or business would be less flood prone in the future.

At the time of Superstorm Sandy, residents who did not adhere to the mandatory evacuation order experienced local access issues to major evacuation

Community Needs

Community Planning and Capacity Building

- Better education and awareness of emergency preparation and protocol;
- Better understanding of the dangers and severity of sea level rise, coastal surges, and hurricanes;
- Updated building code and planning system that supports resilient design and promotes/ enables housing in low risk areas;
- More Community locations to obtain warmth, information, communication, and resources following disasters;
- Updated Emergency Management Plan;
- Improved communication and enforcement of Mandatory Evacuation;
- Regulation to require security or replacement of heating oil tanks;
- Improved way finding and directional signage for post-disaster local travel; and,
- More frequent and improved communication between disaster recovery and response providers (Village, Town, County, and nonprofits).

routes, with many residents leaving their homes struggling to navigate darkened and flooded streets. Warming, charging, communicating, and showering centers in Freeport included the Freeport Memorial Library and Freeport Recreation Center.⁵⁵ The Freeport Recreation Center operated as a FEMA-designated Disaster Recovery Center (DRC) after Superstorm Sandy.

Regular public education and a more robust and unified emergency information system are needed to minimize losses from future storms. This includes dissemination of information and guidance for post-storm recovery resources and comfort.

Community Planning and Capacity Building Opportunities

The Village of Freeport responded quickly and in a coordinated manner, which was facilitated by the local control over its Office of Emergency Management (OEM) and OEM's integration with other municipal agencies. It was acknowledged by OEM Director that the Village was not fully prepared for Superstorm Sandy, however, no Community was.⁵⁶ Following the Superstorm Sandy, OEM continued its strong disaster planning by drafting Superstorm Sandy After Action (2013), a list of recommendations for the Village to undertake in order to be better prepared for future storms.

Community members are often the best resource for local emergency response and coordination, but are rarely used. For instance, Community members may be critical in accounting for missing neighbors or helping to navigate flooded homes. A program to facilitate communication between these residents and emergency responders could supplement existing outreach and coordination measures, facilitating faster recovery.

A more comprehensive public education program could help Community members identify the risks they face during a storm event as well as the benefits of appropriate mitigation measures. Education and outreach programs could include safety measures for property owners before, during, and after major storm events, as well as the circulation of maps containing risk zones and information on potential evacuation, resource, and recovery zones. These programs could also build neighborhood level capacity, enabling residents to help one another during storms, and providing a point of contact between communities and government officials.

Maintaining a more effective planning system year-round can also help mitigate the impact of disasters. It was noted that home heating oil tanks caused large spills and subsequent hazardous material cleanups, which redirected valuable recovery and cleanup resources.⁵⁷

Freeport has a number of Community assets, such as Freeport Memorial Library, Freeport Recreation Center, and several public schools, which could be adapted for emergency use. This entails designating

Community Opportunities

Community Planning and Capacity Building

- Leverage existing local communication and social connectivity to improve the sharing of resources and information between local residents, public services, and private entities during emergency events;
- Strengthen public education to teach residents and business owners about resilience, recovery, and emergency preparedness;
- Retrofit of Community assets for Community assistance, resource, and comfort provision; and,
- Expand capacity, building opportunity with local environmental and community benefit organizations by expanding their function to include coastal resilience education and awareness and create a regional comprehensive public education program to teach residents and business owners about resilience, recovery, and emergency preparedness.

these facilities as Community information and relief facilities and outfitting buildings with permanent generators, digital information signage, and a stock of emergency supplies. These facilities could also be used as a site for public outreach and education and a central location for resiliency-related information and services. The intention of these buildings would be to provide comfort and assistance during the immediate and extended recovery process. They are not intended to act as emergency evacuation or shelter locations.

Freeport has an existing asset that can be built upon to expand coastal resilience education and understanding. Operation SPLASH (Stop Polluting Littering and Save Harbors), a nonprofit guardian of the south shore bays, harbors, and estuaries, could expand its programs to offer classes and exhibits on the hazards of coastal living and emphasize resilient approaches designed to minimize risks and enhance the Community's ability to recover. The Operation

SPLASH facility could become a Long Island-wide center for capacity building and education, centered on coastal resilience.

Economic Development

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

Economic Development Needs

The economy of Freeport was fragile before Superstorm Sandy and the after effects of the storm caused further damage in some areas, while opening opportunity in others.

There is a widely held view on the Committee and expressed at Public Engagement Events that the Industrial Park is ready for reinvention and the downtown needs growth and development.

Small businesses have worked quickly to restore operations and recover revenue flows along the Nautical Mile, in the marinas, and in the Industrial Park. Some businesses owners, after being damaged during Hurricane Irene and Superstorm Sandy, decided reopening was not an option. On site visits and in discussions with local business owners, it was clear that in the rush to rebuild consideration for resiliency measures was lacking. Rebuilding and redevelopment plans with a focus on mitigation activities are necessary to protect Freeport's commercial and industrial sectors from future storm damage. These plans would address incentives for flood protection measures in new and existing properties, as well as development policies that promote growth outside of risk areas.

Retail, industrial, mixed-use, vacant commercial, and vacant industrial uses constitute 1,072 of Freeport's non-residential parcels. While these properties represent 10.1% of all parcels within the Community, they provide 30.2% of assessed land value and 26.3% of total assessed value.

Community Needs

Economic Development

- Redevelopment of the Industrial Park and downtown;
- Increased development in commercial areas to increase the tax base;
- Higher paying jobs and better workforce training for residents;
- Job readiness training for local workforce to ensure they are prepared to meet the demands of local businesses;
- Coordinated planning and development to manage vacancy and blight; and,
- Protection of economic zones and/or a transition of economic development to less vulnerable areas.

The majority of the local workforce commutes in to Freeport from elsewhere in the metropolitan area. Only one in every five Freeport jobs is held by a local resident (17.8%), with the single largest share of workers (18.1%) coming from New York City. At its recent peak in 2007, Freeport employed 14,475 workers, however employment has since steadily declined to 12,597 workers, a difference of 13.5%. Local jobs pay moderate wages and are dominated by retail, health care and social services, and educational services, followed by manufacturing, construction, and wholesale trade. More than half the workforce (53.1%) is employed in the lower-paying service sector. The trend of declining employment in higher paying fields needs to be addresses.

Economic Development Opportunities

The Industrial Park is a unique feature of the local economy and stakeholders within the Industrial Park and the Village expressed an interest in reconceiving the area. Members of the Committee met with leaders from the Brooklyn Navy Yard and learned about strategies to redevelop areas along waterfronts in industrial decline. Strategies like small or light industrial spaces, targeted outreach to potential companies, skills development in the local workforce, and

partnership with surrounding communities were ideas that resonated with the Committee. The Industrial Park was also highlighted at the NYRCR Governor's Convention in Albany.

The Nautical Mile also represents an additional opportunity for potential new architectural features and a resiliency center at Operation SPLASH. Outreach and education about resilient design and service programs to support the health of natural areas could generate more interest and foot traffic year-round as people come and go from Operation SPLASH and the resiliency center.

Downtown Freeport has benefitted from previous planning activities in recent years, primarily the North Main Street Corridor development project, "Building a Better Freeport." This plan included the incorporation of design guidelines and landscaping with transit-oriented residential and mixed-use development. The first downtown redevelopment project after the release of this plan is currently out for bid. The Freeport Plaza West parcel, the high-profile location of the former Freeport Bank and once the tallest building on Long Island, is attracting significant interest for mixed-use housing, hotel, office, and retail development.

In addition to Freeport's downtown core, commercial corridors extend west to east along Merrick Road and Sunrise Highway and north from the Freeport Long Island Rail Road (LIRR) station along North Main Street to the Roosevelt border. In these areas there is potential for redevelopment that could include a mix of uses, such as housing with ground floor retail, which could provide an opportunity for diversification of the tax base and housing options through compact development and without intruding into existing low-density residential areas.

The Brooklyn Navy Yard was cited as an example to be replicated in Freeport with a link to recovery and resiliency efforts. Linking existing or new manufacturing activities to regional education and economic development agendas will unlock new opportunity in the Village. Committee and Community members also hope a revitalized Nautical Mile and new development around the LIRR station will attract younger

Community Opportunities

Economic Development

- Leverage existing redevelopment around the Freeport LIRR station to expand and diversify the commercial tax base;
- Catalyze development on underutilized parcels in downtown Freeport;
- Redevelop of the Nautical Mile to increase resilience and promote walkability;
- Integrate resilient designs into businesses in vulnerable areas;
- Revitalize the Freeport Industrial Park to meet contemporary business needs, combined with resilience measures designed to protect the site and adjacent critical assets;
- Workforce development initiatives guided by Connect Long Island's Strategic Regional Implementation Plan;⁵⁸ and,
- Create an economic development authority to coordinate business needs with commercial assets within the Community.

residents who wish to live and work in vibrant, walkable, transit oriented districts, as well as the businesses that cater to them.

A comprehensive economic development strategy that links growth and development in job generating activity with workforce training would help strengthen the local economy, while also providing job opportunity for the young residents of the village. If the Brooklyn Navy Yard, the City of Hoboken, and the Glen Cove and Farmingdale redevelopment plans are benchmarks, a focus on job growth that links it to housing and development patterns to create walkable neighborhoods has the potential for greatest benefit.

Economic development work should be coordinated by a local authority capable of actively recruiting new businesses to Freeport's downtown core, Industrial Park, and maritime assets, such as the Nautical Mile. Any authority would have to be approved through existing channels and would be subject to review. Once approved, however, it could act as an economic development coordinator, working with local

business associations, the Village of Freeport, and the Town of Hempstead to streamline the permitting process and ensure that commercial properties of appropriate size are available to meet potential demand. The development authority could potentially acquire or hold land in the Industrial Park and work with private landlords to subdivide larger buildings into smaller spaces, which are currently in demand, and to acquire tenants. Additionally, the organization could work with Village engineers and external consultants to develop resilient design guidelines that would decrease vulnerability to future storm events in the Industrial Park and along the Nautical Mile.

Grant funding could be directed to local workforce investment boards to continue support for skills training for under-employed and unemployed residents. There is also an opportunity to integrate workforce readiness programs with local schools and job training facilities and to work with local businesses, such as those located in the Industrial Park, to facilitate job placement. Workforce development initiatives should be expanded to continue support for skills training for under- and unemployed residents and socially vulnerable populations throughout Freeport.

Health and Social Services

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

Health and Social Services Needs

There are important gaps in disaster response and recovery, especially as they relate to independently living elderly populations, low-income residents, non-English speaking residents, caregivers, developmentally disabled populations and their families, and young people.^{59 60} In the aftermath of Superstorm Sandy, senior and elderly populations, especially

Community Needs

Health and Social Services

- Improved access to health care and social support services, including home-care and/or food access services for independently living senior residents;
- Improved access to existing services and information by addressing the barriers to access, including language for some low-income populations;
- Expanded awareness about available health and social service resources and outreach programs, especially among underserved and storm-affected residents; and,
- Expanded investigation of post-storm health issues, including occupational hazards among construction and maintenance workers, as well as home-environment scans.

those living independently, have persistently unmet needs for accessing health and social services, homecare, food, and social support.^{61 62} Local organizations also reported that there are several barriers to accessing existing services, including loss of cars for some Superstorm Sandy-affected adults, as well as limited funding for in-home services.

Freeport has two divergent trends that create health and social service needs in the Community: the population of residents over age 65 is growing, as are younger households from minority populations. The average household size in Freeport is 3.2 people with up to 5.1 persons per household in the northeastern section of Freeport. Freeport's median household income is also approximately \$16,000 below the Nassau County average, as described in Building a Better Freeport (2010).⁶³

Storm-affected low-income residents already face unmet needs for health and social services. Freeport has a relatively high level of poverty (12.7%), and has a significant number of residents that are uninsured (16.8%). These residents may find evacuation and recovery from disasters more economically challenging. Additionally, language and cultural barriers, as well as citizenship or legal status, can prevent affected

Community Opportunities

Health and Social Services

- Promote community centers and places of worship for Community outreach and education campaigns, and as local disaster centers in emergency situations;
- Activate existing underutilized spaces for Community gathering and recreation to promote social connectedness; and,
- Increase programs to provide support and assistance to elderly residents, who live independently but need services to prevent deterioration and promote well being.

Community members from seeking support services. Finally, given development in the Community has historical been tailored towards car-dependent populations, transportation can be a barrier to accessing necessary services for low-income residents without access to a car.

Improved public outreach and education is necessary to ensure that the health and social service needs of Freeport are met. Many storm-affected residents are not aware of the resources available to them, despite the efforts of healthcare organizations to ensure effective outreach across all population groups. Sources of accurate information can be difficult to identify and may be not be updated regularly. Additionally, communication difficulties can potentially affect the quality of care residents receive, and a growing segment of residents do not speak fluent English, (45.8% of Freeport households do not speak English at home). Although public health information is distributed in multiple languages, the current lack of participation signifies that this information is not reaching its intended audience. In order to strengthen outreach, there is a need to develop stronger links with underserved communities through their existing social networks, including, but not limited, to spiritual communities. Many entities created service programs or expanded the reach and scope of their existing services, after Superstorm Sandy, yet some Community members still did not know what services were available or how to access them. It is

important to expand Community awareness and encourage Community members to obtain services, especially if the need may not be readily apparent. One such example of this is construction and maintenance workers with potentially higher likelihood of exposure to toxic substances related to Superstorm Sandy aftermath. The service organizations that were interviewed also indicated that there might be a need to screen individuals with Superstorm Sandy-related toxin exposure. This could include the need to screen for safe living environments, especially mold growth, given increased reports of cases of unsafe living environments, particularly among socially vulnerable populations.⁶⁴

Health and Social Services Opportunities

A key factor for building the resilience of health and social services is adaptive capacity. Adaptive capacity has been defined as “the ability of a population to adapt to an exposure/hazard, take advantage of opportunities that enhance resilience or decrease the impacts of exposure, and cope with the aftermath of exposure.”⁶⁵

Promoting health and social resilience moves beyond preventing illness and adverse health outcomes to focus on promoting health, community development, and equity for all residents. Freeport should make use of its existing public spaces, such as community centers, libraries, parishes, and schools, to foster activities that promote social interaction and education. These facilities can be used for Community outreach and education campaigns, and appropriate sites can be repurposed for use as information and resource centers. Outreach events should be provided in multiple languages, and hosted at community centers and places of worship to increase attendance and participation.

The organizations that were interviewed suggested that there is opportunity to strengthen social connectedness, as well as physical activity in senior populations through expanded senior-center programming. Social support programs to provide live and/or telephone contacts and safety checks to residents who live alone will be necessary to maintain the emotional and physical well-being of older Community members.

Housing

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

Housing Needs

As FEMA aid is directed primarily to owner-occupied properties, its estimates under represent housing damage because rental-housing stock is not reflected. Freeport contains both private and public multifamily housing, with a total of 4,590 rental units comprising 33.2% of the community's total housing stock. Of Freeport's renting population, 58% are low-income households.⁶⁶ Nearly 556 rental units are located in high and extreme risk zones, where inundation during Superstorm Sandy was highest. The 669 rental units that received FEMA aid for Superstorm Sandy recovery represented only 20% of Freeport's FEMA assisted housing stock.⁶⁷ It is not known how many affected households relocated temporarily to rental stock in Freeport, or left the community to stay elsewhere during reconstruction.

The Freeport Housing Authority is responsible for 351 low-income and senior apartments in five locations throughout the Village. Three of these sites sustained significant flood damage from Superstorm Sandy. More than \$207,000 was spent by the Authority to address the immediate repair needs of the Moxie Rigby Apartments, South Main, and 100 North Main Street facilities. Many of the systems replaced had also been damaged in previous disasters and the Housing Authority is currently seeking mitigation assistance to elevate and relocate major systems to avoid the potential costs of repair from future events.

In the year since Superstorm Sandy, the Freeport housing market has seen a sharp decline in asking prices, a rise in vacancies, an increase in housing foreclosures, and the demolition of 18 units due to storm damage. Although some houses have been repaired

Community Needs

Housing

- Mitigate existing housing in flood risk areas with an emphasis on multifamily and affordable developments;
- Plan for housing development in downtown and other areas of the Village away from flood zones;
- Link housing development with economic development activities;
- Existing and future residents need to fully understand the financial risks and limitations of private insurance and public assistance associated with coastal living;
- More rental units and better housing options for low- and moderate-income residents, as well as young adult and elderly populations are needed outside of flood risk areas; and,
- A diversified local economy is needed to reduce financial strains on property owners, especially those making housing repairs.

and others raised, many remain damaged and uninhabitable. These units pose a risk to the health and safety of residents and can negatively impact neighborhood property values. The Community's tax base has lost value and residents have lost equity in housing assets that, coupled with repair costs, have severely constrained their budgets. It is clear that with another storm event of Superstorm Sandy's magnitude, many homeowners would not have the resources to recover again.

Freeport's population is expected to grow slightly over the next five years, increasing by less than 1%.⁶⁸ An additional 125 households are anticipated, with the strongest growth among residents aged 55 and over. Gains are also expected in young adults aged 25 to 34 years. Despite its relatively large low-income population, Freeport's per capita income is expected to increase in current dollars from \$27,756 in 2013 to \$32,668 by 2018⁶⁹. Freeport's household and per capital income levels are notably lower than the surrounding hamlets in the Town of Hempstead. These trends reflect a continued need for mixed-income

housing and a need to provide housing choices for people of varying income levels and household types. This would be consistent with historical trends in development patterns and suggests that Committee and Community Members stated interest in the redevelopment of downtown aligns with the needs and market trends in the local Community.

Housing Opportunities

Freeport has opportunities to link housing development with economic development objectives in order to obtain multiple returns on investments in public infrastructure in certain areas of the Community where housing development can be joined with new retail and commercial spaces supported by more robust infrastructure systems. By offering housing opportunity in low risk areas that also respond to the diverse housing needs of the Community, people will have options to choose to leave areas that too are risky and live in areas where housing can safely be developed. This would allow residents to relocate away from risk, yet remain in the Community, without compromising their existing social networks and family relationships. Planning should primarily identify places within Freeport, like the downtown area, that can absorb new residential development. Further, by identifying areas for future resettlement, it is possible to develop a process for ecosystem restoration through acquisition, which can improve disaster resilience for lower-risk areas, improve ecological habitats, and enhance overall resilience and enjoyment of coastal living for Freeport residents.

As Freeport's population of seniors over 65 continues to increase and seniors chose to live in easier to maintain apartment options or facilities that offer senior support services, single-family homes will decrease. Prior to Superstorm Sandy, almost 900 households in extreme and high risk zones were headed by older Community members. The impact of Superstorm Sandy on these areas and the subsequent cost of recovery and repair not only weakened financial resources, the physical challenge of remaining and pursuing reconstruction also posed a potential health risk to aging residents. Increasingly, elderly households are moving to "continuing care" environments that combine healthcare-intensive amenities with community facilities in a clustered development.

Community Opportunities

Housing

- Existing redevelopment around the Freeport LIRR station could be leveraged to provide multifamily housing for low-income residents, displaced coastal residents, aging populations, and the young commuter workforce;
- Additional funding options for repair and reconstruction costs for housing not covered by public disaster funding or private insurance could be explored;
- Better education on coastal financial risks could be incorporated into existing education and outreach programs;
- Development of design guidelines to protect housing in flood zones;
- A modified incentivized housing acquisition program to acquire extreme and high risk properties for coastal buffer areas could be developed; and,
- Continuing care residential development for elderly residents, located outside of risk zones, and paired with incentivized relocation services could be developed.

A relocation program as outlined above could be coupled with incentives to develop diverse housing options in upland low risk areas.

Nassau County currently has a housing acquisition program and participates in the federal HOME Investment Partnerships Program (HOME) that enables municipalities to buy and/or rehabilitate homes to provide decent and affordable housing.⁷⁰ ⁷¹ However, the program could be amended to offer acquisition of housing at above pre-storm values for demolition of damaged structures and retention of land as a coastal buffer zone. An additional incentive to encourage the acquisition of clusters of contiguous properties could be included. These opportunities are likely to increase the flooding resilience of the Community, while providing recreational and tourism

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

Low-income renters may need to be relocated from storm-damaged apartments. There is an opportunity to build upon the existing proposal to develop Freeport Plaza West, adjacent to the LIRR Freeport station, which currently seeks to create 180 mixed-income apartments.⁷²

For those who chose to remain in existing residential areas along the water, incorporation of resilient designs can help reduce or eliminate potential damage threats. The Resiliency Education Center proposed in the Freeport NYRCR Plan can also be a clearinghouse of information and provide workshops to educate homeowners and building managers on how to protect themselves from risk or reduce risks during storm events.

Many rental units are occupied by low-income residents, an unknown share of which were likely impacted by Superstorm Sandy. Similar to the way the HOME program requires beneficiaries to be low- or moderate-income, priority could be given to acquiring or repairing buildings, relocating households, and assisting the owners of buildings where a disproportionate share of units are occupied by low-income residents.⁷³ If Low Income Housing Tax Credits (LIHTC) are used in the construction of multifamily buildings, a fixed percentage of units will be inclusionary or off-site in resilient housing for low-income occupants.

Infrastructure

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

Infrastructure needs

Flooding in Freeport is not limited to major storm events. It is a regular occurrence during heavy rainfall and/or high tide in many areas south of Merrick Road. Although drainage outflow check valves are installed on storm drain outfalls to mitigate backflow into the storm sewer system, the valves require additional maintenance to ensure they are working properly. A portion of the system, Milburn Creek, is under the jurisdiction of Nassau County and is not covered by Village maintenance work. The large area of impervious surfaces in Freeport prevents stormwater from infiltrating the ground naturally, creating the need for storm sewers to manage flooding. During heavy rainfall events, storm sewers are often overwhelmed, causing stormwater to accumulate and, ultimately, flood the area. These situations are exacerbated when trash and debris blocks stormwater from entering the system.

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

Although bulkheads are not designed for flood control, the condition of deteriorated or non-functional bulkheads exacerbates flooding issues in Freeport. Many bulkheads in the Village have exceeded their maximum lifespan and some older bulkheads are too low, allowing water to pass over them and cause damage to adjacent properties. Many of these older bulkheads have not been raised to current code requirements, causing significant erosion, property damage, and increased flood levels in Long Creek, Swift Creek, and the surrounding marshes. Height regulations are typically enforced when bulkheads are new or replaced, but uniform enforcement is needed to make bulkhead structures effective at mitigating flood and erosion effects in the future.

In 2003, the Village commenced a pilot program to assist property owners with the replacement of deteriorated bulkheads on private property, in compliance with the local code height requirement of seven feet above mean sea level. The Village's Engineering Department provides technical assistance for applicants and obtains the required permits from Federal, State, and local government departments. In addition, permit fees are waived. While bulkheads are a common coastal property application on the south shore, these structures are not flood control structures and can have negative long-term impacts on coastal environments and littoral systems. Improved education on various approaches to shoreline management, as well as emphasis on the importance of maintaining the resilience of natural systems, is needed.

Unmanaged trees around streets and power lines can damage energy and transportation infrastructure during major storms. Wind-damaged and felled power lines result in outages, and can create hazardous environments if still energized. Currently, only 4% of Freeport's power lines are underground. Customers in affected areas must wait for damaged assets to be identified and serviced before their power is restored, a process that typically takes up to several days. Likewise, streets can become blocked and impassable until municipal and/or private repair crews can clear the way. Road and utility rights-of-way in Freeport are owned and managed by a number of private and public entities across multiple jurisdictions. Identifying and contacting the party responsible for maintenance in a specific location is unnecessarily challenging and can substantially impede repair work.

Freeport Electric currently owns two power plants, totaling almost 90 Megawatts (MW) in capacity. The utility's Power Plants I and II use diesel generators, built in 1898 and 1895, respectively. The two diesel plants are likely only used when necessary to supply power under peak load conditions, typically hot summer days. The generators at both power plants are currently not equipped with black start capability, which would allow the plant to start generating electricity without external power. Without this, the time required to restart generators and restore power is increased. The newer generator at Power Plant II,

Community Needs

Infrastructure

- Improved coordination and understanding of roles between jurisdictions and government agencies is needed to ensure maintenance and repairs occur as needed;
- An investigation into low-lying streets and proper management techniques is needed;
- More permeable surfaces are needed to enable stormwater infiltration and reduce runoff in commercial and downtown areas;
- Improved oversight of the consistency and longevity of private bulkheads, and improved education on their ineffectiveness as a coastal protection measure are needed;
- The transportation system needs to be diversified to improve accessibility for socially vulnerable populations and improve post-storm accessibility; and,
- Upgraded electric infrastructure is needed to replace aged and vulnerable assets.

which came online in 2004, employs a gas turbine for generation. Based on 2012 reports, the plant has a capacity factor of less than 12% with a net generation of 47,423 MW hours in 2011, and alone is insufficient to meet the energy needs of the Community.⁷⁴ Because of this, a majority of power in Freeport is delivered to customers by external purchases from the statewide capacity market.

Power Plant II is highly vulnerable to coastal surges due to its location at the southern edge of the Industrial Park peninsula. Transmission lines run from Power Plant II underneath Freeport Channel, which is located in southeastern Freeport and sits between the western boundary of the Industrial Park and the eastern side of South Main Street. On the western side of Freeport Channel, the electric tie lines emerge from the sub-channel conduits in a boatyard right-of-way on Ray Street via one riser pole. Freeport Electric

staff, boatyard/marina operators, and Committee Members reported that un-tethered vessels and other floating debris struck elevated electric lines and their support structures during Superstorm Sandy. This is a key vulnerability during storm events for the Village of Freeport’s electric grid. The electrical lines located in the boatyard right-of-way on Ray Street were tripped by floating debris several times, resulting in an overload and delaying system restoration following Superstorm Sandy.

Infrastructure Opportunities

A coordinated roadway management plan can provide the structure for cooperation and accountability across transportation jurisdictions, allocating responsibilities between State, County, and municipal governments for maintenance and disaster recovery work. The plan could identify existing capabilities among public entities and establish priorities to best use shared resources in emergency situations. Information sharing protocols could reduce overlap and efficiency during regular operations by facilitating communication and reducing redundant work, ultimately lowering tax and ratepayer costs.

To ensure Freeport’s southern neighborhoods are accessible in storm conditions, critical roadways can be elevated to reduce the impact of flooding on mobility. Raised roadways and drainage improvements should be coordinated with local evacuation routes and prioritized for debris removal following emergency weather events. These routes should also be well-publicized to residents and be clearly marked, offering connection to community resources, such as safe parking areas, post-storm community assistance centers, and emergency shelters.

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

Community Opportunities

Infrastructure

- Existing regional examples for improved resiliency of commercial corridors could be leveraged;
- Further exploration into the raising of key roadways could be explored;
- Structured parking facilities to reduce impermeable surfaces and unlock valuable land for development can be built, with the added benefit of providing a safe location to store vehicles prior to storms; and,
- Resiliency measures can be incorporated into existing or planned street reconstruction projects to reduce disruption and expenses.

attract more customers by increasing visibility and access. There is an opportunity to study how commercial corridors could function better from a transportation, energy, lighting, and flood management perspective. This would entail developing “Green Street” guidelines, “Complete Street” guidelines, and recommendations for energy security. Merrick Road is an ideal candidate to study and implement pilot projects in Freeport.

Freeport Electric is in the process of developing plans to implement a microgrid system in Freeport’s downtown, which would include public assets, such as the Police Department and Village Halls, schools, recreation centers, and a number of private businesses. The utility’s Power Plant I would be retrofitted with a 16 MW dual fuel combustion turbine to replace the current diesel generator, and a minimum of four new underground circuits. A 150 kW solar array would be installed on the plant’s rooftop, with an additional 100 kW of solar on the roof of Power Plant II and a 1 MW wind turbine near the facility. Currently, there is a 50 kW solar array on the fire department headquarters roof. Four new 250 kW fuel cells are also planned for the Village’s main water pump house to supply backup power in the event of an outage.

Natural and Cultural Resources

Natural and cultural resource issues concern the impact of Superstorm Sandy on Freeport's natural systems and the services these systems provide. They address the need for the repair and restoration of both natural assets, such as dunes and tidal wetlands, and cultural amenities, such as public beaches and parkland. Additionally, these issues present opportunities to use natural systems to reduce vulnerability and foster increased Community resilience.

Natural and Cultural Resources Needs

Approximately 284 acres of tidal wetlands have been lost along Nassau County's south shore over the past five decades.⁷⁵ Increased development and infill, along with hardening and bulkheading of shorelines, have caused, and continue to cause, coastal wetland loss. The popularity of waterfront homes peaked after World War II, when hundreds of acres of marshland were filled and developed. However, Freeport is an older community and much of its waterfront wetlands were drained, dredged, and developed around the turn of the 20th Century. With the passage of the Water Quality Act of 1965, the Town of Hempstead stopped granting permits for shoreline development, but the damage had been done. Extensive building left little space for waterfront parks and public spaces and the loss of tidal wetlands left the Community without an important natural barrier against coastal flooding. The creation of the Sea Breeze Park in 2009, located on the southern end of the Nautical Mile, is a step in the right direction.

Waterfront development in the Industrial Park presents a significant risk to Freeport's natural resources. The Freeport Hazard Mitigation Plan identifies 189 US Environmental Protection Agency (EPA) regulated sites in Freeport, in addition to four hazardous waste sites. The four hazardous waste sites are located within the high and extreme risk zones. In the instance of coastal flooding, these sites can leach hazardous materials into the waterways and cause contamination of wildlife habitats.

These development patterns have also resulted in an increase of overland flooding, as the storm sewer system is unable to manage the increase in stormwater runoff from parking lots and roadways. Impervious

Community Needs

Natural and Cultural Resources

- Mitigation and cleanup of contaminated and hazardous waste sites;
- Protection of ecological systems, as well as restoration and reconstruction of streams, wetlands, and storm water basins;
- Increase wetlands and softer shorelines;
- Increase the quantity of pervious surfaces and infiltration areas to improve stormwater management; and,
- Monitoring of impacts of storm protection measures on ecological systems.

surfaces stop stormwater from infiltrating the ground naturally, preventing groundwater recharge. As stormwater runs over these surfaces, it collects pollutants, such as gasoline and motor oil and excess nutrients from fertilizers, before being channeled into sewers and eventually the bay. Regular cleaning and system maintenance is needed to keep storm drains free from trash and debris, which can cause storm water to back up and ultimately flood the landscape.

Natural and Cultural Resource Opportunities

Natural systems can provide soft solutions to storm management and can include restoration and expansion of wetlands, such as tidal marshes. It is estimated that an acre of wetland can store approximately 1 million gallons of water, equal to about three-quarters of a football field covered in three feet of water.⁷⁶ Vegetation in wetland areas helps to slow the speed of floodwater, resulting in lower flood heights and, ultimately, less flood damage.

Wetlands in coastal areas are especially important from a storm-protection perspective, as the flat coastal terrain leaves land and property exposed to hurricanes and other storm events. Coastal wetlands protect these assets from storm surge and provide a sustainable buffer against storm-generated wave action.⁷⁷ The EPA has stated that wetland preservation, along with other natural flood control measures, provides more effective and less costly flood

Community Opportunities

Natural and Cultural Resources

- Explore the potential to acquire damaged or vacant properties for flood mitigation, stormwater management and wildlife habitats;
- Increase awareness and education around the importance of natural systems for resilience through local community organizations;
- Explore storm protection measures that enhance, rather than degrade, the local ecological system; and,
- Explore opportunities to protect green space for stormwater management.

protection than engineered defenses.⁷⁸ Traditionally, bulkheads, rip-rap, or other engineered structures have been used to control coastal erosion and protect property from storm damage. However, these measures can potentially increase erosion in adjacent areas. Wave energy from boat wakes, wind, and storm events creates scouring in front of these structures, resulting in the loss of vegetated shallow areas to open water. Tidal marshland protection not only provides erosion control, it improves water quality, creates or restores habitat, and increases the aesthetic value of the property, typically at reduced cost to the landowner.⁷⁹

Restoration and protection measures should be pursued to further preserve and enhance the function of Freeport's natural and cultural resources. Seagrasses or submerged aquatic vegetation restoration is a relatively economic and environmentally beneficial way to improve water quality and stabilize sediment, while providing a buffer against wave and storm surge energy. Seagrass restoration entails either the transplant of adult shoots from existing meadows or the seeding of previously damaged seagrass beds. The Town of Hempstead Department of Conservation and Waterways is also currently studying the use of Mollusk bed restoration as a means of protecting shoreline areas from erosion. In addition to these measures, the use of green infrastructure presents an opportunity for Freeport to increase resilience while enhancing the Community's cultural resources.

Green Infrastructure approaches, which use engineered systems that mimic natural processes to infiltrate, evaporate, retain and reuse stormwater runoff, can be employed in areas like the Industrial Park to strengthen and protect the surrounding natural environment. This includes the use of stormwater ponds and constructed wetlands to contain and naturally treat runoff on a large scale, as well as localized installations, such as bioswales, that naturally filter sediment and pollutants from stormwater as it enters the ground. Materials like permeable paving can also be used to capture pollutants and improve runoff quality. These approaches can mitigate flood issues by diverting stormwater from Freeport's already overloaded storm sewers. Green Infrastructure can be implemented on public or vacant land or in areas that are subject to routine flooding. Additionally, smaller systems can be implemented on private properties to help contain stormwater on site and increase capacity of the public drainage system.



BAYVIEW HOSE
FIRE DEPARTMENT



Section III: Reconstruction and Resiliency Strategies

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

A strategy is a plan of action designed to achieve a major goal. Each strategy herein outlines the key considerations for implementation including project names and descriptions, cost, start and completion dates, and target areas. There are three reasons it is critical that the Community have a strong plan of action with a rapid implementation schedule at this time. First, there are areas in the Community still significantly degraded by Superstorm Sandy. Second, there is the potential for another significant storm event that could negatively impact the Community since many areas remain degraded and new preparedness, protection, and mitigation measures have not yet been fully instituted. Finally, the Community has the opportunity to jump-start the implementation of some of the projects proposed in this plan through the NYRCR Program.

A. Reconstruction and Resiliency Strategies

Understandably, resiliency in the face of storm events, changing weather patterns, and sea level rise is forefront in the minds of many Community members. Residents of Freeport are long familiar with the vicissitudes of living by the ocean and along bays and inlets but Freeport, like other coastal communities, must come to terms with stronger storm events and higher sea levels. Given the immediate needs of the Community, there is an emphasis in the NYRCR Plan on strategies that protect critical assets in the Village. A particular focus is on stormwater management and drainage improvements. Related projects seek to minimize flooding and flooding impacts, protect critical assets, and increase energy stability. There is also a focus on projects that presume and prepare for significant impacts from future storm events such as undertaking a public communication and education gap analysis, studying of potential Lifeline corridors, developing of Community Assistance Centers, and improving lighting and signage on key recovery corridors.

At the same time that the strategies address impacts of storm events, there are other economic, demographic, social, and built and natural environmental challenges and opportunities that this NYRCR Plan addresses. The project Modernize the Industrial Park Study will identify strategies to make the Industrial Park more resilient and modernize its facilities with the intent to attract new investment. The Business

Continuity Program will arm small business owners with tools and ideas to reduce the financial impact of future disruptions. Studying transit oriented development, parking and accessibility opportunities can unlock new, lower-risk, economic development potential, create housing for all types of Community members, and increase transportation options for moving about the Community. Developing neighborhood preservation guidelines will ensure that existing neighborhoods that experience flood damage regularly are not negatively impacted by house raising and other residential mitigation measures.

There are five Reconstruction and Resilience Strategies for the Community that include a total of 26 projects. The strategies are as follows:

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

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

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

Project Types

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

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

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

Invest in Resilience Enhancements for Critical Assets

Investing in resilience enhancements for critical community assets will help the Community withstand and recover quickly from future disaster events. Strengthening energy infrastructure throughout the Community will help ensure the reliable availability of power during future storm events. Developing monitoring and maintenance systems will help the Freeport Electric, Freeport Department of Public Works (DPW) and Freeport Office of Emergency Management (OEM) monitor and respond to issues and public safety concerns more quickly. It will also allow Freeport Electric to restore power with more confidence, when it appears safe to do so. This, in turn, will allow DPW and OEM to quickly respond to needs after a major weather event or other disaster. After Superstorm Sandy, it took approximately three days to fully restore the network after which individual residential and business needs could be addressed.⁸¹

Resilient design is another critical issue relevant to Community assets. The Village of Freeport is currently engaged in resilience upgrades to four of its sewer lift stations located in FEMA Special Flood Hazard Areas (SFHAs). The addition of permanent backup natural gas generators to these assets would ensure continued operation through prolonged power outages. The Freeport DPW is also located in a flood risk zone. Relocation or resilience enhancements for the DPW and other vulnerable Village-owned facilities should be assessed and implemented to enable safe and secure access in future storm or disaster events.

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

Project Name	Project Description	Cost Estimate	Category	Regional
Relocation Feasibility Analysis: Move Freeport Department of Public Works Away from Extreme Risk	Study opportunities to relocate DPW out of the SFHA while minimizing impact on existing neighborhoods - provide concept design for recommended solution and possible site acquisition.	\$3,000,000	Proposed	N
Freeport Electrical Cable Channel Crossing Improvements	The project would extend the buried portion of the cables beyond the boat yard to protect the lines from freed boats and debris during storm surges.	\$3,000,000	Proposed	N
Outage Management System	The system upgrade creates a web-based reporting and response system for outages or issues with essential services (power, water mains, gas). It would link directly to existing systems and enables asset protection before an event, incident mitigation during an event, and faster incident management and service restoration after an event.	\$265,000	Proposed	N
Protection for Freeport's Power Plant II: Phase I: Study, Design, and Proof of Concept	This project would seek to study protection options, design flood protection, and identify further funding from NYS and US grant programs to implement and construct the design. A proof of concept would be constructed along the most vulnerable portion of the site.	\$1,750,000	Proposed	N

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

Project Name	Project Description	Cost Estimate	Category	Regional
Downtown Microgrid Phase I: Financial and Engineering Feasibility Study	This project seeks to identify funding and financing methods for the development of the microgrid - including State and Federal grant programs, capital budgeting and contributions from benefitting private entities. In addition, it will explore preliminary engineering feasibility concepts for the development of the microgrid, examine costs and identify necessary construction.	\$750,000	Proposed	N
Downtown Microgrid Phase 2: Redundant Energy Supply at Power Plant I	This project would purchase a dual-fuel (diesel/natural gas) generator with black-start capability and replace an outdated diesel generator at Freeport Power Plant I.	\$5,000,000	Proposed	N
Backup Power for Sewer Lift Stations	This project seeks to install permanent backup natural gas generators at each of the Village of Freeport's three sewer lift stations located in a SFHA.	\$150,000	Proposed	N
Downtown Microgrid Phase 3: Redundant Distribution Surrounding Microgrid	Phase 3 of the Downtown Microgrid project involves the installation of four new underground circuits on the streets that border of the microgrid. These circuits increase redundancy and replace outdated circuits, while increasing capacity.	\$30,500,000	Featured	N
Protection for Freeport Electric's Power Plant II Phase 2: Construction	This project would seek to construct the recommended design of protection options from Phase 1 of the Protection for Freeport Electric's Power Plant II project. Further funding from NYS and US grant programs for construction is required.	\$10,000,000 - 20,000,000	Featured	N
Street Tree Maintenance and Guidelines	This project seeks to recommend policy changes to identify roads for tree trimming, maintenance and/or replacement with more resilient trees.	\$100,000	Featured	N
Downtown Microgrid Phase 4: Power Plant I and II, Recreation Center, North Freeport Pump Station	Phase 4 of the Downtown Microgrid project involves the installation of distributed renewable energy sources to diversify generation resources and add capacity and redundancy to the power supply.	N/A	Additional Resiliency Measure	N
Lifeline Corridor Implementation: Flood Valves	Establish a program to regularly inspect and maintain and replace flood valves located along identified Lifeline roads.	N/A	Additional Resiliency Measure	N
Lifeline Corridor Implementation: Underground Utilities	Use planned roadway improvements as an opportunity to bury overhead utility lines along identified Lifeline roads.	N/A	Additional Resiliency Measure	N

Establish Programs and Policies for Resilient Planning and Design

Resilient planning and design initiatives include programs and policies that support and incentivize resilient building and reconstruction. This strategy addresses the Recovery Support functions of Infrastructure, Housing, and Economic Development. As some of the projects for implementing this strategy will require coordination with the Town of Hempstead and Nassau County, they highlight the need for a regional approach to effectively solve issues shared between south shore communities.

Building codes and zoning should be revised to incorporate or amend regulations to support resilient building measures, and provide guidelines and models for future commercial and residential development. This includes exploring innovative techniques for flood mitigation design, and creating new opportunities for growth in areas outside of flood risk zones. These initiatives would not only increase community resilience, but also create a more robust and diversified local economy by attracting and retaining new businesses and residents.

Specific design issues must also be addressed with targeted policies for resilience. Many bulkheads on public land are in need of repair, and their deterioration puts the Community's open space and recreational areas at risk for flooding and erosion. The Village was allocated \$200,000 from the Regional Economic Development Council for bulkhead repairs at Waterfront Park, however, it is not sufficient to cover the extent of repair work.⁸² Fuel oil tanks also pose a threat to properties in flood risk areas. Regulations for residential fuel oil use and storage could prevent damage from spills and dislodged tanks, and can be coupled with incentives for converting to natural gas heating.

Table 07: Strategy: Establish Programs and Policies for Resilient Planning and Design

Project Name	Project Description	Cost Estimate	Category	Regional
Operation SPLASH: Resilience Education Center	This project seeks to fortify and protect Operation SPLASH with innovative flood protection design and infrastructure (two passive self-closing flood barriers, sewage back flow preventers and personnel door barriers). In addition, partnerships with Nassau County higher education institutions will be sought to raise awareness of climate related risks on the South Shore and promote environmental stewardship. Finally, surveillance cameras will be installed at high points along the coast and the video feeds will be displayed at Operation SPLASH as a scientific monitoring, community awareness, and educational tool.	\$1,100,000	Proposed	N
Convert Home Heating to Natural Gas in Extreme and High Risk Areas	This project will develop policy recommendations and an incentive program to convert home heating oil to natural gas in extreme and high risk areas. Temporary regulations to require proper anchoring of tanks in risk areas will be developed and incorporated. A deadline for all structures in extreme, high and moderate risk areas to convert to Natural Gas and/or other heat/hot water supply will be established.	\$50,000	Featured	N

Table 07 (cont'd): Strategy: Establish Programs and Policies for Resilient Planning and Design

Project Name	Project Description	Cost Estimate	Category	Regional
Public Bulkhead Repair	Publicly-owned bulkheads will be replaced at an appropriate height and with modern materials that are more resilient to erosion and wind. The reconstruction of the bulkheads will provide coastal protection in public areas, helping to maintain Freeport's open space and recreational areas. In addition, the bulkheads can reduce flooding impacts on local streets, helping to maintain access during and after flood events.	\$950,000	Featured	N
Regional Transit Oriented Development, Access and Parking Study	This study will identify opportunities to combine parking areas and develop structured parking facilities in key areas, and provide recommendations on their best use based on community need. Guidelines for the design of resilient, sustainable and aesthetically pleasing parking structures will be identified. This study will also develop a concept for local public transportation that connects Freeport's key business, retail and recreational areas.	\$500,000	Featured	N
Neighborhood Preservation Guidelines	This project seeks to undertake a planning study and make recommendations to revise Freeport zoning, planning and building code regulations for resilient design. The study will work with Freeport planning and building agencies to ensure that needs specific to the community's rebuilding efforts are not omitted or overlooked.	\$250,000	Featured	N
Develop a Strategic Adaptation Plan	Develop a plan to identify long-term retreat and resilience options for Freeport to protect future residents and businesses from more frequent and more intense storms.	N/A	Additional Resiliency Measure	N
Regional Energy Action Plan	This project proposes the development of an energy action plan using a collaborative, regional approach. The many stakeholders involved in energy generation, distribution, and use will be brought together to identify options for distributed generation, microgrids, and smart grid technology integration along the South Shore and in the broader Nassau County area.	\$200,000	Additional Resiliency Measure	Y

Improve Transportation and Communication Connectivity

Storm damage during Superstorm Sandy resulted in flooding, loss of power and an impaired communication and transportation system. Improved communication and access to resources is critical for building Community resilience. During and after the storm, Community members that did not adhere to the mandatory evacuation order had difficulty finding their way out of flooded neighborhoods and were left frustrated with the lack of recovery information. Many residents did not know where to go for help and how to get there. This strategy addresses the Recovery Support Functions of Community Planning and Capacity Building and Infrastructure with projects that address emergency preparedness and immediate recovery needs.

Community member access to information should be assessed to identify and address any communication deficiencies. The findings of this assessment should be used to guide the creation of a consolidated emergency information hub with real-time updates and Community involvement. Physical locations should also be established for Community members to find information and assistance. These Community Assistance Centers should function after emergencies to provide resources and relief to affected community members, and operate within existing Community assets such as the Freeport Library. At other times they can be used as public information and training sites, in addition to carrying out their normal Community functions.

Prolonged power outages after the storm left street lights and signals inoperable and made it difficult for residents to navigate their way to safety. Street light retrofits targeting key intersections will ensure that critical routes stay lit during power outages. Combined with wayfinding and destination signage, these upgrades should direct residents to the Community Assistance Centers, and to Nassau County evacuation routes and emergency shelters.

Table 08: Strategy: Improve Transportation and Communication Connectivity

Project Name	Project Description	Cost Estimate	Category	Regional
Community Assistance Centers	Community Assistance Centers are places for residents to gather information about emergency preparedness under normal conditions. During and after a storm, these centers would become a place to gather, collect and distribute resources, charge cell phones, access the internet/TV, and seek comfort. This project would install backup power generation, dynamic electronic notification and alert signage, and additional charging and wifi capacity at each center. In addition, a Local Disaster Recovery Manager would be hired for two years.	\$2,200,000	Proposed	N
Lifeline Corridor Study and Pilot Implementation: Merrick Road Corridor	Merrick Road is an important lifeline for many people, businesses and institutions. Due to the importance of the road, it is proposed that a study and subsequent pilot projects to improve its post-storm functionality take place. Based on the findings and results, the Lifeline Project could then be applied to additional streets that are critical at the neighborhood and community level. The study will identify best practices and develop design guidelines for resilient streetscapes and implement a pilot project.	\$300,000	Proposed	Y

Table 08 (cont'd): Strategy: Improve Transportation and Communication Connectivity

Project Name	Project Description	Cost Estimate	Category	Regional
Key Intersection Streetlight Retrofit Pilot Project	This project seeks to provide solar powered lighting with backup power leading to key intersections, to ensure these roads always stay lit in the event of a power outage and residents can follow these lit streets toward safer areas and critical resources. In addition to providing solar power and backup energy for street lights, traffic signals at each of these intersections will also be provided.	\$520,000	Featured	N
Key Intersection Signage	This project provides wayfinding and destination signage to guide people toward critical assets, assistance centers and information after storms and during power outages. This will enhance route clarity and orient residents toward streets that should be used after future emergencies.	\$60,000	Featured	N
Public Communication and Education Gap Analysis	This project would begin with a gap analysis to determine additional emergency community needs in the region. Findings would guide the creation of a central website with a community-driven communication component, and eventually include education and outreach activities.	\$20,000	Featured	Y
Raise Guy Lombardo Avenue and South Long Beach Avenue	Identify roads to raise based on highest risk of flooding, start with previously identified key roads from the Freeport Hazard Mitigation Plan.	N/A	Additional Resiliency Measure	N
Community Assistance Centers: Emergency Backup (Option 2)	Outfit proposed Community Assistance Centers with solar PV systems and battery storage to reduce energy costs and provide power during outages.	N/A	Additional Resiliency Measure	N
Advocate for Local Participation in the Citizen Preparedness Corps Training Program	Take advantage of existing training and capacity building programs in New York State to train Freeport residents to be first responders in their Community.	N/A	Additional Resiliency Measure	Y

Plan for Business Continuity and Growth

Business continuity and economic growth is a critical issue for the Community, which is home to diverse industrial, commercial, and retail businesses. While most business owners affected by Sandy were able to rebuild and resume operations, the loss of revenue and cost of repairs represented a significant financial loss. This strategy addresses the Economic Development Recovery Support Function through projects to increase the physical and operational resilience of Community businesses.

Freeport's Nautical Mile and Industrial Park are two major economic assets within the Community. The Nautical Mile is an important regional leisure destination, and the Nautical Mile Buoyant Architecture Project was developed to maintain this status while reducing the risk of flooding and damage. The Freeport Industrial Park is likewise an important component of the local and regional economy, and it is critical to the Community's future economic growth. It is suggested that a local development authority is created, in cooperation with the Nassau County Industrial Development Authority (IDA) and local business owners, to help transform the Park into a modern and resilient business center.

Table 09: Strategy: Plan for Business Continuity and Growth

Project Name	Project Description	Cost Estimate	Category	Regional
Nautical Mile Buoyant Architecture	This project will design and construct a buoyant building along the Nautical Mile to demonstrate the ability to economically and resiliently maintain a coastal economy. In addition to improving resilience of coastal structures, this allows buildings and neighborhoods the ability to maintain their character, retain access for elderly and disabled populations, prepare for sea level rise and in some cases reduce the cost of construction to comply with new building elevation requirements.	\$195,000	Proposed	N
Modernize the Industrial Park Study	This project seeks to outline implementation steps for the formation of a local nonprofit development authority that is committed to transforming the Industrial Park into a modern, environmentally conscious and resilient business center. The study will also propose design guidelines for safe, affordable and environmentally conscious light-industrial and commercial development. Short-term and long-term goals, strategies, actions and design concepts will be developed.	\$500,000	Proposed	N
Business Continuity Program	This program would help small businesses create their own business continuity plans, and provide a custom roadmap for businesses to continue operations under adverse conditions. This includes planning assistance and access to alternate spaces and facilities and grant assistance.	\$40,000	Proposed	Y

Table 9 (cont'd): Strategy: Plan for Business Continuity and Growth

Project Name	Project Description	Cost Estimate	Category	Regional
Enhance, Diversify, and Protect the Nautical Mile	Perform a study to investigate options to protect the Nautical Mile from storm surge, sea level rise, and coastal flooding. In addition, explore opportunities to transform the Nautical Mile into a year-round destination.	N/A	Additional Resiliency Measure	N
Freeport Library Digitization Center	Provide Freeport and surrounding communities with a place to scan and store important documents to prevent losses during flooding/fire events.	N/A	Additional Resiliency Measure	Y
Clean Energy Education and Apprentice Program	Apply for and utilize New York Energy Research and Development Authority (NYSERDA) funding to develop a clean energy education and apprentice program for high school students.	N/A	Additional Resiliency Measure	N

Improve Stormwater Management and Drainage Systems

Improvements to the Community’s stormwater management and drainage systems are critical to reduce future flooding from tidal and rainfall events. This strategy addresses the both the Infrastructure and Natural and Cultural Resources Recovery Support Functions by proposing a series of projects to assess current stormwater drainage systems and identify opportunities to implement green infrastructure or other stormwater management initiatives.

This strategy requires the modeling and analysis of the South Shore stormwater system, including a survey of stormwater drainage infrastructure. This study would help to identify problem areas and evaluate solutions for stormwater management, including management policies and capital projects. Specific projects have been proposed to address known problem locations. Homes and businesses along the Community’s canals and around East Meadow Pond and Freeport Creek experience frequent flooding, and can be used to site pilot projects for stormwater management improvements.

Table 10: Strategy: Improve Stormwater Management and Drainage Systems

Project Name	Project Description	Cost Estimate	Category	Regional
Meadowbrook Corridor Stormwater System Modeling, Analysis, and Pilot	This project would include the reconstruction of five stormwater outfalls currently entering Freeport Creek. And reconnecting the Creek with the natural floodplain. A floating wetland pilot and drainage study would also be conducted for East Meadow Pond to improve water quality and reduce future flooding. A daylighting study for Freeport Creek would examine the potential benefits of uncovering the current underground portion of the Creek.	\$650,000	Proposed	Y
Regional Stormwater Drainage Cleanout, Survey, and Verification	This project seeks to clean out all storm drains in the Freeport area. While they are being accessed, it is recommended that a comprehensive survey is conducted to document and verify all missing stormwater infrastructure from the local data inventory. The data collected will feed into the hydraulic and hydrologic model to analyze the current drainage system and identify critical drainage projects. This will include the implementation of green infrastructure projects and will quantify the benefits of green infrastructure solutions.	\$4,800,000	Featured	N
Green Infrastructure Plan	This Plan seeks to identify green infrastructure opportunities based on feasibility, level of impact, funding and street reconstruction schedules. Opportunities to manage stormwater on public and private properties will also be identified and recommended.	\$500,000	Featured	N

Table 10 (cont'd): Strategy: Improve Stormwater Management and Drainage Systems

Project Name	Project Description	Cost Estimate	Category	Regional
Green Infrastructure Plan Implementation: Main Street Improvements	This project builds on the existing "Building a Better Freeport" plan - which recommends street improvement projects along North Main Street. This project would operate in tandem with the proposed improvements, ensuring that any pedestrian improvements incorporate bioswales or open channel infiltration areas, to the extent possible. It also recommends reconstruction of areas along South Main Street that have been improved recently but missed opportunities to incorporate green infrastructure.	\$790,000	Featured	N
Green Infrastructure: JW Dodd Middle School Demonstration Installation (Option 1)	This option involves the installation of a green roof to detain rainwater and reduce runoff. Dodd School serves as an ideal location for a green infrastructure demonstration project due to its high profile location and ability to educate students on an emerging technology and employment generator. Green infrastructure here can also offer flood mitigation for a proposed Community Assistance Center.	N/A	Additional Resiliency Measure	N
Green Infrastructure: JW Dodd Middle School Pilot Installation (Option 2)	This option involves the installation of a of a retention pond on the school grounds to capture and store stormwater runoff. Dodd School serves as an ideal location for a green infrastructure demonstration project due to its high profile location and ability to educate students on an emerging technology and employment generator. Green infrastructure here can also offer flood mitigation for a proposed Community Assistance Center.	N/A	Additional Resiliency Measure	N
Lifeline Corridor Implementation: Stormwater System Upgrades	Install bioswales, permeable pavement and other stormwater system improvements during regular street maintenance and reconstruction projects along identified Lifeline roads.	N/A	Additional Resiliency Measure	N
Flood Diversion and Control	Strategically locate structural and natural drainage features to divert flood waters into designated catchment areas. Commission a study and determine overland flow patterns in flood-prone areas to identify locations for drainage and detention.	N/A	Additional Resiliency Measure	N

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Section IV: Implementation – Project Profiles

The New York Rising Community Reconstruction (NYRCR) Program has allocated to the NYRCR Freeport Planning Committee (Committee) up to \$17.8 million. 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 Freeport Plan (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 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, but that are not categorized as Proposed Projects or Featured Projects.

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

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

A full list of Proposed and Featured projects can be seen in Table 11 on the following page. Table 11 includes a “Key” column that references the project map in Figure 08, which provides the geographic location of projects included in the NYRCR Plan (note: project numbering is used for location purposes and does not indicate prioritization). Some projects are not included on the map as they cover a larger geographic area, or require additional analysis and study to determine the appropriate location. When possible, project locations will be specified in the individual project profiles.

Cost-Benefit Analysis

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

Because the NYRCR Program is a community-driven process, the CBA has focused on identifying project costs and benefits that easily relate to the Community. Committee and Community input – informed by a true understanding of local conditions, needs, and community values – plays a crucial role in the selection of projects to be implemented. With this in mind, the CBA has used a mix of both quantitative and qualitative factors in its analysis.

Project Costs

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

The cost of implementing a project is just one aspect of the justification for funding these Proposed Projects. Conversely, another important variable is the future costs of not implementing these Proposed Projects, which has the potential to negatively impact the long-term viability of both the Community and its neighboring south shore communities.

While these costs are more difficult to quantify, they are no less important to our analysis, and are therefore addressed qualitatively. These costs include:

- Extensive, repetitive damage to personal property, including vehicles and residences, and public infrastructure resulting from frequent recurring flooding and future storm events;
- Economic loss to residents and to local and regional employers as a result of the inability to work; and
- Hindrance in the provision of life safety and emergency services, resulting in repeated inability to access vast areas of the community.

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

Project Benefits

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

- **Risk Reduction:** The extent to which a project reduces the risk of damage to a Community Asset from a future storm event (discussed below under “Risk Reduction Analysis”).

- **Economic Resiliency:** The project's potential to help minimize economic costs and reduce the time it takes the local economy to rebound from a storm event. Economic data included, where applicable, an estimate of permanent jobs secured/added; relationship to, and/or furtherance of, Regional Economic Development Plan goals; potential for additional economic activity; and the net effect on local municipal expenditures.
- **Health, Social and Public Safety Services:** Qualitative information was provided on the overall population benefits of improved access to health and social service facilities and public safety services, type and size of socially vulnerable population secured, and degree to which essential health and social service facilities are able to provide services to a community during a future storm or weather event as a result of the project.
- **Environmental Protection:** Benefits include the protection of crucial environmental assets or high-priority habitat, threatened and endangered species, migration or habitat connectivity; any clean-up resulting from the action; and creation of open space or a new recreational asset.

or scenarios (e.g., different levels of projected sea level rise). A risk reduction score is then assigned to each project scenario. This helps communities and decision-makers understand the potential environmental, social, and economic outcomes associated with each scenario.

Risk Reduction Analysis

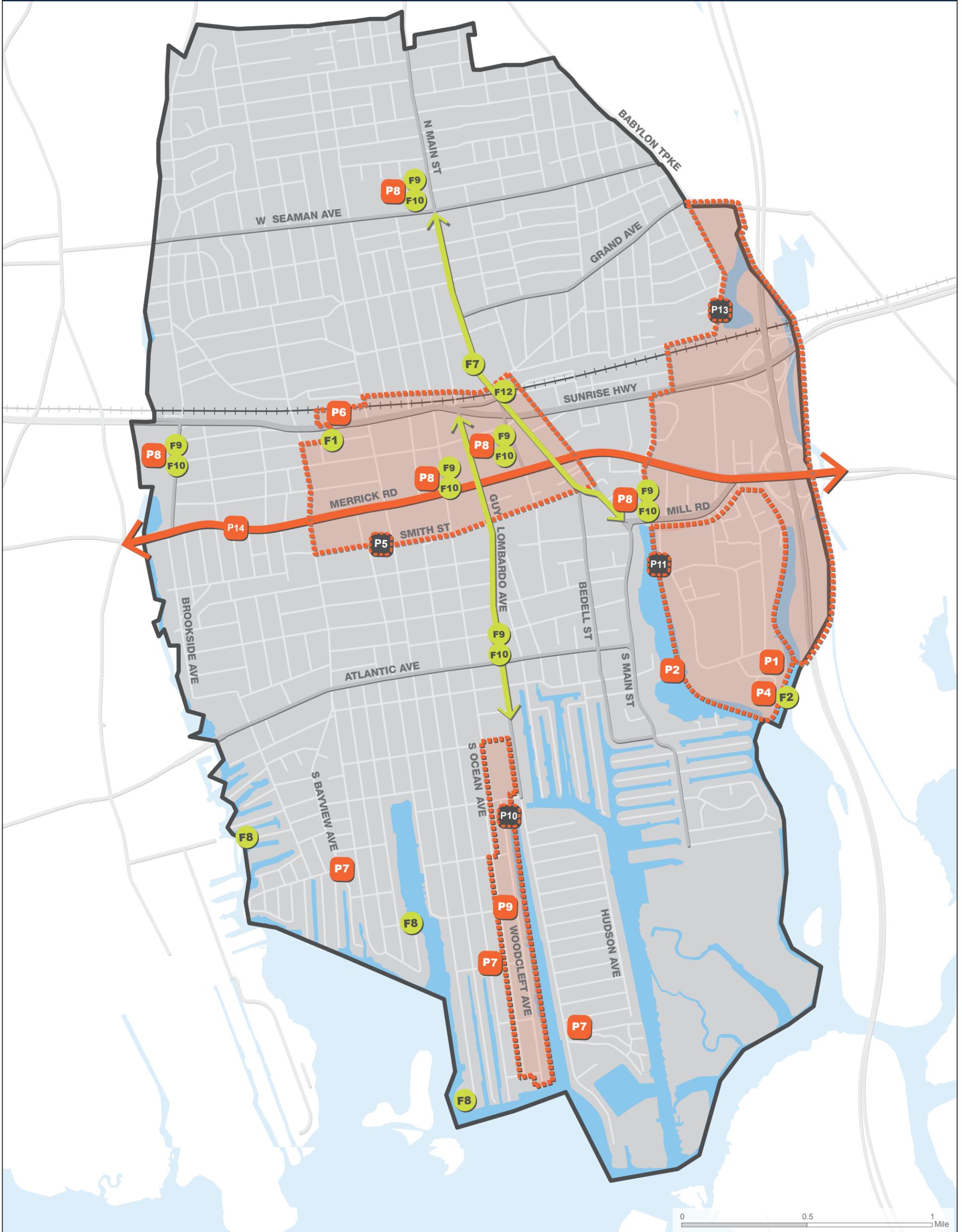
A Risk Reduction Analysis estimates the extent to which Proposed and Featured Projects will reduce storm damage (environmental, social, and economic) and flooding risk to specific Community Assets when the project is in place. (The extent to which a project reduced such risk is also considered as a benefit in the Cost Benefit Analysis – see “Project Benefits” above.) Risk “reduction” is different from the risk “assessment” in the previous section in a very important way – risk assessment looks at storm and flood risks to Community Assets before the project is implemented; risk reduction looks at the reduced risk after the project is in place.

The Risk Reduction Analysis uses a tool called “Scenario Planning.” Scenario Planning measures a project's potential to reduce risk under a variety/ range of potential future environmental conditions

Table 11: Project list and location key

Key	Category	Project Name	Notes
P1	Proposed	Relocation Feasibility Analysis: Move Freeport Department of Public Works Away From Extreme Risk	
P2	Proposed	Freeport Channel Crossing Electrical Improvements	
P3	Proposed	Outage Management System	Not shown, Community-wide
P4	Proposed	Protection for Freeport's Power Plant II, Phase 1: Study, Design, and Proof of Concept	
P5	Proposed	Downtown Microgrid Feasibility Study, Phase 1: Financial and Engineering Feasibility Study	
P6	Proposed	Downtown Microgrid Phase 2: Redundant Energy Supply at Power Plant I	
P7	Proposed	Backup Power for Sewer Lift Stations	
P8	Proposed	Proposed Project: Community Assistance Centers	
P9	Proposed	Operation SPLASH: Resilience Education Center	
P10	Proposed	Nautical Mile Buoyant Architecture	
P11	Proposed	Modernize the Freeport Industrial Park Study	
P12	Proposed	Business Continuity Program	Not shown, Community-wide
P13	Proposed	Meadowbrook Corridor Stormwater System Modeling, Analysis and Pilot	
P14	Proposed	Lifeline Corridor Study and Pilot Implementation: Merrick Road Corridor	
F1	Featured	Downtown Microgrid Phase 3: Redundant Distribution Surrounding Microgrid	
F2	Featured	Protection for Freeport Electric's Power Plant II, Phase 2: Construction	
F3	Featured	Convert Home Heating to Natural Gas in Extreme and High Risk Areas	Not shown, Community-wide
F4	Featured	Regional Stormwater Drainage Cleanout, Survey, and Verification	Not shown, location TBD
F5	Featured	Street Tree Maintenance and Guidelines	Not shown, Community-wide
F6	Featured	Green Infrastructure Plan	Not shown, Community-wide

Figure 08: Proposed and Featured Projects



Legend

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

Refer to Table 11 for Project list and location key

Data Sources

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



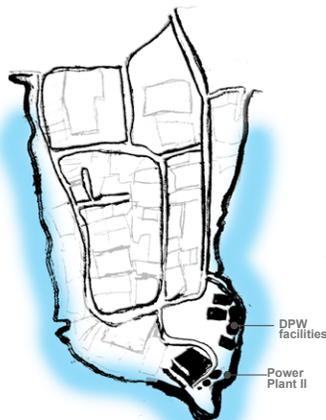
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Table 11 (cont'd): Project list and location key

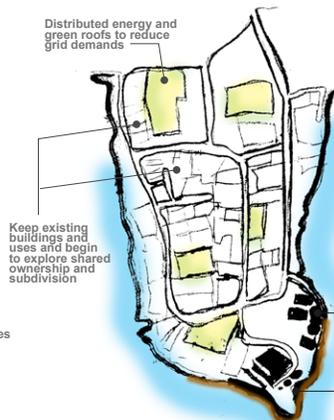
Key	Category	Project Name	Notes
F7	Featured	Green Infrastructure Plan Implementation - Main Street Improvements	
F8	Featured	Public Bulkhead Repair	
F9	Featured	Key Intersection: Streetlight Retrofit Pilot Project	
F10	Featured	Key Intersection Signage	
F11	Featured	Public Communication and Education Gap Analysis	Not shown, Community-wide
F12	Featured	Regional Transit-Oriented Development, Access, and Parking Study	
F13	Featured	Neighborhood Preservation Guidelines	Not shown, Community-wide

Proposed Project: Relocation Feasibility Analysis: Move Freeport Department of Public Works Away From Extreme Risk

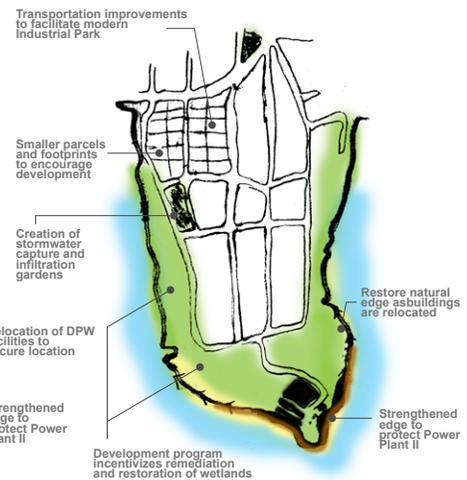
EXISTING INDUSTRIAL PARK



NEW DEVELOPMENT OPPORTUNITIES



RESTORE AND REDEFINE + GREEN PARKS



If the DPW is relocated from its existing location to an alternative site, options for reusing the existing site can be considered such as new, more resilient waterfront development or the introduction of waterfront parklands and open space (source: Arup)

The Village of Freeport's Department of Public Works (DPW) site is currently located at the southern edge of the Freeport Industrial Park peninsula, which falls entirely within a FEMA designated Special Flood Hazard Area (SFHA) and New York State Department of State (NYS DOS) identified extreme and high risk areas. The DPW provides a critical post-disaster Community function, deploying, operating, fueling, and repairing the Village's emergency response and cleanup vehicles and equipment. This proposed project will analyze the regulatory, financial, and engineering feasibility of relocating the DPW to another site within the Community that is farther from the waterfront and outside of high and extreme risk areas, enabling secure and safe access to DPW equipment and facilities during major storms and other disaster events.

This proposed project will ultimately recommend a new location for the DPW site and provide potential options for site layout and programming, building design and massing, resiliency and urban design. An accessibility plan will examine potential flood and traffic risks and recommend upgrades that may be needed to nearby infrastructure to maintain

continuous access to the site. Construction and relocation phasing will be examined to ensure operability can be maintained throughout the relocation process. The project will also provide a cost estimate for the relocation and reconstruction and will identify funding options for the proposal.

The Village of Freeport's fuel depot, located at the DPW site, is used to refuel police cars, fire trucks, heavy equipment, and other Village vehicles. The site also houses the Village's vehicle repair garage and provides storage for all of the storm recovery and emergency response equipment (e.g., chainsaws and pumps), much of which was destroyed by Superstorm Sandy. It is critical that the DPW's vehicles and heavy equipment can be ready to remove fallen trees, displaced boats, and other debris immediately after a storm to clear the way for police, fire, and utility personnel.

During Superstorm Sandy, flooding made access to the DPW's isolated location impassible. The basement of DPW's operations center was flooded and its telecommunications system was destroyed. Other buildings and the service garage sustained roughly four feet of flooding. Village of Freeport staff members



The DPW garage is responsible for the maintenance and repair of all Village-owned vehicles (source: Arup)



High water mark from Superstorm Sandy at DPW garage, approximately 4.5 ft. (source: Arup)

and emergency responders were unable to access response vehicles, fuel and equipment needed for recovery. Many of the buildings at the DPW site have sustained numerous incidents of flooding from previous storms. In total, damages, vehicle replacements, and repairs resulting from Superstorm Sandy and Hurricane Irene amounted to \$1.7 million. While mitigations such as flood-proofing buildings and garages would have some benefit, these strategies would not fully protect the DPW site or its accessibility. The Village acknowledges the vulnerability and risk associated with the current location and is opting for a more strategic approach that would limit the potential of recurring flood damages and offer long-term resilience for DPW and its equipment.

This proposed project will explore alternative sites for the relocation, including but not limited to groupings of vacant/underutilized sites along North Main Street or underutilized sites along the Long Island Rail Road (LIRR) corridor. The relocation site will need to accommodate DPW trucks, equipment, fuel storage/pumps and telecommunication systems. Approximately 160,000 square feet (3.7 acres) is needed for buildings, garages, storage, and fuel pump space. Potential construction, reconstruction, retrofitting, and rehabilitation of existing buildings on any proposed site may be required.

Although relocation of the DPW is important to the Community, the impacts and benefits of the move on each of the proposed locations will need to be

evaluated. This feasibility analysis will seek to identify opportunities to positively affect the surrounding community by considering building and site design, building orientation and materials, and landscape features.

Estimated Project Cost

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

Project Benefits

This proposed project supports the Recovery Support Functions of Health and Social Services and Infrastructure.

Risk Reduction & Resiliency Benefits

This project would begin the process of moving a number of critical disaster recovery assets out of extreme risk. As a result, flooding and subsequent public safety risk will be reduced to DPW's employees, buildings, vehicles, garage, fuel pumps and storage tanks, and equipment.

Economic Benefits

The reduced risk of flooding at the proposed DPW site would yield economic benefits through the reduced public expenditure on replacing flood damaged equipment and repairing flood damaged



Most of the DPW site sits significantly lower than the adjacent Power Plant II site (source: Arup)

buildings. The Community's businesses would also benefit from quicker response and cleanup so that they may resume operation more quickly following future disasters.

Health and Social Benefits

Once the DPW facility and equipment are fully moved, the entire Community population of more than 43,000 residents and 1,800 businesses will benefit from increased certainty and speed of response and recovery in a future disaster. In addition, emergency responders will be exposed to fewer dangerous scenarios when attempting to access vehicles and equipment in future disasters.

Environmental Benefits

As discussed, the relocation presents an opportunity to design a modern, energy efficient and flood resilient facility. Consequently, the implementation of the DPW move can result in improved air quality through reduced energy use, containment and reduction of stormwater, and decreased potential for fuel spills as a result of flood damage.

Cost-Benefit Analysis

In total, damages, vehicle replacements, and repairs resulting from Superstorm Sandy and Hurricane Irene amounted to \$1.7 million. By moving the DPW site out of a flood risk area, the risk of damage to

Village-owned property, equipment, and communications systems will be reduced. Moreover, improved access to critical public recovery services can reduce the indirect costs of loss of life or serious injury, private property damage and loss, and business interruption. As such, the benefits of this proposed project will outweigh the costs.

Risk Reduction Analysis

Relocation of the Village of Freeport DPW will result in reduced risk to DPW personnel, buildings, equipment, and response vehicles. Freeport's more than 43,000 residents and 1,800 businesses will also be exposed to less risk during and following future disasters. The Community's natural environment will experience less risk of pollution and contamination.

General Timeframe for Implementation

This proposed project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

Initial funding for this proposed project only covers the feasibility analysis and potential relocation, which will not require permitting.

Jurisdiction

The Village of Freeport has jurisdiction over Freeport DPW facilities.

Proposed Project: Freeport Channel Crossing Electrical Improvements



A artist's impression showing the removal of the riser poles and buried tie lines from the channel (source: Arup)

This proposed project will replace a submarine electrical cable crossing under Freeport Channel that is responsible for carrying 25% of Freeport Electric's utility load and serving 3,750 of its approximately 15,000 customers, many of which are located south of Atlantic Avenue in extreme and high risk zones. Freeport Channel is located in southeastern Freeport and sits between the western boundary of the Industrial Park and the eastern side of South Main Street. On the western side of Freeport Channel, the electric tie lines emerge from the sub-channel conduits in a boatyard right-of-way on Ray Street via a single riser pole.

The project will replace the existing conduits and tie lines that are buried below the Channel bed and which were originally installed in 1967. The improvements will extend the buried portion of the tie lines inland on the western side of the Channel. The project will remove seven existing riser poles and bury the tie lines from the channel, through the right-of-way (where they currently emerge) and terminate at



The existing condition where submarine cable crossing emerges in a private boat yard (source: Arup)



Loose boats struck riser poles and transmission lines during Superstorm Sandy (source: Dante Grover, High & Dry Boat Yard)

the intersection of Ray Street and South End Avenue. Four new riser poles will be installed at Ray Street/South End Avenue and Ray Street/Bedell Street to diversify the exit locations of the tie lines.

In addition to serving a quarter of Freeport's residential and commercial buildings, the electrical cable serves critical Community assets, including three flood sirens, two firehouses, two sewer pump stations, and two schools. It distributes power to the Nautical Mile, the heart of the Village's boating, fishing, tourism, nightlife, and recreational economy.

Freeport Electric, the Village of Freeport's power utility, owns and maintains power generation and distribution infrastructure throughout the Village. Freeport Electric serves a population of more than 43,000 people and is the largest of three municipal-owned electric utilities on Long Island (the others include Rockville Centre and Greenport Villages). The Utility's infrastructure in some areas is more vulnerable to damage from coastal inundation than others. The tie lines proposed for replacement in this project are vulnerable to damage and destruction from floating debris and untethered vessels during coastal surges and storms.

Freeport Electric staff, boatyard/marina operators, and Committee members reported that vessels that became untethered and other floating debris struck

elevated electric lines and their support structures during Superstorm Sandy. This is a key vulnerability during storm events for the Village of Freeport's electric grid. The electrical lines located in the boatyard right-of-way on Ray Street were tripped by floating debris several times, resulting in an overload and delaying system restoration following the storm. According to the 2013 Draft Freeport Hazard Mitigation Plan, fire was partly responsible for \$6 million in damage to vessels. Failure of this part of the distribution network presents a significant fire hazard to south Freeport in future storms.

Estimated Project Cost

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

Project Benefits

This proposed project supports the Recovery Support Functions of Economic Development, Health and Social Services, Infrastructure, and Natural and Cultural Resources.

Risk Reduction & Resiliency Benefits

The Community will benefit from reduced risk of power loss or interruption during or after future storm and flooding events. Subsequently health and safety risks to residents, businesses, emergency responders, and technicians will be reduced due to the reduced chance of electrocution or fire.

Economic Benefits

The electrical cable improvements will improve certainty and reliability of service for the businesses along the Nautical Mile and private boat storage facilities and marina operators in the area. Future costs of maintenance and disaster recovery by Freeport Electric may be reduced with the extension of the buried portion of the cables to points further from floodwaters and potential floating and fire hazards.

Health and Social Benefits

This proposed project will make Freeport Electric's south Freeport service area (primarily customers south of Atlantic Avenue) and approximately 3,750 customers more resistant against power outages

during future storm events. In addition, the whole of southern Freeport will be more protected from the advent of electrical fire, which is important in areas with large numbers of vessels as they catch fire quickly and the resulting fires are difficult to contain. The increased protection for the distribution network can increase the likelihood of a quicker recovery following future storms and disasters. The Community can benefit from emergency response resources and efforts that can be allocated elsewhere when needed. Residents of Freeport's coastal area may also benefit from the improvements due to the increased reliability of electricity service. In a post-disaster scenario, residents will be able to maintain or restore power to their homes quicker and move about the Community with a greater certainty of public safety, provided traffic signals and streetlights maintain power.

Environmental Benefits

Vessel fires that may result from a small electrical fire can spread quickly and cause widespread environmental impacts. If the possibility of these fires can be reduced, then the natural environment can benefit from reduced air pollution from burning fuel and toxic vessel finishes, as well as from reduced debris and fuel spills into waterways and wetlands.

Cost-Benefit Analysis

Superstorm Sandy heightened Freeport Electric's and the Community's awareness of the risk of electrocution and fire-related injury and damage during and after extreme weather events. It also reminded the Community of the vulnerable portions of Freeport Electric's distribution system. For a cost of approximately \$3 million, power distribution can be better protected for more than 10,000 residents and 450 businesses in Freeport. The benefits of less frequent power disruptions and lowered potential for electrical and vessel fires that can damage personal property and place human life and safety at risk justify the estimated project cost. In addition, future maintenance and disaster recovery costs for Freeport Electric may be reduced, creating an additional financial benefit for the utility and its ratepayers.

Risk Reduction Analysis

This project seeks to reduce the risk of damage to two of Freeport Electric's substations and a critical distribution network link across Freeport Channel by extending the buried portion of the transmission tie lines further west and inland from the Channel. This reduces risk and allows for greater resiliency and energy security by removing the tie lines from the vulnerable and hazardous boatyard area and by diversifying the exit locations of the lines further inland via four new riser poles. Diversifying the exit locations reduces the risk of total power failure should one of the poles be damaged or destroyed. This will reduce the chances that electricity will be interrupted to critical services including flood sirens, firehouses, sewer pump stations, and schools. The project will also reduce the risk of fire hazards and energy vulnerabilities for more than 10,000 residents and 450 businesses.

The project also reduces fire and damage risk to private boats and private properties due to downed lines and distribution equipment, increasing social and economic resilience in the process. The reduced risk of a boat fire in boatyards and marinas surrounding the project location will improve the chances of business continuity following a storm.

General Timeframe for Implementation

This proposed project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

This project may require permits and/or coordination with NYS Department of Environmental Conservation, NYS Department of State (NYS DOS), U.S. Army Corps of Engineers, and U.S. Coast Guard. NYS DOS Coastal Consistency approval may be required for any activity within the coastal zone.

Jurisdiction

The Village of Freeport and its power company Freeport Electric, the U.S. Department of Interior (including the U.S. Fish & Wildlife Service), and potentially the New York State Office of Parks, Recreation & Historic Preservation (SHPO) have jurisdiction over this project.

Proposed Project: Outage Management System

This proposed project will provide for the purchase and installation of an outage management system, a reporting and response system for outages or issues with essential utility services. Freeport Electric will be able to monitor electricity outages from a central location and shut off buildings or portions of the electric grid remotely to contain the scope of outages and enable quicker repairs. The System will consist of a software upgrade to Freeport Electric's existing customer information and geographic information systems. The project will also provide for training of staff using the system.

Freeport Electric, the Village of Freeport's power utility, owns and maintains power generation and distribution infrastructure throughout the Village. Currently, when an outage occurs, labor-intensive field verifications of the outage location must occur

prior to repairs and service restoration. Installation of an Outage Management System will enable system operators to monitor outages from a central command center.

Due to the absence of this technology in Freeport during Hurricane Irene and Superstorm Sandy when electrical network outages occurred across the Community, it was impossible to monitor the outages from a central location. According to comments received by the Committee and in Public Engagement Events, this forced Freeport Electric staff and emergency responders to conduct field verifications after the storms. Responders and technicians were put into risky situations and system restoration was delayed to customers in the service area.

Estimated Project Cost

The total estimated project cost is \$265,000.

Project Benefits

This proposed project supports the Recovery Support Functions of Economic Development, Health and Social Services, and Infrastructure.

Risk Reduction & Resiliency Benefits

Emergency responders, residents, and businesses benefit from a reduced risk of electrocution or exposure to electrical fire in the event of a future incident, malfunction or disaster. Residents throughout Freeport, especially socially vulnerable populations, benefit from reduced risk of communication loss and resultant social isolation. The use of the Outage Management System will increase the resiliency of the essential utilities serving Freeport by reducing and containing outages and reducing the chance of widespread disruptions.

Economic Benefits

By being able to safely and remotely isolate and power down portions of the service area, the lifespan of Freeport Electric's infrastructure can be extended. This translates to a cost-savings over the life of equipment, and a reduction in the number of labor-intensive field verifications required after an outage.



An Outage Management System would enable Freeport Electric to monitor conditions from the control room prior to sending technicians into potentially unsafe conditions.

In addition, better outage management will enable improved business continuity during and after future disasters.

Health and Social Benefits

Buildings and homes throughout the community will have a greater chance of retaining electricity and remaining habitable, reducing the need for immediate emergency response or shelter. Freeport Electric will be able to protect key assets before an anticipated event, manage incidents more efficiently during an event, and restore service more quickly after a storm or disruption. Responses will be more targeted and reduce the amount of time lost searching for damage. Freeport Electric technicians and emergency responders will be able to enter impacted areas and perform their duties with a greater level of certainty and security.

Cost-Benefit Analysis

Freeport Electric's disaster preparation, response and recovery following Superstorm Sandy were highlighted by Committee and Community members throughout the NYRCR Program. Nearly 98% of Freeport Electric's customers had their power restored within three days of the storm. However, lessons learned from the response and recovery from Superstorm Sandy displayed the high risk of electrocution technicians and emergency responders experienced due to the uncertainty to the extent of outages and status of circuit breakers. For a small investment, this proposed project will reduce chances of electrocution, minimize future infrastructure replacement costs, and minimize business interruptions by increasing the certainty and speed of Freeport Electric's future disaster and disruption response and recovery.

Risk Reduction Analysis

Implementing an outage management system will reduce health risks to emergency personnel by asserting better control of assets. By limiting the spread of outages, emergency response facilities will have a greater chance of remaining operational,

reducing risk to all of Freeport's more than 43,000 residents and 1,800 businesses through faster emergency response.

General Timeframe for Implementation

This project has the potential for implementation within 12 months of commencement, including purchase of equipment, installation, and training of Freeport Electric staff.

Regulatory Requirements Related to Project

There are no regulatory requirements needed to implement this proposed project.

Jurisdiction

The Village of Freeport and Freeport Electric are the entities with jurisdiction over this project area.

Proposed Project: Protection for Freeport's Power Plant II, Phase 1: Study, Design, and Proof of Concept



Resiliency measures for Freeport's Power Plant II can be combined with resiliency measures and ecosystem restoration (source: Arup)

This project will develop, analyze, and design flood protection options for either critical assets at the Plant or the entire power plant site depending on the results of the analysis of vulnerability. The preferred design will be constructed in a future phase. Recognizing the immediate need to protect the most vulnerable and hazardous portion of the Plant's site, the fuel storage tanks. This phase of the project will implement a proof of concept protective feature or implementation of a proven best-practice technique to monitor and demonstrate local appropriateness. Finally, the project will identify funding from NYS and Federal grant programs to implement and construct the design.

This project leverages other resiliency activities being taken by the Village to protect Power Plant II. A National Fish and Wildlife Foundation (NFWF) grant is currently being sought to restore the natural coastline and ecosystem immediately to the east of the plant,

which will also provide a layer of natural protection around Power Plant II. Should the NFWF grant be secured, the grant work will be coordinated with this proposed project to ensure the designed flood protection contemplated is compatible with and enhanced by the protection afforded by the natural system.

Freeport Electric, the Village of Freeport's power utility, owns and maintains power generation and distribution infrastructure throughout the Village. Power Plant II is one of two Freeport Electric's power plants and is the primary power generating facility for the more than 43,000 residents and 1,800 businesses in Freeport. It is capable of producing up to 87% of Freeport's total electrical power output.

Power Plant II is highly vulnerable to coastal surges due to its location at the southern edge of the Industrial Park peninsula. Though major damage was not sustained during Superstorm Sandy and



During Superstorm Sandy the fuel tank containment pool filled with water and shifted the tanks on their bases (source: Arup)



Despite being bolted down, the large volume of water from Superstorm Sandy's storm surge was able to move the tanks (source: Arup)

Hurricane Irene, many components of Power Plant II could be destroyed with the advent of a slightly larger storm surge, potentially creating floating hazards and fuel spills. According to the Freeport Electric Director and staff, who led a site visit with Committee members, State planning officials, and the Consultant Team, floodwaters reached the control center door and fuel tanks were shifted on their bases (despite being bolted down) by the large volume of water from Superstorm Sandy's surge.

Nearly 98% of Freeport Electric's customers had their power restored within three days of Superstorm Sandy. Because power was returned so quickly, many people from surrounding communities came to Freeport to use the Library and other public facilities to charge mobile phones, make calls, and access the internet.

The risk assessment presented in the 2013 Draft Freeport Hazard Mitigation Plan states that a Category three or four hurricane could damage or destroy all power generation equipment at the Plant, including generators, motors, transformers, and cooling towers, and could tear fuel storage tanks from their foundations, contaminating waterways and creating floating hazards in the process.

Estimated Project Cost

The total estimated project cost is \$1,750,000.

Project Benefits

The benefits of implementing a proof of concept around the fuel tanks can immediately benefit Freeport Electric, residents of southern Freeport and businesses in the Industrial Park and along the coast. This proposed project supports the Recovery Support Functions of Infrastructure, Health and Social Services, and Natural and Cultural Resources.

Risk Reduction & Resiliency Benefits

Freeport Electric reduces its risk of losing fuel, power generation potential, and sustaining damage to other portions of the site due to a potential floating hazard in future storms. Residents and businesses are at a reduced risk of sustaining loss of life, injury, and property damage from floating and contamination hazards.

Economic Benefits

Freeport Electric benefits economically by protecting key assets and reducing the potential foregone costs of replacing fuel, generation equipment, and repairing buildings. Depending on the protection measures selected, the designed full project could also offer protection for the adjacent Equus Freeport Power Plant, which supplies power to the Long Island Power Authority / Public Service Enterprise Group grid, as well as the broader Industrial Park peninsula,

which is a key local economic driver. By performing an analysis, design, and proof of concept phase first, Freeport Electric can develop a full protection system with greater confidence that it will perform adequately for future storms and floods, minimizing the potential for future expenses of retrofitting and rehabilitating the system.

Health and Social Benefits

By having a stable energy supply, emergency response facilities will have a greater chance of remaining operational, reducing risk to the population through faster emergency response. Buildings and homes throughout the Community will have a greater chance of retaining electricity and remaining habitable, reducing the need for immediate emergency response or shelter.

Environmental Benefits

The bays, marshes, wetlands, and wildlife will be better protected from contamination hazards in the event of a stronger storm surge dislodging one or more of the fuel tanks.

Cost-Benefit Analysis

By protecting the most vulnerable and hazardous portion of Power Plant II, a significant economic benefit can be realized in the event of a future storm surge. The costs of an environmental cleanup and repairs to private properties or businesses would outweigh the costs of the design and proof of concept, as well as the implementation of full protection, when funding becomes available.

Risk Reduction Analysis

The proof of concept portion of this proposed project may reduce the risk of catastrophic loss of key Freeport Electric fuel storage assets, which are critical in a post-disaster scenario, due to storm surge-related flooding. The study and design portion of the project will create a process by which the risk of asset loss across the Power Plant II site can be reduced.

Implementation of the study and the pilot project will reduce flood risk to the oil tanks and, through implementation in the longer term, enhance energy security for tens of thousands of residents, and businesses

and key Community facilities. Environmental risk of contamination from leaking oil tanks and inundated machinery and equipment will be reduced.

General Timeframe for Completion

This proposed project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

This project may require permits and/or coordination with NYS Department of Environmental Conservation, NYS Department of State (NYS DOS), U.S. Army Corps of Engineers, and U.S. Coast Guard. NYS DOS Coastal Consistency approval may be required for any activity within the coastal zone.

Jurisdiction

The Village of Freeport and its power company, Freeport Electric, have jurisdiction over this project area.

Proposed Project: Downtown Microgrid Feasibility Study, Phase 1: Financial and Engineering Feasibility Study



Location of the proposed Downtown Microgrid Feasibility Study (source: Arup)

Freeport Electric, the Village of Freeport's power authority, owns and maintains power generation and distribution infrastructure throughout the Village. As a Village-owned utility, Freeport Electric is committed to providing reliable and affordable energy, and investigating innovative ways to maintain these positive features of living and doing business in Freeport. After Superstorm Sandy, nearly 98% of Freeport Electric's customers had their power restored within three days. Because power was returned so quickly, many people from surrounding communities came to Freeport to use the Library and other public facilities to charge mobile phones, make calls, and access the internet.

An emerging trend for small scale and contained energy distribution is the development of 'microgrids.' A microgrid is a small-scale version of the centralized electricity system that includes all the necessary components to operate in isolation of the centralized grid. Microgrids operate independently allow for the import or export of electricity when connected to the

wider electricity grid. This enables power continuity in critical areas when power outages and service disruptions affect the wider grid. Downtown Freeport has been identified by Freeport Electric as an ideal location for a microgrid demonstration project.

This proposed project will investigate the engineering and financial feasibility of installing the following power generation and transmission components of the microgrid:

- Replace an outdated diesel generator at Freeport Power Plant I with a dual-fuel (diesel/natural gas) generator with "black-start" capability, which is the ability to restart a generator after a blackout without the use of external electrical power inputs. (See Microgrid Phase 2 project)
- Four new underground circuits around the border of the microgrid.
- Four 250 kilowatt (kW) fuel cells at Freeport's potable water pump station.

- One 1 megawatt (MW) wind turbine near Freeport Power Plant II.
- Solar farms at Freeport Recreation Center 1 MW, Power Plant I (150 kW) and Power Plant II (100 kW).

The project will identify funding for implementing the microgrid, including State and Federal grant programs and capital budgeting.

Downtown Freeport has a high concentration of critical assets, infrastructure, and facilities instrumental to disaster response and recovery. Critical assets include Verizon Wireless (telecommunications provider); the Long Island Rail Road (LIRR) Freeport station and associated substation that provides power to the LIRR Babylon Branch; the Village Hall and police headquarters; three firehouses including the headquarters; four public schools; the Freeport Memorial Library; and numerous health and community services and businesses that serve post-disaster functions (e.g., supermarkets, banks, gas stations). All of these facilities are essential to the economic and social well-being of the Community. The Freeport Memorial Library and the JW Dodd School, both located within the microgrid project area, are proposed to serve as Community Assistance Centers (see project description below) after disasters.



The Downtown Microgrid could leverage existing public facility investments in renewable energy, such as the installation of this solar panel atop the Freeport Fire House's garage (source: Arup)

During Superstorm Sandy, heavy winds and flooding caused damage to Freeport Electric's power distribution network, resulting in outages lasting multiple days. Critical facilities that lacked sufficient backup power were adversely affected. As a result, residents and business owners experienced delays in obtaining critical life supporting supplies such as food, fuel, and pharmaceuticals.

The 2013 Draft Freeport Hazard Mitigation Plan and other Village of Freeport planning documents cite Downtown as an important area for continued economic growth and the certainty of power supply will allow businesses and community services to quickly reopen after storm events and spur economic growth.

Estimated Project Cost

The proposed project will cost an estimated \$750,000.

Project Benefits

This proposed project supports the Recovery Support Functions of Infrastructure, Health and Social Services, Natural and Cultural Resources, Community Planning and Capacity Building, Housing, and Economic Development.

Risk Reduction & Resiliency Benefits

Developing a central location with a cluster of essential services that can effectively avoid power loss during and after an event is valuable to Community residents and businesses. Reducing the risk of power loss through diversifying energy sources and creating redundancy within the distribution network provides greater certainty to residents and business owners, allowing them to move about the Community and access resources and businesses safely with the aid of well-lit streets and functioning traffic signals.

Economic Benefits

Economically, a microgrid provides an opportunity to reduce loads on the existing Freeport Electric grid, reducing costs to Freeport Electric and public expenditures by the Village. Business continuity can also be improved and more quickly restored after a disaster, thereby reducing losses to business revenues.

Increasing energy capacity will better allow for redevelopment of Freeport's downtown, which can create new job opportunities and tax revenue.

Health and Social Benefits

Increasing the energy capacity of Freeport's downtown enables residents and business to relocate from vulnerable areas to upland areas. Finally, this project will provide an important educational benefit as an innovative pilot project that can be demonstrated at the Operation SPLASH Resiliency Education Center.

Environmental Benefits

Increasing the use of cleaner energy, through the implementation of renewable sources, such as solar and wind, and lower emitting sources, such as fuel cell and natural gas, create the environmental benefits of reduced emissions and improved air quality.

Cost-Benefit Analysis

The multitude of potential benefits discussed above, and ability to support each of the Recovery Support Functions justifies the cost of examining the feasibility of a microgrid in Downtown Freeport. Through a phased implementation of the various microgrid components, many more indirect benefits will be realized.

Risk Reduction Analysis

Providing redundant power and on-site generation will enhance energy security and resilience for key community facilities, businesses, and residents. However, there is a risk that the project will not be implemented in a way that maximizes benefits, and unintended negative impacts are possible. By carrying out a comprehensive feasibility analysis, significant risks and uncertainty of implementation can be reduced.

By having a stable energy supply, emergency response facilities will have a greater chance of remaining operational, reducing risk to the population through faster emergency response. Buildings and homes throughout the community will have a greater chance of retaining electricity and remaining habitable, reducing the need for immediate emergency response or shelter.

General Timeframe for Implementation

As a study, this proposed project can be fully carried out in approximately 12 months.

Regulatory Requirements Related to Project

As the proposed project is a feasibility study, no government regulatory approval or permitting is required for this phase of the project.

Jurisdiction

The Village of Freeport and Freeport Electric are the entities with jurisdiction over this project area.

Proposed Project: Downtown Microgrid Phase 2: Redundant Energy Supply at Power Plant I

Freeport Electric, the Village of Freeport's power authority, owns and maintains power generation and distribution infrastructure throughout the Village. As a Village-owned utility, Freeport Electric is committed to providing reliable and affordable energy, and investigating innovative ways to maintain these positive features of living and doing business in Freeport. Nearly 98% of Freeport Electric's customers had their power restored within three days of Superstorm Sandy. Because power was returned so quickly, many people from surrounding communities came to Freeport to use the Library and other public facilities to charge mobile phones, make calls, and access the internet.

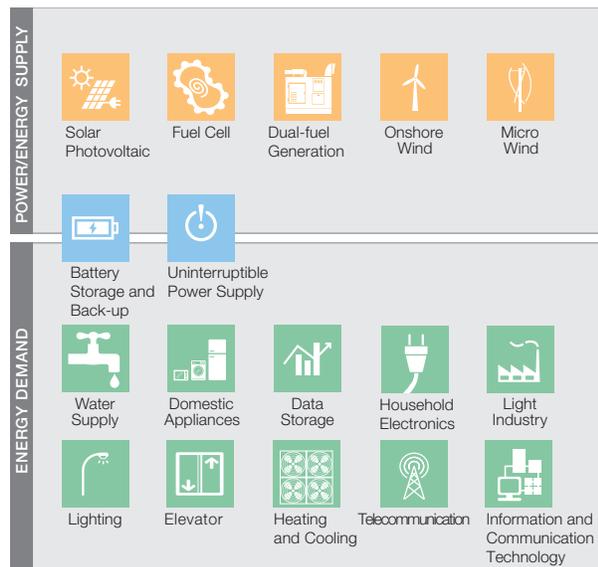
An emerging trend for small scale and contained energy distribution is the development of 'microgrids.' A microgrid is a small-scale version of the centralized electricity system that includes all the necessary components to operate in isolation of the centralized grid. Microgrids operate independently allow for the import or export of electricity when connected to the wider electricity grid. This enables power continuity

in critical areas when power outages and service disruptions affect the wider grid. Downtown Freeport has been identified by Freeport Electric as an ideal location for a microgrid demonstration project.

Phase 1 of the Downtown Microgrid (described in the previous project) will investigate the engineering and financial feasibility of implementing power generation and transmission components of the proposed microgrid. This proposed project will take the first step necessary in developing the microgrid by installing a new 3 megawatt (MW) dual-fuel (diesel/natural gas) generator with "black-start" capability to replace an outdated diesel generator at Freeport Power Plant I, where the average age of existing generators is 59 years. Power Plant I will be the main power supply for the microgrid area and is the only Freeport Electric power plant located outside of the NYS DOS identified risk areas in Freeport.

The power generation and transmission components of the microgrid include:

- Replace an outdated diesel generator at Freeport Power Plant I with a dual-fuel (diesel/natural gas) generator with "black-start" capability, which is the ability to restart a generator after a black-out without the use of external electrical power inputs.
- Four new underground circuits around the border of the microgrid.
- Four 250 kilowatt (kW) fuel cells at Freeport's potable water pump station.
- One 1 MW wind turbine near Freeport Power Plant II.
- Solar farms at Freeport Recreation Center 1 MW, Power Plant I (150 kW) and Power Plant II (100 kW).



Microgrid technology uses renewable energy sources and battery storage to provide a secure, reliable, and redundant energy supply to meet a variety of demands (source: Arup)

Downtown Freeport has a high concentration of critical assets, infrastructure, and facilities instrumental to disaster response and recovery. Critical assets include Verizon Wireless (telecommunications provider); the Long Island Rail Road (LIRR) Freeport station and associated substation that provides power to the LIRR Babylon Branch; the Village Hall and police headquarters; three firehouses including

the headquarters; four public schools; the Freeport Memorial Library; and numerous health and community services and businesses that serve post-disaster functions (e.g., supermarkets, banks, gas stations). All of these facilities are essential to the economic and social well-being of the Community. The Freeport Memorial Library and the JW Dodd School, both located within the microgrid project area, are proposed to serve as Community Assistance Centers (see project description below) after disasters.

During Superstorm Sandy, heavy winds and flooding caused damage to Freeport Electric's power distribution network, resulting in outages lasting three days. Critical facilities that lacked sufficient backup power were adversely affected. As a result, according to Village employees, there were delays in obtaining critical supplies such as fuel, food, and pharmaceuticals, which may be essential to socially vulnerable populations including elderly and disabled residents.

The installation of a new "black-start" generator was cited by Freeport Electric as the most immediate need as it will enable them to "kick-start" the other generators at Power Plant I and II if a blackout occurs or there is a system shutdown. In addition, the "black-start" generator provides redundancy within the power generation system by allowing electricity to be generated by either oil or natural gas. Finally, it diversifies and modernizes the fuel source for Freeport Electric's generation equipment, reducing harmful emissions associated with traditional diesel generators.

Estimated Project Cost

The proposed project will cost \$5,000,000.

Project Benefits

This proposed project supports the Recovery Support Functions of Infrastructure, Health and Social Services, Natural and Cultural Resources, Community Planning and Capacity Building, Housing, and Economic Development.

Risk Reduction & Resiliency Benefits

Developing a central location with a cluster of essential services that can effectively avoid power loss during and after an event is valuable to Community



Power Plant I would be the heart of the proposed Downtown Microgrid (source: Freeport Electric)



A critical first step of building a Downtown Microgrid would be the provision of 'black-start' capability at Power Plant I (source: Freeport Electric)

residents and businesses. Reducing the risk of power loss through diversifying energy sources and creating redundancy within the distribution network provides greater certainty to residents and business owners, allowing them to move about the Community and access resources and businesses safely with the aid of well-lit streets and functioning traffic signals.

Economic Benefits

Economically, a microgrid provides an opportunity to reduce loads on the existing Freeport Electric grid, reducing costs to Freeport Electric and public expenditures by the Village. Business continuity can also be improved and more quickly restored after a disaster, thereby reducing losses to business revenues. Increasing energy capacity will better allow for redevelopment of Freeport's downtown, which can create new job opportunities and tax revenue.

Health and Social Benefits

Increasing the energy capacity of Freeport's downtown enables residents and business to relocate from vulnerable areas to upland areas. Finally, this project will provide an important educational benefit as an innovative pilot project that can be demonstrated at the Operation SPLASH Resiliency Education Center.

Environmental Benefits

Increasing the use of cleaner energy, through the implementation of renewable sources, such as solar and wind, and lower emitting sources, such as fuel cell and natural gas, create the environmental benefits of reduced emissions and improved air quality.

Cost-Benefit Analysis

The multitude of potential benefits discussed above, and ability to support each of the Recovery Support Functions justifies the cost of examining the feasibility of a microgrid in Downtown Freeport. Through a phased implementation of the various microgrid components, many more indirect benefits will be realized.

Risk Reduction Analysis

Providing redundant power and on-site generation will enhance energy security and resilience for key community facilities, businesses, and residents. By having a stable energy supply, emergency response facilities will have a greater chance of remaining operational, reducing risk to the population through faster emergency response. Buildings and homes throughout the community will have a greater chance of retaining electricity and remaining habitable, reducing the need for immediate emergency response or shelter.

General Timeframe for Implementation

This proposed project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

Approval may be required from NYS Department of Environmental Conservation.

Jurisdiction

The Village of Freeport and Freeport Electric are the entities with jurisdiction over this project area.

Proposed Project: Backup Power for Sewer Lift Stations

The Village of Freeport Sanitary Sewer Department operates and maintains 103 miles of collection and conveyance infrastructure, three sanitary sewer lift stations and one pump station. The three Village-owned sewer lift stations, located on Howard Avenue, South Bayview Avenue, and Suffolk Street, are also located in the Special Flood Hazard Area designated by FEMA, and NYS DOS high and extreme flood risk areas. This proposed project seeks to leverage the Village's ongoing mitigation efforts at the lift stations and increase resiliency by providing backup power generation at each station.

Sewer lift stations are a necessary part of the sewage conveyance system, ensuring that sewage can flow when elevation and gravity alone are not enough. Freeport's sewage is processed at the Nassau County Cedar Creek Water Pollution Control Plant (WPCP) located beyond Community boundaries. Sewer lift stations are critical pieces of infrastructure that must be protected and kept operating to ensure that sewage does not overflow back into community facilities, businesses, and homes. The lift stations serve homes and businesses including those along the Nautical Mile, which is identified as the heart of Freeport Village and an important economic generator for the Community. All of the Community's residents and businesses depend on these lift stations for conveying sewage to the WPCP.



One of Freeport's vulnerable sewer lift stations, located on Howard Avenue (source: Village of Freeport)

All three sewer lift stations were damaged by Superstorm Sandy when the electrical panels, pumps, and compressors were submerged and destroyed. In response, the Village of Freeport has embarked on a number of flood mitigation efforts that include replacing and raising motors, compressors and electrical panels; bricking over windows; and installing dam doors.

However, if the power distribution system is disrupted, the sewer lift stations will be rendered inoperable, potentially causing a sewage overflow into several residential neighborhoods in southern Freeport. Backup power will help to ensure that this does not happen in future storms. This project proposes the installation of permanent backup natural gas generators at each of the three sites.

Estimated Project Cost

This project will cost approximately \$150,000.

Project Benefits

This project supports the Recovery Support Functions of Infrastructure, Health and Social Services, and Natural and Cultural Resources.

Risk Reduction & Resiliency Benefits

The additional of backup power at the Community's sewer lift stations will reduce the risk of a service disruption that could potentially cause a sewage overflow into several residential neighborhoods in southern Freeport.

Economic Benefits

The project reduces the risk of costly sewer overflow-rated damage to Village infrastructure, private residential property, and coastal businesses, such as the Nautical Mile.

Health and Social Benefits

Residents and businesses would benefit from increased protection against sewage overflow and resultant sanitary and health impacts. The ability to safely use residential and commercial sanitary sewer

systems during and after future disasters would benefit the approximately 10,000 people who live south of Atlantic Avenue.

Environmental Benefits

Environmental benefits may be realized by preventing sewage from contaminating land, groundwater, and bay water in future flooding or disaster scenarios. The use of natural gas generators over conventional diesel generators will reduce the release of harmful emissions in the event of prolonged generator usage.

Cost-Benefit Analysis

The certainty of continued operation of the sanitary sewage conveyance system during and after disasters or other causes of power loss, will prevent significant damage to homes, businesses, the natural environment, and Village infrastructure, justifying the cost of purchasing and installing the generators.

Risk Reduction Analysis

Maintaining a constant flow of sewage out of the low-lying areas of the Community will minimize public health risks by allowing community facilities, businesses, and homes to remain operational and habitable during and after a storm event.

General Timeframe for Implementation

This proposed project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

Approval may be required from NYS Department of Environmental Conservation.

Jurisdiction

The Village of Freeport Department of Public Works and Department of Water are the entities with jurisdiction over this project area.

Proposed Project: Community Assistance Centers

This project proposes to establish five Community Assistance Centers (CACs) as places that can provide emergency preparedness information to residents before storms or disasters, and which can provide resources, information, and comfort after storms. These CACs potentially may include the Freeport Memorial Library, Freeport Recreation Center, Freeport High School, JW Dodd School, and Atkinson School. Four of these facilities are located in a NYS DOS moderate risk zone, the lowest identified risk zone. The exception is Atkinson School, which is located out of any designated risk zone. These locations are also centrally located within the Community, making it easier for both residents and suppliers to access them. After a storm, CACs will become a place to gather, collect, and distribute information and resources including emergency supplies (not funded by this project) and to access to electricity and the Internet. The CACs are not intended to serve as emergency shelters during a storm.

This project will include an assessment of the current infrastructure at each location, the installation of an emergency backup natural gas generator, additional electricity outlets, wireless Internet access, and electronic dynamic public notification signage. Prior to, and during a storm or disaster, the electronic dynamic signage will provide status updates in the Community, updates from the Freeport Office of Emergency Management, and will list resources available at the CAC. Finally, this project proposes the employment of a Local Disaster Recovery



Freeport Memorial Library (source: Joe Mabel)

Manager, working 20 hours per week for the Village for two years. Responsibilities of the Local Disaster Recovery Manager are defined as:

- Develop a Resiliency Education Program that provides preparedness training sessions geared towards businesses and community members.
- Provide yearly Community workshops on the types of assistance that will and will not be available in pre-disaster and post-disaster phases.
- Ensure all preparedness information is accessible and understandable to all residents (including non-English versions and audible materials).
- Establish a list of resiliency features to be added to the CACs and implement them (not funded by this project), such as toiletries, water, food, and supplies.
- The generators for the identified CACs, should they be deemed appropriate, are proposed to have the following capacities:
 - Freeport Memorial Library: 50 kW generator
 - Freeport Recreation Center: 150 kW generator
 - Freeport High School: 200 kW generator
 - JW Dodd School: 100 kW generator
 - Atkinson School: 100 kW generator

The Freeport Memorial Library was selected as it served as a resource center during Superstorm Sandy recovery. The Freeport Recreation Center was used as a charging and warming center during Superstorm Sandy recovery. The Recreation Center features the ability to serve a large number of people, has a large parking lot (for vehicle storage and as a distribution location), and is in a well-known, central location. The schools were chosen as they offer a broad reach across the Community and are accessible from other areas of Freeport. The community is familiar with the schools, their locations are on or near County designated evacuation routes or key local streets, they are located in moderate or lower risk areas, and they suffered little or no damage during Superstorm Sandy and Hurricane Irene.

The project will assess the existing building infrastructure and if there are any funds saved on pre-existing infrastructure, including Wi-Fi capability or high capacity charging stations, the budget will be reallocated towards increasing the size of the emergency backup generator and/or the Resiliency Education Program.

During Superstorm Sandy and Hurricane Irene, there was a lack of clarity on where residents could get information, comfort, and relief services. The Community expressed frustration with lack of information on what to do, where to go for help, and how to get there following the storm. Residents were unable to access basic resources such as food, warm clothing, charging centers, and Internet service. It was also mentioned that many emergency support services provided by nonprofit groups and hosted by the Town of Hempstead did not distribute resources in Freeport. The Freeport Memorial Library was utilized by Village residents as well as those from neighboring communities to charge phones, use the Internet, watch TV, and seek warmth. The Library was overstressed as it was physically unable to accommodate the needs of every resident and visitor.

Major concerns after Superstorm Sandy included a lack of safety, lack of access to potable drinking water, communication access, social isolation, and access to food resources. In addressing these needs, a number of opportunities have been identified to enable the Community to recover after a storm, including being better prepared for hurricane season and future disasters; having more information after storms; having access to computers, Internet access, and cellphones; and having stockpiles of food, water, and clothing for places that provide support after disasters.

Estimated Project Cost

This proposed project will cost approximately \$2,200,000.

Project Benefits

This proposed project seeks to establish locations within the Community for residents to learn about disaster preparation and response, as well as obtain resources and information after a future disaster. This

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

Risk Reduction & Resiliency Benefits

The installation of natural gas generators with battery backup reduces the risk of power failure, providing resiliency and continuity benefits to the CACs.

Economic Benefits

The project provides an economic benefit by reducing disaster relief and recovery costs through utilization of Federal and State-level public grants for preparation costs, as well as creating part-time positions through the creation of the LDRM roles.

Health and Social Benefits

Many residents at Public Engagement Events cited the need for improved access to information about happenings in the region as well as improved connectivity to family and friends. The CACs address urgent human needs after a major storm event by providing information and communication support within local areas. The CACs will provide a year-round educational benefit by increasing the Community's access to, and understanding of, emergency procedures and responsibilities. After an event, each CAC will directly provide basic health and social services, including food, water, electricity, and communication services.

Dynamic signage will provide updates and information, keeping the public informed. In turn, once basic needs are met, people will be able to turn their attention to recovery, using information and communication services available at the Centers to minimize time needed to rebound from a storm event. This project will also reduce the risk of power loss by equipping each Center with a backup generator.

Socially vulnerable populations will benefit from the employment of the LDRM, who will ensure that all residents, despite English literacy, reduced mobility, or diminished ability, understand disaster preparation and recovery protocols. In addition, these residents, who may be more likely to have insufficient access to post-disaster comforts and necessities, will have these resources available in the Community.

Cost-Benefit Analysis

The funding for this project provides an opportunity for people who are in the local areas – storm-affected or not – to learn how to be prepared before, and how to respond during and after, an event. People are more informed by the community education programs supported by the CAC. This leads to a greater awareness of preparedness; builds support for following directives from local, State, and Federal officials; ensures people are ready to act when a storm is approaching; and, helps homes or businesses in the local area formulate a response plan. It also reduces the possibility that Community members will not know what to do and, therefore, stay behind.

After an event, the CAC provides a one-stop-shop for information about important matters, such as the suitability of drinking water and the availability of power, fuel, food, and medicines. This helps protect Community health and well-being. In the case of a significant event, such as Superstorm Sandy, it also offers the opportunity for Community needs to be communicated to support functions outside the area if clean drinking water, medications, food, or other supplies are needed locally. The CACs can tabulate the needs and issue requests for support to the local areas.

Local expenditures for disaster preparedness and response will be reduced through the identification of grant monies. In addition, an educated Community can reduce the potential for loss of life or injury to Community members and Village emergency responders, and the loss of emergency equipment.

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

Risk Reduction Analysis

Lack of information was cited as a major issue in the Community and a problem requiring a response in this NYRCR Plan. The educational programming associated with this project reduces risks by creating a more educated and prepared public. Preparation before a crisis occurs ensures people will be more

likely to respond appropriately when a disaster happens. On a day-to-day level, the CAC will distribute information about preparedness.

If downed communication lines or loss of power restricts access to television, radio, or the Internet during or after a storm, there is currently no method of informing Community members of appropriate actions or necessary activities. A CAC can be an information clearinghouse, providing information to the local population so they can make informed and safe choices. It also provides an opportunity for local populations to communicate news and needs outward to friends, family, and support organizations. The CACs can offer information about health and safety risks and approved repopulation zones, as well as dispense necessary supplies and provide communication links between local populations and family or friends further away. This reduces the risk that people will enter into dangerous areas or engage in potentially hazardous behaviors, such as drinking unsafe water or entering an unstable home, before knowing whether it is safe to do so.

General Timeframe for Implementation

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

Regulatory Requirements Related to Project

There are no regulatory approvals required for this project, however, consent to use school and other public facilities as CACs will be required.

Jurisdiction

The Freeport School District owns the educational facilities and the Village of Freeport owns the Library and Recreation Center. Coordination with Nassau County and the Town of Hempstead on the communication of emergency information will be necessary to ensure consistency of information and that post-disaster responsibilities are complementary and not duplicated.

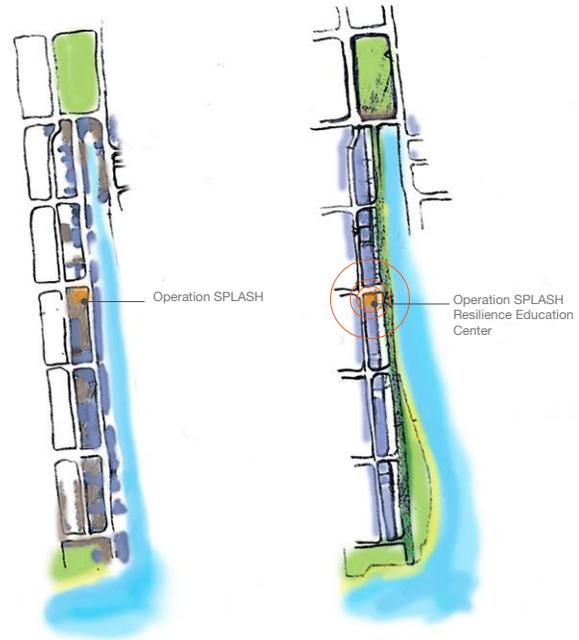
Proposed Project: Operation SPLASH: Resilience Education Center

Operation SPLASH (Stop Polluting, Littering and Save Harbors) is widely regarded as the pre-eminent environmental non-profit community and regional outreach organization on Long Island's western south shore. Operation SPLASH helps maintain the health of the bays and waterways through environmental education and advocacy and waterway cleanup efforts, using its vessels, which are moored at six locations including at its headquarters in Freeport. SPLASH's volunteer network of nearly 3,500 members allows it to reach a wide cross-section of regional residents. The continued operation of Operation SPLASH during and after storms is an essential regional need due to its commitment to environmental protection and storm cleanup, as well as year-round debris removal. The SPLASH building, owned by Freeport Community Development Agency (CDA), is located in Freeport at the heart of the Nautical Mile. The building was inundated with 16 inches of water during Hurricane Irene and 4.5 feet of water in Superstorm Sandy, and sustained building damage in both storms.

The Nautical Mile, located along one of Freeport's developed peninsulas, is identified as the heart of the Community's cultural maritime identity and the driver of the Village's tourism economy as the main waterfront retail, nightlife, and restaurant district. The Because of this, it is an ideal location to host a community education and outreach center.

This project seeks to fortify and protect the Operation SPLASH building with innovative flood protection design and infrastructure consisting of two passive self-closing flood barriers, sewage backflow preventers, and personnel door barriers, which prevent water from entering through doors.

The proposed project will also create a full-time position at Operation SPLASH for two years to expand the scope of Operation SPLASH to become a Resilience Education Center that offers education and outreach programs related to coastal and community resilience. This expanded offering will complement Operation SPLASH's long-standing roles of environmental protection and advocacy. This project will help fund partnerships with Nassau County higher education institutions to raise awareness of



Floodproofing measures and resilient street design
at Freeport's Nautical Mile (source: Arup)

regional risks from sea level rise, climate change, and the risk of living on the coast, in addition to promoting environmental stewardship.

The final component of the proposed project will be the installation of three high-definition, controllable surveillance cameras along Freeport's waterfront. The cameras will be mounted at high points and will enable storm monitoring by the Freeport Department of Public Works (DPW), and the feeds will be on public display at the Operation SPLASH headquarters building to be used as a public awareness and education tool. Waterfront Park, Power Plant II and Guy Lombardo Marina are identified as possible camera locations. The DPW will be able to monitor storm impacts, damages, and water recession following a storm which will improve emergency management and recovery operations. In addition, scientific researchers will be able to monitor the effectiveness of different coastal defense systems, including ones proposed in this program (Protect Power Plant II, Nautical Mile Buoyant Architecture, Public Bulkhead

Repair) and elsewhere, including the proposed coastal improvement project as part of the National Fish and Wildlife Foundation grant application.

Estimated Project Cost

The proposed project would cost an estimated \$1,100,000.

Project Benefits

This project supports the Recovery Support Function of Community Planning and Capacity Building.

Risk Reduction & Resiliency Benefits

Flood protection measures will protect the critical community function that Operation SPLASH provides, and will serve as a model for resilient design to other buildings in high and extreme risk areas. The surveillance cameras help improve emergency response by providing instantaneous information about environmental conditions. An added benefit of

the cameras will be enabling better scientific monitoring and data collection following the implementation of coastal improvements. These strategically placed cameras will enable scientific researchers and government agencies the ability to evaluate the effectiveness of coastal improvement projects and quickly address any issues that may occur.

Finally, displaying the camera feeds and storm footage at a prominent community center like Operation SPLASH will provide Community members with greater awareness of what happens during coastal surges and hurricanes. This can be a powerful tool in increasing Community understanding of the risks and responsibilities of coastal living and help build capacity for more ambitious coastal resilience strategies, such as planned retreat.

Economic Benefits

Economic development benefit will be provided by enhancing partnerships with universities and research facilities.

Health and Social Benefits

The educational component will enable Operation SPLASH to widely broadcast the importance of resilient design, the responsibilities that come with living in a coastal region, and the important role that ecosystems have in storm protection, pollution mitigation and quality of life. Linking with educational institutions and schools will enable Operation SPLASH to offer a contemporary and innovative education to a wide audience.

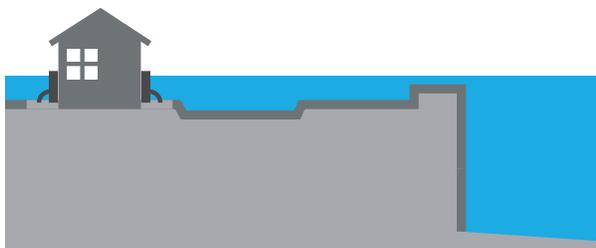
This proposed project will have a social benefit by promoting interest in and building capacity for environmental and resilience-focused jobs.

Environmental Benefits

Environmental protection is achieved through reduced risk of pollution and littering in Freeport's waterways due to SPLASH's protection, cleanup, education, and outreach function.



Waterfront businesses are vulnerable to flooding from storm surge and high tides (source: Arup)



Design strategies such as self-closing flood barriers can reduce the risk of flood damage (source: Arup)



A statue along Woodcleft Ave demonstrates the importance of Operation SPLASH's work in the local community (source: Arup)



A closeup of a plaque that demonstrates the importance of Operation SPLASH's work in the local community (source: Arup)

Cost-Benefit Analysis

The benefits of increased community awareness of storm risks and the importance of resilient communities, increasing the potential of Operation SPLASH's headquarters to remain habitable during and after future storms, and the increased ability to monitor storm conditions justify the cost of this project.

Risk Reduction Analysis

This project will reduce flood risk to a key community asset, the Operation SPLASH building. Environmental protection is achieved through reduced risk of pollution and littering in Freeport's waterways due to SPLASH's protection, cleanup, education and outreach function.

During a storm, improved monitoring ability will help reduce risk to population and assets by providing information useful to directing response efforts. In normal conditions, the monitoring data may be used to evaluate the effectiveness of coastal improvement projects, reducing flood risk by helping to improve the design of protection systems.

General Timeframe for Implementation

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

Regulatory Requirements Related to Project

Approval may be required from the Village of Freeport Buildings Department.

Jurisdiction

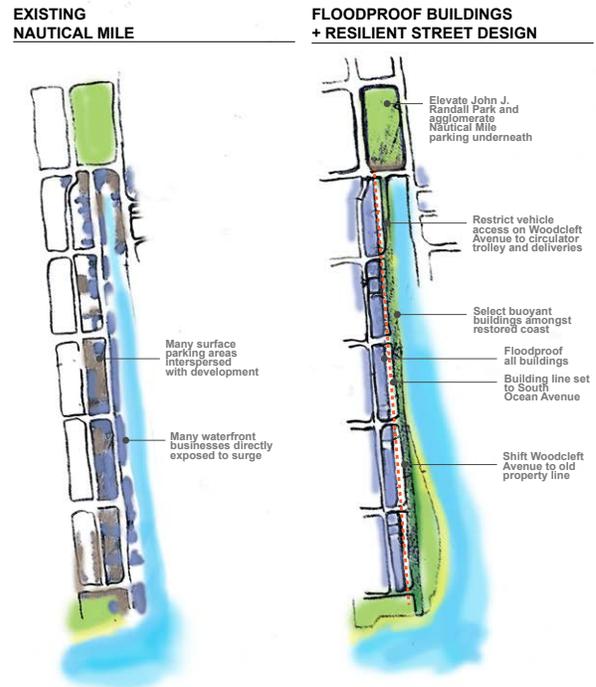
The Freeport CDA is the owner of the Operation SPLASH building. The Village of Freeport and the Town of Hempstead have jurisdiction over the public facilities where cameras will be installed.

Proposed Project: Nautical Mile Buoyant Architecture

'Buoyant architecture' allows residents and businesses to have greater flexibility to respond to future flooding events while maintaining existing access. The goal is to implement systems that add buoyant displacement to existing structures without raising the living or public space. Different structures allow for varying levels of buoyancy either directly underneath, around the perimeter, or a combination of both. This enables the building to go up and down with the rising waters.

This project will provide for the design and construction of a buoyant building along the Nautical Mile to demonstrate the ability to resiliently maintain a coastal economy in a cost-effective way. Existing examples from across the U.S. and preliminary investigations into local implementation appear to indicate the ability to convert a building to enable buoyancy for less than the cost of adequately raising it. Developing a proof of concept for buoyant architecture on the Nautical Mile will allow the Village to maintain this vision while reducing risk to the businesses in the district and reducing or eliminating damage during future events.

The Nautical Mile, located along one of Freeport's developed peninsulas, is identified as the heart of the Community's cultural maritime identity and the driver of the Village's tourism economy as the main waterfront retail, nightlife, and restaurant district. The Nautical Mile sustained widespread damage during Superstorm Sandy and Hurricane Irene as homes and businesses were inundated by the storm surge and roads became impassable. According to the 2013 Draft Freeport Hazard Mitigation Plan, two commercial buildings burned down and three commercial properties experienced significant damage that required closures for reconstruction. The Operation SPLASH building was inundated with 16 inches of water during Hurricane Irene and 4.5 feet of water in Superstorm Sandy, and sustained building damage in both storms. In addition, certain businesses, such as the Schooner restaurant, were unable to recover financially from repeated damage and have not been able to reopen after Superstorm Sandy. The closed Schooner building now sits damaged and unoccupied on the Nautical Mile, detracting from the pleasantness of the area and creating an element of blight.



Buoyant architecture for the Nautical Mile (source: Arup)

The economic health of the Nautical Mile is important to the Community and the Village of Freeport is committed to maintaining a presence on the waterfront and sustaining the Nautical Mile. The two primary options for recovering storm-damaged residences and businesses, raising or relocation, are not sufficient to meet everyone's needs. For some business owners, relocation would be detrimental to the success of their business. Homeowners may be living in their current house primarily because of their waterfront location, despite the risk associated with this location. The other option, raising buildings, is typically a costly endeavor, and creates accessibility complications for customers and residents. While raising homes provides significant protection from storm surges or other flooding, substantial changes in building height can disrupt existing neighborhood character and impact close neighbors. Furthermore, static building raising is designed to respond to one future condition while no one is certain how high the next storm surge will be.

Estimated Project Cost

The proposed project will cost an estimated \$195,000.

Project Benefits

This project supports the Recovery Support Functions of Economic Development and Housing.

Risk Reduction & Resiliency Benefits

In addition to demonstrating the ability to achieve resilience of coastal structures, this project may enable buildings and neighborhoods the ability to maintain their character, retain access for elderly and disabled populations, prepare for sea level rise, and in some cases reduce the cost of construction to comply with new building elevation requirements.

Economic Benefits

Property owners may benefit if the cost of retrofitting a building to buoyant architecture standards is less expensive than raising it to a certain required height.

Health and Social Benefits

This project will provide an important educational benefit as one of the innovative pilot projects that would be highlighted at the Operation SPLASH Resiliency Education Center.

Cost-Benefit Analysis

For the limited cost of one demonstration project, this project can provide business owners an alternative to raising buildings that would enable the Nautical Mile to better retain its character as waterfront commercial district. This prototype has the potential for regional implementation, benefiting other Long Island communities.

Risk Reduction Analysis

This project will serve as an innovative example of reducing flood risk to the target building. Additionally, should the demonstration project prove effective, it will provide a cost-effective flood mitigation option for businesses, enabling them to retain their waterfront location and reduce the risk of abandonment and decline of the Nautical Mile.

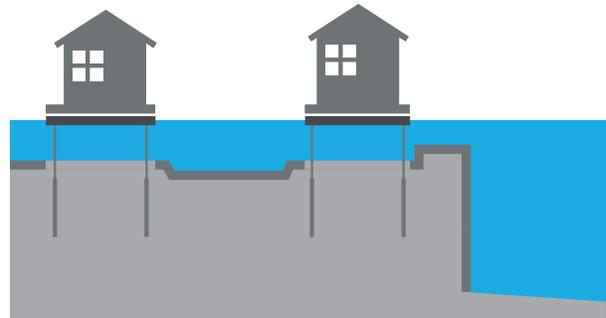
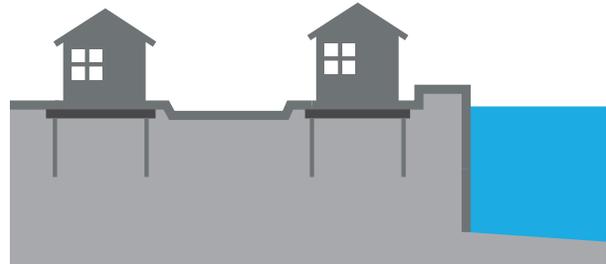


Illustration of buoyant architecture (source: Arup)

General Timeframe for Implementation

This proposed project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

Approval may be required from the Village of Freeport Buildings Department, Town of Hempstead Department of Conservation and Waterways, and the NYS Department of Environmental Conservation.

Jurisdiction

This project will be under the jurisdiction of the Village of Freeport, either on a Village-owned property, or through an agreement with a private landowner.

Proposed Project: Modernize the Freeport Industrial Park Study



A artist's impression showing the economic potential of specialized, adaptable shop areas. (source: Arup)

The Freeport Industrial Park is a unique and important asset to Freeport's economy and the regional economy as a whole, as it is one of only several industrial areas in Nassau County. It is located on a peninsula near the head of Freeport Creek and is entirely within the FEMA-designated Special Flood Hazard Area. The Park is primarily in the high and extreme NYS DOS risk zones, yet it has the potential to be central to the economic resiliency of the Village.

Due to its waterfront location and peninsular geography, it is vulnerable to coastal inundation and storm damage. It is also the only developed peninsula in Freeport with large, continuous segments of non-bulkheaded and natural coastline. Bulkheads are primarily used for erosion control, although inconsistency between bulkhead heights on adjacent properties can complicate coastal flooding issues. Furthermore, soils contaminated by industrial chemicals can be detrimental to aquatic ecosystems when inundation and runoff carries those chemicals into local waterways.



The existing condition of the industrial park (source: Arup)

The Industrial Park's building repertoire is outdated and does not reflect the demands of modern industrial businesses. Large floor plate buildings are not as desirable to smaller, specialized industrial businesses, which have proven to be successful in the challenging industrial business environment of the United States of America. The market appetite for industrial space has shifted over time to favor more specialized uses and smaller, more adaptable shop areas.

As one of the region's key economic assets, the Industrial Park faces the challenge of protecting properties from storms and limiting environmental damage while attracting market investment. These factors highlight an important Community need and unique opportunity to re-vision the Industrial Park. Re-visioning includes exploring ways to offer a competitive, safe, and environmentally conscious environment for local industrial businesses.

Two examples of recent flood damage on the Industrial Park site include Freeport Electric's Power Plant II, which was inundated during Superstorm Sandy, and Freeport Village's Department of Public Works facility, where most of the buildings have flooded repeatedly. In addition, there are several buildings and sites containing fire, explosion, and contamination hazards.

This project will outline steps for the formation of a local nonprofit development organization committed to transforming the Industrial Park into a modern and resilient business center. The main objective of the development organization is to revitalize the Industrial Park by addressing the amount of vacant and underutilized space, attracting innovative and complementary businesses, developing and maintaining a long-term vision and plan for the Park, acquiring property for restoring the coast and creating natural storm defenses, and for redeveloping vacant or underutilized buildings into attractive spaces for new tenants.

The study will kick-off with a 'brand-storming' session, in which existing businesses, prospective tenants, interested community members, and governmental stakeholders identify potential 'brands' or themes of the Industrial Park. New and innovative uses could include a clean energy education center, job training and production center, a flood-defense system manufacturing and training center, or, to



The Industrial Park (source: Arup)



The Industrial Park (source: Arup)



The Industrial Park can leverage its waterfront location to simultaneously attract new tenants and improve the natural environment (source: Arup)

recall the rich cultural history of Freeport, a theatrical set production and ancillary performance hub, or an innovative combination of different complementary sectors.

This project will fund a study to propose design guidelines for industrial and commercial development in the Industrial Park. Short-term and long-term goals, strategies, actions, and design concepts will be developed to guide future development so that it is built to be safe and resilient, protected, affordable, and environmentally-sensitive.

As a part of the development of this project, Committee members met with the Brooklyn Navy Yard, an established industrial park that has benefited from proactive planning and resilient design, and are seeking to replicate the success of that remade industrial park into a modern green facility. As communicated on the tour, the redevelopment has been successful to the point where the Brooklyn Navy Yard is currently at capacity and expanding in southern parts of Brooklyn. This encouraged Committee members to explore the potential of proposing a further expansion of the Brooklyn Navy Yard to Freeport, so the industrial parks together can offer a wider range of building types, and more importantly, lease prices. This study will first assess the site to determine what

infrastructure changes are needed to make the park more resilient to flooding and how to allow for future development in a manner that is market responsive and in harmony with the local environment. The study will assess the market and environmental context and recommend a series of short, medium, and long-term goals, strategies, and actions to allow the park to be reborn in a more economically and environmentally healthy fashion.

Estimated Project Cost

The proposed project will cost an estimated \$500,000.

Project Benefits

This project supports the Recovery Support Functions of Economic Development and Natural and Cultural Resources.

Risk Reduction & Resiliency Benefits

Resiliency design guidelines will educate existing and future businesses in the Industrial Park about how to build or retrofit structures in a resilient manner, reducing the risk of property damage during future storm events.

Economic Benefits

A successful Industrial Park has the potential to attract employment, economic activity, and a non-residential tax base to Freeport. A dedicated development organization will be able to focus attention on improving the economic viability of the Industrial Park as the need for resilient and modern adaptable buildings increases in order to accommodate changing industrial demands, sensitivity to the natural environment, and more powerful storm events.

This project offers benefits to Freeport and to Nassau County by reinventing an important area and expanding its industrial and commercial job base. An increase of jobs in the Industrial Park would have a multiplier effect of creating additional retail jobs to support the Industrial Park workers, and may stimulate other businesses in the supply chain.

An increase in new local jobs may reduce the need for local social services provided by the Village and will reduce costs associated with unemployment benefits.

Health and Social Benefits

Social benefits of the project include additional jobs created by new businesses in the Industrial Park, which can provide increased employment for local residents.

Environmental Benefits

With the incorporation of resilient design techniques into structures within the Industrial Park, the risk of pollution to local waterways during flooding events from environmental contaminants stored in businesses will be lessened. Incorporating green infrastructure measures into site plans and building designs will reduce the amount of pollutants reaching the waterways from stormwater drainage.

Cost-Benefit Analysis

This project is the critical first step in creating a vibrant commercial and industrial business district that provides local jobs and stimulates the Village's economy as a whole. Increased business revenues and new jobs will increase local tax revenues. Constructing new buildings and retrofitting existing buildings in a resilient manner will decrease the risk of damage

from future storm events. The considerable economic, social, and environmental benefits associated with a successful Industrial Park justify the modest cost of this initial study.

Risk Reduction Analysis

This project will identify ways to reduce flood risk and damage to properties throughout the Industrial Park, including business property, machinery, and equipment.

General Timeframe for Implementation

This proposed project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

There are no regulatory requirements associated with this project.

Jurisdiction

Village of Freeport

Proposed Project: Business Continuity Program

Superstorm Sandy significantly impacted Community businesses. Some were flooded and suffered substantial physical damage; others were indirectly affected by public misperception that businesses were closed when they were, in fact, open. Working hours were reduced in many cases, causing financial hardship to employees. Businesses are crucial to the fiscal health of the Village, as they make up 10% of all parcels in the Community but provide more than 30% of assessed land value.

According to data from the U.S Small Business Administration, 234 Freeport businesses, representing 1,035 employees, applied for disaster management assistance after Superstorm Sandy. These applications represented claims totaling \$14.7 million in real property damage, \$8.3 million of machinery damage, an inventory loss of \$2.4 million and a leaseholder improvement loss of \$2.2 million. Of these applications, 49 (21%) were approved for an amount totaling just under \$6.7 million, roughly one-quarter of the \$27.6 million in verified damage assistance applied for.

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

- Educational sessions for the business community,
- Creation of a Risk Assessment Checklist and audit assistance,
- Individualized business continuity plan assistance, and
- Maintenance and monitoring through annual exercises and continuous improvements.

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

Through ongoing coordination with the Freeport Chamber of Commerce (and those of neighboring or nearby hamlets) and/or related business organizations, the Business Continuity Program facilitator would help small businesses to create their own plans for continuing operations under adverse conditions, such as a major storm, as well as be responsible for identifying and assisting businesses in the pursuit of future funding opportunities. The Program will help business owners identify their backup power needs in advance of an emergency, which will allow owners to procure emergency power generation supplies.

Estimated Project Cost

The NYRCR Communities of Baldwin, Bellmore/Merrick, Seaford/Wantagh, and Massapequa intend on cooperating with NYRCR Freeport on this project.

This project will cost the Community approximately \$40,000, with similar contributions from neighboring NYRCR Communities.

Project Benefits

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

Risk Reduction & Resiliency Benefits

The benefit to local business will be reduced interruption of normal business following future storms and disasters.

Economic Benefits

The Community's commercial sector is largely comprised of retail businesses, but also contains a notable and historically significant industrial sector. When these businesses close, even for a short period of time, it is disruptive to the local economy and affects wholesalers and other businesses in the supply chain. Loss in sales across a number of businesses

can lead to considerable lost sales tax revenue for Nassau County. When employees are laid off or hours are reduced, income taxes are affected at both the State and Federal level. In addition, better preparedness and education can lead to a reduction in post-disaster claims for financial assistance from State and Federal programs.

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

Health and Social Benefits

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

Environmental Benefits

For businesses that handle environmentally hazardous material, flooding can cause widespread environmental damage. Better education about the risks of flooding and how to plan for storm events can help to prevent this type of environmental damage from occurring. Businesses that store hazardous materials will receive guidance on safe storage that removes the risk of contaminating floodwaters.

Cost-Benefit Analysis

As this is a shared and programmatic project, the costs are relatively low at \$40,000, yet the benefits can be tremendous in getting businesses back in operation faster after a storm. Benefits are realized when businesses owners understand and mitigate



A Business Continuity Program can help small businesses plan better and bounce back quicker after a disruption or storm (source: Arup)

against risks their business may present to local areas should flood waters intrude the property or building, such as securing fuel tanks, raising sensitive chemicals to higher floors, or dry- or wet-floodproofing their operations.

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

Risk Reduction Analysis

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

General Timeframe for Implementation

The implementation of this project will take approximately 24 months from commencement.

Regulatory Requirements Related to Project

There are no regulatory requirements associated with this project.

Jurisdiction

None

Proposed Project: Meadowbrook Corridor Stormwater System Modeling, Analysis and Pilot

The Meadowbrook Corridor is a large tributary system running south from Westbury to Hempstead's Middle Bay. The Corridor's tributaries and system of retention ponds were originally part of the Brooklyn Water Works reservoir system, which was a water conveyance system built to provide drinking water to the rapidly growing New York City Borough of Brooklyn. Today, the corridor conveys stormwater from the Freeport Creek watershed out into Merrick Bay. The Corridor is divided by the Meadowbrook State Parkway elevated roadway, which also serves as the border between the hamlet of Merrick and the Village of Freeport and is a County designated evacuation route serving the Community and the barrier islands. There are more than 200 stormwater outfalls draining into the Meadowbrook Corridor and its sensitive fresh and tidal wetlands.

The Corridor is vulnerable to flooding from storm surges due to its low elevation and connection with the bay. The high number of stormwater outfalls combined with runoff from the Meadowbrook State Parkway leads to severe flooding. During and following Superstorm Sandy, south Freeport, Merrick, and Bellmore residents were restricted from using Merrick Road where it meets the Parkway as Merrick Road received floodwaters from the Corridor. In addition, on the Freeport side of the Corridor, the storm surge and the stormwater runoff converged between Sunrise Highway and Merrick Road, exacerbating flood damages in the area, including building damages sustained at the Freeport Housing Authority Moxie Rigby Apartments.

The area is very low lying, only two to four feet above the water table, and the soil types are mainly Udipsammments wet substratum, Ipswich mucky peat, Udorthents, refuse substratum at south end and Atsion loamy sand at north end. Within the Corridor, the East Meadow Brook to the north of Freeport and Merrick is polluted with pathogens from urban and stormwater runoff. The Freeport Reservoir and East Meadow Pond, located in Freeport and Merrick, respectively, are polluted with chlordane from contaminated sediments, which are currently carried into Merrick Bay.

Information about the existing stormwater infrastructure within the Freeport Creek Watershed is limited and a better understanding of how surface and

subsurface water moves through the area will be used to provide insight about the most effective solutions to best water management approaches along the Corridor. Therefore, this project includes both a comprehensive analysis of the existing system, as well as the identification and implementation of five pilot projects using "green infrastructure" methods to help mitigate flood risk and improve water quality.

The project includes will undertake the following phases:

Phase 1: Key stakeholder engagement

The location of the Meadowbrook Corridor and Freeport Creek Watershed requires coordination across several jurisdictions and with numerous stakeholders. An initial phase of key stakeholder meetings will be used to collect and collate existing drainage sets from Nassau County, the Village of Freeport, the Town of Hempstead, and NYS DOT. Other stakeholders may include NYS DEC, NYS DOS, and the Town of North Hempstead.

Phase 2: Development of a hydrologic and hydraulic model

This phase includes gathering data on the existing stormwater system within the Freeport Creek Watershed and the development of a hydrologic and hydraulic ("H&H") model to provide a detailed picture of where the runoff is coming from, how much there is, whether the current system has adequate capacity and what improvements could be made.

A proportion of the drainage will be surveyed to inform the model. The survey will include manhole inspections and connectivity surveys to give level, size, line, and condition of the pipes. The survey assumptions include one manhole every 300 feet, a drainage length assumption of 195,288 feet, and 651 manholes. The building and verification of an integrated catchment model will be undertaken to determine the contributors to flooding and the most appropriate solutions and the outfalls with the greatest discharges into the impaired water bodies. Using the most current LiDAR (Light Detection and Ranging) ground surface data available, this stage will involve processing the data, building and calibrating the model and installing and collecting data from four stream gauges.

This model will be capable of:

- Determining the causes of localized flooding issues across the catchment and identifying measures to prevent the flooding;
- Determining which outfalls are contributing the most urban stormwater run-off to the impaired watercourses, lakes and estuaries and identifying outfalls for the implementation of green infrastructure to reduce and treat stormwater runoff; and,
- Locating green infrastructure solutions to provide the most effective investment to reduce surface water flooding.

Following development of the model, it will be used, in combination with a GIS mapping study of the physical ground conditions, to determine the most appropriate location for green infrastructure in terms of maximizing water retention, infiltration, and additional water quality benefits and choosing the most appropriate green infrastructure solutions for the various sites.

Phase 3: Pilot Projects

Upon completion of the model and corresponding analysis, pilot projects will be built to study and monitor various methods of managing and treating stormwater runoff. A few pilot projects have been conceived though an initial assessment of existing conditions and issues and, contingent upon verification of benefits using the H&H model, will involve the following five interventions:

- Regenerative storm conveyance retrofits at five locations within Merrick. This involves moving the storm drainage outfalls further away from the road and constructing a staggered regenerative storm conveyance system that retains and cleans storm water. The following outfall retrofits have been identified:
 - Babylon Turnpike: 180 foot long conveyance system;
 - Webster Avenue: 93 foot long conveyance system;
 - Camp Avenue: 99 foot long conveyance system;

- Michalicki Place: 171 foot long bio-swale along one side of the highway with three crossing points for driveways and 158 foot long conveyance system; and,
- Reid Avenue: 274 foot long bio-swale along one side of the highway with three crossing points for driveways and 108 foot long conveyance system.
- Creek Restoration: This project entails reconnecting the creek with the natural floodplain using a wetland seepage regime to reduce wet-weather velocities, prevent further erosion and improve flood plain wetland area. The restoration will involve filling the incised channel (5,250 feet long) with sand and gravel to raise the stream bed elevation and constructing a series of shallow pools and riffle grade weir controls to encourage seepage.
- East Meadow Pond Drainage Study: This study will seek to understand the capacity of the two East Meadow ponds and the operation of existing flow controls at the outlets of the ponds. Additionally, it will investigate whether any drain down regimes can be implemented at the ponds to prevent flooding in these areas.
- East Meadow Pond Floating Wetlands Restoration: Restoration of wetland along Meadowbrook Corridor Pilot Project: This pilot project will demonstrate the ability of a modular floating wetlands system to remove excess nutrients from the pond that are carried by stormwater runoff entering the pond and improve the aesthetic quality of the pond.
- Freeport Creek Day-lighting Study: Freeport Creek currently runs through a culvert under industrial and retail properties between East Meadow Pond and Mill Road for a length of one-half mile. Creek day-lighting is the redirection of a below-ground stream culvert into an above-ground channel, typically with the goal of restoring the stream to a more natural state. This study will assess whether day-lighting the creek is feasible, and assess the costs and benefits of this project.

This project will be funded and carried out in partnership with the neighboring NYRCR Bellmore/Merrick Community, which is located to the east of the Meadowbrook Parkway Corridor and is partially contained within the Freeport Creek Watershed.

Estimated Project Cost

The total project cost is approximately \$2,500,000. However, the cost would be shared with the neighboring NYRCR Bellmore/Merrick and, given the weighting of benefits toward Merrick, will cost the Community an estimated \$650,000.

Project Benefits

This proposed project will improve stormwater management for NYRCR Freeport and NYRCR Bellmore/Merrick and supports the Infrastructure, Natural and Cultural Resources, and Health and Social Services Recovery Support Functions (RSFs).

Risk Reduction & Resiliency Benefits

This project will yield several risk reduction benefits for the Communities and the natural environment. As noted, flooding is exacerbated in the Village of Freeport and the hamlet of Merrick due to the volume of upstream stormwater that drains through these areas. Through the proposed improvements, stormwater runoff will be better managed in the vicinity of the Communities and subsequently reduce the risk of flooding impacts for adjacent property owners. Flooding in these areas also impacted Merrick Road and Sunrise Highway during Superstorm Sandy and Hurricane Irene. Reducing stormwater runoff impacts will also reduce the risk of Merrick Road and Sunrise Highway being impassable during and after future storms and flooding events. This benefits residents and business owners who rely on these roads to access goods and services, and to access the Meadowbrook Parkway, which is a regional gateway for freight deliveries and emergency services.

Economic Benefits

Owners of businesses adjacent to the corridor will benefit through reduced recovery costs following future flooding events. The model that will be constructed will provide future cost-savings benefits to



Flooding along the Meadowbrook Parkway in 2011 (source: Merrick Patch)

the Village of Freeport and the Town of Hempstead, as it can guide agencies toward projects that are more cost-effective, resilient, and that bring about the most co-benefits such as increasing recreational space and adding new green spaces to commercial areas.

Health and Social Benefits

Through reducing the impacts of stormwater runoff, the proposed project will enable emergency and disaster response resources to be allocated to other areas in future storm and flooding events. In addition, the improvements can decrease flood damages and increase the aesthetic value of existing green spaces. The improvements can create an opportunity in the future to develop pedestrian and bicycle paths along the Meadowbrook Corridor. These recreational and aesthetic improvements can increase property values for residents and businesses. Flooding impacts can also be reduced at the ball fields owned by Freeport School District. Finally, socially vulnerable populations living at the Moxie Rigby Apartments will also benefit from reduced occurrence and severity of flooding impacts.

Environmental Benefits

The proposed project will create a system to retain stormwater within the Meadowbrook Corridor so that it can be filtered before it enters the South Shore Estuary. The Estuary will benefit through improved water quality and subsequently, ecosystem health.

The Creek Restoration pilot project will improve the quality of wetlands and restore a portion of the natural systems which have been heavily damaged. Birds, fish, and other fauna as well as several floras will benefit from the restoration. By expanding green space and reducing the use of hard infrastructure, air quality, emission reduction, and air temperature benefits may also be realized. Finally, the proposed model can help demonstrate the value of green infrastructure solutions, furthering the justification for improvements to the natural environment in the future.

Cost-Benefit Analysis

Modeling and analysis is necessary to help identify solutions for stormwater management, which include initiatives for capital projects, updated maintenance requirements, regulatory improvements, public awareness programs, and other property owner assistance measures. These initiatives will improve the functionality of the stormwater system and reduce flooding issues in the region, reducing damage to buildings due to flooding and increasing the chance that buildings will remain habitable.

This project will improve access to critical assets and facilities during storms and improve access for fast and safe evacuation. By reducing the amount of standing water on roadways, vehicle operation becomes safer during all types of inclement weather, and road congestion will be reduced. During major storms, improved drainage will increase the amount of time that roads are available to emergency services at the storm's outset, and can return a flooded road to service more quickly.

Green infrastructure projects will help to clean stormwater before it reaches the estuary, reducing pollution effects on wetlands, which when healthy, provide a natural barrier and help to filter stormwater before it enters the estuary and help attenuate storm surge. Additional benefits of green infrastructure projects include localized air quality improvements, habitat restoration, aesthetic improvements and potential savings of capital and maintenance costs of expensive traditional infrastructure improvements. The pilot projects offer a local opportunity for public education and job training for an emerging field, in addition to a local example of best stormwater management

practices and resilient infrastructure, to be displayed and discussed at the proposed Operation SPLASH Resiliency Education Center.

Risk Reduction Analysis

Hurricane Irene and Superstorm Sandy brought the Communities' attention to the various causes of flooding and flood damage. NYRCR Freeport and NYRCR Bellmore/Merrick now understand that they can improve the way stormwater runoff from upstream areas is managed in order to more effectively protect their Communities from flood risk. These initiatives will increase the capacity of the stormwater system and reduce flooding issues in the region. This reduces risk to population and private and natural assets. The various components of the proposed project will help Communities reduce the risks of flooding to homes, businesses, parks and open spaces, civic institutions, and infrastructure systems. The ability to keep roads operating under more severe circumstances in the future will also enable more effective disaster management, response, and recovery, reducing the risks to public health and safety in the Communities.

General Timeframe for Implementation

The implementation of this project will take approximately 24 months.

Regulatory Requirements Related to Project

Coordination on approvals and permitting will be required with NYS DOT and Nassau County Department of Public Works. This may also involve the NYS DEC, USACE and CZM consistency concurrence (NYS DOS).

Jurisdiction

The majority of drainage is under the jurisdiction of the Town of Hempstead, Nassau County, New York State Department of Transportation (NYS DOT) and the Village of Freeport.

Proposed Project: Lifeline Corridor Study and Pilot Implementation: Merrick Road Corridor



A artist's impression of Merrick Road with new high-efficiency LED street lights powered by solar panels, underground power lines, and additional green infrastructure improvements (source: Arup)

Throughout NYRCR Communities of Baldwin, Freeport, Bellmore/Merrick, Seaford/Wantagh, and Massapequa post-storm conditions on various roads compromised life safety and impeded the ability of first responders and residents to access certain destinations. Issues, such as lack of power to traffic lights, lack of street lighting, flooding, downed power lines, damaged trees, and debris all contributed to disruptions to the local and regional road network.

By strategically focusing infrastructure investments to key streets within the five areas, a “Lifeline Network” would provide maximum accessibility in and out of residential neighborhoods, as well as in and out of the area in general. This network of State, County, and local streets would integrate streetscape design such as redundant power and improved drainage systems so that they would be more resilient to storm events and better serve first responders and residents before, during and after a storm.



Existing condition along Merrick Road (source: Arup)

The project includes a study to determine the location and specific objectives of the Lifeline Network streets, followed by the creation of guidelines for increasing the resiliency of Merrick Road and Sunrise Highway which traverse all five NYRCR Communities in east-west orientation, and north-south streets in each Community.

This study seeks to accomplish the following:

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

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

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

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

Merrick Road Green Infrastructure Design

Following the guideline development phase, a pilot project which tests the application of the guidelines for each NYRCR Community will be designed and recommended for implementation.

In Freeport, the pilot project will be green infrastructure improvements on Merrick Road between Buffalo Avenue and the Meadowbrook State Parkway ramps to reduce flooding and improve stormwater management during and after significant storm events.

As a commercial arterial corridor, Merrick Road provides access to many important community assets in each of the NYRCR Communities. These include pharmacies, medical offices, gas stations, supermarkets, restaurants, banks, pet hotels, libraries, and government institutions. Access to these assets is essential in a post-storm scenario. Further, many higher density housing developments are prevalent along Merrick Road, some of which serve socially vulnerable populations, including seniors, non-English speaking residents and low income populations. Merrick Road also provides access to critical links to north-south transportation connectors, including Ocean Avenue, the Meadowbrook State Parkway, the Wantagh State Parkway, the Seaford-Oyster Bay Expressway and Hicksville Road and is a primary corridor for Nassau Inter-County Express (NICE) bus service – an important service for non-automobile owning populations. Access to these regional connectors is essential for safe transportation after a storm has struck.

Merrick Road is an important lifeline for many people, businesses and institutions. Due to the importance of the road, it is proposed that a study and subsequent pilot projects to improve its post-storm functionality take place. Based on the findings and results, the Lifeline Project Corridor guidelines will be applied to additional streets that are critical at the neighborhood and community levels.

Estimated Project Cost

Each NYRCR Community’s contribution to the shared project will be \$300,000. Developing streetscape design guidelines that incorporate resiliency features, green infrastructure, and complete streets principles will provide the Communities with the information needed to refit critical roads to function better in case of major storm events.

Project Benefits

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

Risk Reduction & Resiliency Benefits

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

Economic Benefits

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

Health and Social Benefits

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

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

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

Environmental Benefits

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

Cost-Benefit Analysis

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

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

Risk Reduction Analysis

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

General Timeframe for Implementation

The implementation of this project will take approximately 24 months from commencement.

Regulatory requirement related to the project

The implementation of this project in the Village of Freeport would involve the New York State Department of Transportation, Nassau County Department of Public Works, and the Town of Hempstead Highway Department. This may also involve the NYS DEC, USACE and CZM consistency concurrence (NYS DOS).

Jurisdiction

The Village of Freeport and Nassau County have jurisdiction over this project.

Featured Project: Green Infrastructure Plan Implementation - Main Street Improvements



An artist's impression of green infrastructure such as rain gardens, and landscaping help reduce stormwater runoff along South Main Street as part of the Green Infrastructure Plan (source: Arup)

As described in the Green Infrastructure Plan project, green infrastructure helps to alleviate flooding issues by diverting and/or delaying stormwater from entering the drainage system. Examples of green infrastructure include permeable paving, bioswales and green roofs, and stormwater ponds.

This project proposes a pilot implementation of green infrastructure concepts along Main Street in Freeport. This project builds on the existing Building a Better Freeport plan, which recommends street improvement projects along North Main Street. This project would operate in tandem with the proposed improvements, ensuring that pedestrian improvements are accompanied by stormwater improvements such as bioswales or open channel infiltration areas, to the extent possible. This project will also



Existing condition along South Main Street
(source: Arup)

fund reconstruction of areas along South Main Street that have been improved recently, but missed opportunities to incorporate green infrastructure.

The pilot project includes the construction of 1,800 square feet of bioswales on Main Street between Seaman Avenue and Mill Road, in accordance with proposed pedestrian safety improvements, 400 square feet of bioswales in existing pedestrian bump-outs – or curb extensions at pedestrian crossings to reduce crossing distances – on South Main Street, and 6,000 square feet of rain gardens in the public plazas at the intersection of South Main Street and Smith Street.

Estimated Project Cost

The proposed project will cost an estimated \$790,000.

Project Benefits

This project supports the Recovery Support Functions of Natural and Cultural Resources, Infrastructure, Health and Social Services, and Economic Development.

Risk Reduction & Resiliency Benefits

By diverting or delaying stormwater from entering the drainage system, green infrastructure helps reduce the risk of flooding of community assets, homes, and businesses. Often, green infrastructure projects can be combined with regular road maintenance or utility maintenance projects to realize cost savings.

Economic Benefits

Investments in green infrastructure have been proven to reduce capital costs of installing expansive and expensive grey infrastructure components (pipes, drains, outfalls). In addition, the aesthetic value that green infrastructure provides can encourage economic development along the Main Street corridor in Freeport, which has been identified in previous Village planning documents as an area for economic growth, beautification, and infrastructure investment.

Health and Social Benefits

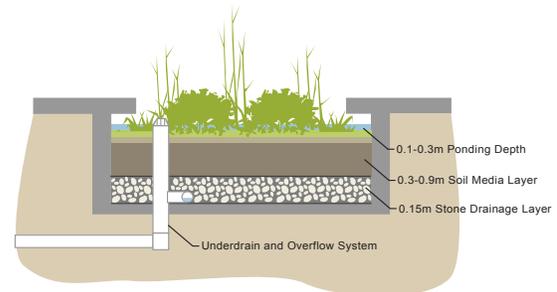
Green infrastructure systems also create opportunities to improve social resilience and cohesiveness by creating open spaces for residents to recreate and interact with one another. Public health can also be improved through enhancing local air quality and providing places throughout communities for residents to exercise and enjoy the outdoors.

Environmental Benefits

The environmental benefits of green infrastructure are vast and varied depending on the improvements made; however, the benefits of the proposed bioswales and rainwater gardens can include groundwater recharging through facilitating absorption of stormwater, pollutant reduction in bays and wetlands by reducing the amount of runoff generated, air quality improvements through increasing carbon-absorbing foliage, and lower summer temperatures through increasing reducing the footprint of contiguous heat absorbing materials such as steel, concrete and pavement.

Cost-Benefit Analysis

Implementation of green infrastructure improvements along Main Street can bring about the economic, environmental, and social benefits outlined above. Through the implementation of these projects, the full benefits of green infrastructure in the Village can be realized.



Example of a cross section of a bioswale (source: Arup)

Risk Reduction Analysis

This featured project would reduce asset risk due to flooding to infrastructure, housing, businesses, and parks and open spaces. It will also reduce the risk of ecosystem loss through pollution carried to wetland areas – which serve a storm protection function – and waterways through the stormwater system.

General Timeframe for Implementation

The development of a Green Infrastructure Plan will take approximately twelve months to complete from project commencement.

Regulatory Requirements Related to Project

Coordination on approvals and permitting may be required with Nassau County and NYS DOT.

Jurisdiction

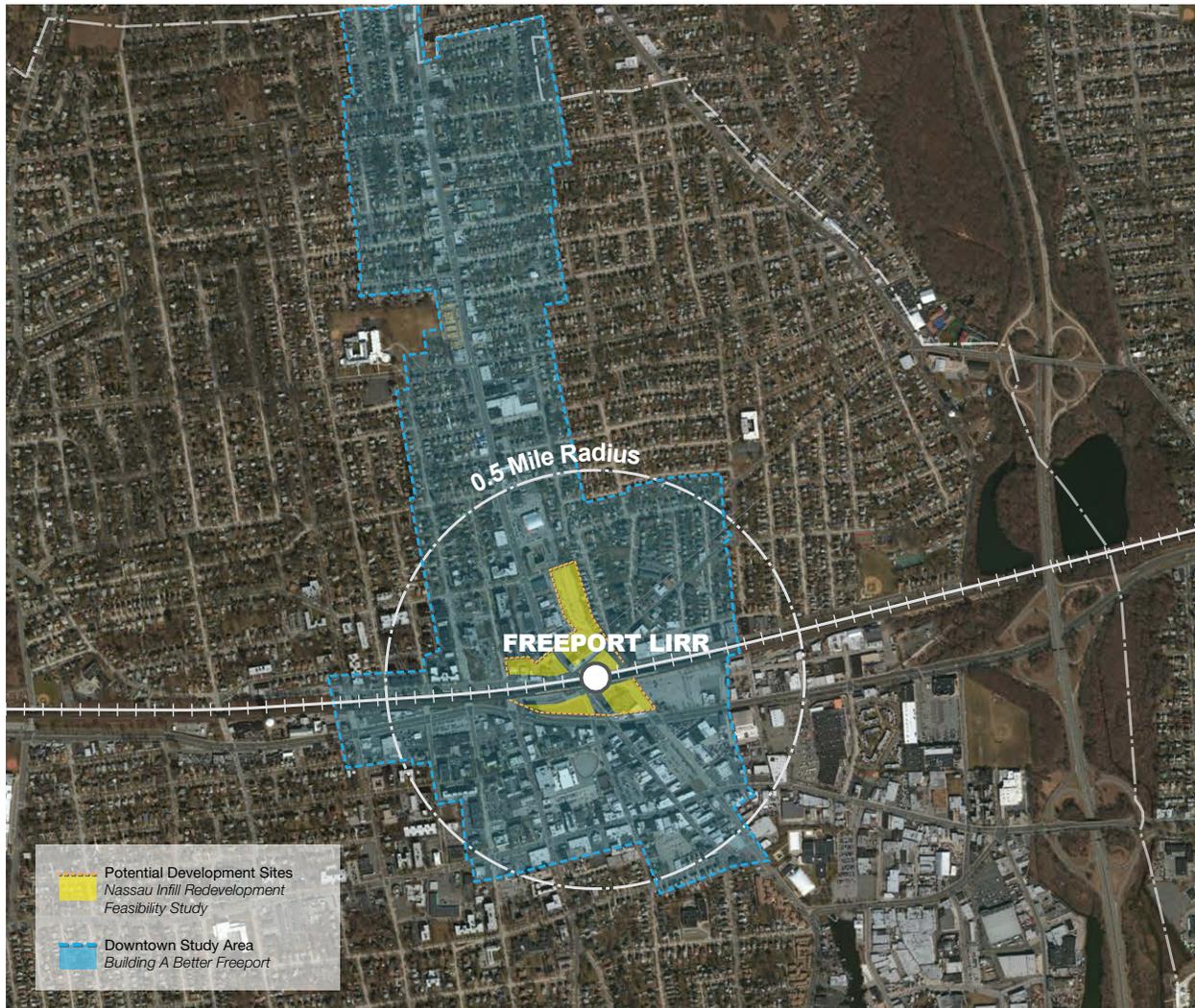
The Village of Freeport Department of Public Works has jurisdiction over the implementation of this project.

Featured Project: Regional Transit-Oriented Development, Access, and Parking Study

This project comprises a study of the following: (1) Redevelopment potential of Downtown Freeport, particularly within a half mile of the Long Island Rail Road (LIRR) station, (2) Access to local public transportation connecting Downtown Freeport, the Nautical Mile, and the Freeport Industrial Park, and (3) Optimization of parking within Downtown Freeport, the Nautical Mile, and the Freeport Industrial Park.

The area around the Long Island Rail Road (LIRR) station in Downtown Freeport presents an opportunity for commercial and residential development outside of extreme and high risk areas. The study will make

recommendations for enhancing the Downtown area into a thriving, pedestrian-friendly Community core with a mix of housing and commercial businesses at an appropriate scale, and which leverage their proximity to the LIRR station. Currently, there are several underutilized parcels in the Downtown area, several of which are devoted to surface parking lots. The study will identify opportunities to redevelop these parcels to create a more cohesive, attractive street environment. The potential for the consolidation of parking spaces within a parking structure will be explored, as a centrally located parking structure would also



The area around the Freeport LIRR station presents an opportunity for transit-oriented development (source: Arup)



Freeport Plaza West is future of mixed-use transit-oriented development (source: Arup)

offer shoreline residents a place to store their vehicles during storm events. Guidelines for the design of resilient, sustainable, and aesthetically pleasing parking structures will be developed and strategies for financing parking structures will be identified.

There is also a need to optimize the parking supply near the Nautical Mile and Freeport Industrial Park. At the Nautical Mile, the street façade is interrupted by small, individual parking lots that detract from a pedestrian-friendly environment. The study will explore options for increase parking supply at peak periods, while maintaining the character of the area. Like other older industrial areas, the Freeport Industrial Park has unique parking needs and vehicle access needs that are not necessarily reflected in the built form today. This study will evaluate the parking needs for the Freeport Industrial Park and recommend appropriate solutions.

Local transportation access is also an important element of a resilient community. This study will also develop a concept for local public transportation circulator that connects Freeport's key businesses, retail, and recreational areas to each other. Key stops and corridors could include the Nautical Mile, LIRR Freeport Station, the Industrial Park, North Main Street, Merrick Road, Atlantic Avenue, and Guy Lombardo Avenue. This service can also serve as a form of transportation for socially vulnerable populations and aid post-disaster mobility, when private vehicle and fuel access may be limited.

Estimated Project Cost

The proposed project will cost an estimated \$500,000.

Project Benefits

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

Risk Reduction & Resiliency Benefits

In the study of potential development opportunities, lower-risk options for housing and commercial space that would assist in the potential relocation of residents or business from higher risk areas will be evaluated.

Economic Benefits

The redevelopment of underutilized parcels, including existing parking lots, in the Downtown area will provide opportunities for waterfront landowners to relocate out of high and extreme risk areas, as well as attract new residents and business owners to Freeport. Increased residential and commercial development will allow Freeport to maintain and enhance its tax base. The access and parking studies will improve and optimize the local transportation system, which can bring more customers to businesses in the Downtown, Nautical Mile, and Freeport Industrial Park.

Health and Social Benefits

A revitalized Downtown that serves as a Community destination will help to strengthen social ties. A focus on transit-oriented development in close proximity to the LIRR station facilitates walking and provides a public health benefit. Safe storage of vehicles provides a health benefit by reducing the owner's anxiety that his or her car will be destroyed by flooding, and reduces the risk that vehicles will be swept away during a heavy flooding event and block access to key roads.

Environmental Benefits

Storing cars in a protected structure out of an extreme or high risk zone reduces the risk of gasoline leaking into waterways during a flooding event. By consolidating parking and allowing for redevelopment of parcels, the amount of impervious surfaces could be reduced, providing the environmental benefit of increasing stormwater capture and reducing the amount of environmental contaminants reaching local waterways.

By concentrating redevelopment near a transit hub, trips formerly taken by cars can be replaced with walking, bicycling, or mass transit. This reduces greenhouse gas emissions, and requires less space for car parking, which in turn lessens the amount of impervious surface and improves stormwater runoff performance.

Cost-Benefit Analysis

Planning for future resiliency, economic development, public transportation, and parking optimization in the Community's key commercial areas would cost approximately \$500,000. In the creation of opportunities for growth, development, and possible relocation to less risky areas, the plan and subsequent development can reduce the exposure to harm and the potential need to rebuild by creating opportunities to relocate within the Community to areas of greater safety. The development that results from the plan will generate construction jobs during the building phase and local jobs at retail or commercial establishments after the project(s) are built. Finally, green infrastructure can reduce or eliminate the costs of future stormwater drainage infrastructure by dealing

with stormwater on site. The additional tax revenue that can be generated from attractive commercial, industrial, and residential development, and the subsequent increase in local spending, can also help to justify the project cost.

Risk Reduction Analysis

This development, access and parking study will help to reduce population risk by identifying areas suitable for relocation of businesses and residents, including vulnerable populations, from high risk areas to areas of lower flood risk. The implementation of parking structures in lower risk areas may also help reduce risk of flood damage to vehicles that would otherwise be located in high risk areas.

General Timeframe for Implementation

This featured project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

As the output of the project is a plan, there are no regulatory requirements related to this project.

Jurisdiction

The Village of Freeport has jurisdiction over the project area.

Featured Project: Downtown Microgrid Phase 3: Redundant Distribution Surrounding Microgrid

Freeport Electric, the Village of Freeport's power authority, owns and maintains power generation and distribution infrastructure throughout the Village. As a Village-owned utility, Freeport Electric is committed to providing reliable and affordable energy, and investigating innovative ways to maintain these positive features of living and doing business in Freeport. An emerging trend for small scale and contained energy distribution is the development of 'microgrids.' A microgrid is a small-scale version of the centralized electricity system that includes all the necessary components to operate in isolation of the centralized grid. Microgrids operate independently allow for the import or export of electricity when connected to the wider electricity grid. This enables power continuity in critical areas when power outages and service disruptions affect the wider grid. Downtown Freeport has been identified by Freeport Electric as an ideal location for a microgrid demonstration project.

Phase 1 of the Downtown Microgrid project (described in a proposed project above) will investigate the engineering and financial feasibility of implementing power generation and transmission components of the proposed microgrid. Phase 2 (described in a proposed project above) proposes the purchase of a 'black-start' – the ability to restart a generator after a blackout without the use of external electrical power transmission – generator at Power Plant I, the heart of the proposed microgrid. This project proposes the implementation of Phase 3, which involves the installation of four new underground circuits on the streets to create the border of the microgrid. These circuits increase redundancy and replace outdated circuits, while increasing capacity.

The power generation and transmission components of the microgrid include:

- Replace an outdated diesel generator at Freeport Power Plant I with a dual-fuel (diesel/natural gas) generator with "black-start" capability, which is the ability to restart a generator after a blackout without the use of external electrical power inputs. (See Microgrid Phase 2 project, following)
- Four new underground circuits around the border of the microgrid.
- Four 250 kilowatt (kW) fuel cells at Freeport's potable water pump station.
- One 1 megawatt (MW) wind turbine near Freeport Power Plant II.
- Solar farms at Freeport Recreation Center 1 MW, Power Plant I (150 kW) and Power Plant II (100 kW).

Downtown Freeport has a high concentration of critical assets, infrastructure, and facilities instrumental to disaster response and recovery. Critical assets include Verizon Wireless (telecommunications provider); the Long Island Rail Road (LIRR) Freeport station and associated substation that provides power to the LIRR Babylon Branch; the Village Hall and police headquarters; three firehouses including the headquarters; four public schools, the Freeport Memorial Library; numerous health and community services; and businesses that serve post-disaster functions (e.g., supermarkets, banks, gas stations). All of these facilities are essential to the economic and social well-being of the Community. The Freeport Memorial Library and the JW Dodd School, located within the microgrid project area, are proposed to serve as Community Assistance Centers (see project description below) after disasters.

During Superstorm Sandy, heavy winds and flooding caused damage to Freeport Electric's power distribution network, resulting in outages lasting multiple days. Critical facilities that lacked sufficient backup power were adversely affected. As a result, residents and business owners experienced delays in obtaining critical life supporting supplies such as food, fuel, and pharmaceuticals.

The 2013 Draft Freeport Hazard Mitigation Plan and other Village of Freeport planning documents cite downtown as an important area for continued economic growth and the certainty of power supply will allow businesses and community services to quickly reopen after storm events and spur economic growth.

Estimated Project Cost

This project will cost approximately \$30.5 million.

Project Benefits

This featured project supports the Recovery Support Functions of Infrastructure, Health and Social Services, Natural and Cultural Resources, Community Planning and Capacity Building, Housing, and Economic Development.

Risk Reduction & Resiliency Benefits

Developing a central location with a cluster of essential services that can effectively avoid power loss during and after an event is valuable to Community residents and businesses. Reducing the risk of power loss through diversifying energy sources and creating redundancy within the distribution network provides greater certainty to residents and business owners, allowing them to move about the Community and access resources and businesses safely with the aid of well-lit streets and functioning traffic signals.

Economic Benefits

Economically, a microgrid provides an opportunity to reduce loads on the existing Freeport Electric grid, reducing costs to Freeport Electric and public expenditures by the Village. Business continuity can also be improved and more quickly restored after a disaster, which can offset losses caused by a reduced customer base. Increasing capacity for anticipated downtown/transit-oriented development (TOD) growth, characterized by mixed-use residential development in close proximity to a transit station, can create new job opportunities and tax revenue.

Health and Social Benefits

Increasing capacity for TOD also enables relocation of residents and business from vulnerable areas to upland areas. Finally, this project will provide an important educational benefit as one of the innovative pilot projects that can be described at the Operation SPLASH Resiliency Education Center (described above).

Environmental Benefits

Increasing the use of cleaner energy, through the implementation of renewable sources such as solar and wind and lower emissions sources such as fuel cell and natural gas create the environmental benefits of reduced emissions and improved air quality.

Cost-Benefit Analysis

The multitude of potential benefits discussed above, and ability to support each of the Recovery Support Functions justifies the cost of examining the feasibility of a microgrid in Downtown Freeport. Through a phased implementation of the various microgrid components, many more indirect benefits will be realized.

Risk Reduction Analysis

Providing a redundant distribution network around the microgrid will enhance energy security and resilience for key community facilities, businesses, and residents. By installing the four circuits, instead of two, there is reduced risk that anticipated future demand will exceed capacity, and reduced risk that power cannot be distributed, should a problem arise with one set of circuits.

By having a stable energy supply, emergency response facilities will have a greater chance of remaining operational, reducing risk to the population through faster emergency response. Buildings and homes throughout the community will have a greater chance of retaining electricity and remaining habitable, reducing the need for immediate emergency response or shelter.

General Timeframe for Implementation

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

Regulatory Requirements Related to Project

Approval or permitting may be required from Nassau County Department of Transportation (DOT), New York State DOT, and Long Island Power Authority/ Public Service Enterprise Group for this phase of the microgrid implementation.

Jurisdiction

The Village of Freeport and Freeport Electric are the entities with primary jurisdiction over this project area. The Federal Energy Regulatory Commission (FERC) authorize the New York Independant Systems Operator (NYISO) to grant permission for grid inter-connection. The Public Services Comission (PSC) and New York State Department of Environmental Conservation (NYS DEC) may also have jurisdiction over this project.

Featured Project: Protection for Freeport Electric's Power Plant II, Phase 2: Construction

Phase 1 of Protection for Freeport Electric's Power Plant II develops, analyzes, and designs a coastal flood protection system for Power Plant II. This project will fund the construction of the recommended long-term flood protection options developed in Phase 1. Further funding from State and Federal grant programs for construction is required.

This project leverages other resiliency activities being taken by the Village to protect Power Plant II. A National Fish and Wildlife Foundation (NFWF) grant is currently being sought to restore the natural coastline and ecosystem immediately to the east of the plant, which will simultaneously restore a natural ecosystem and provide a layer of natural protection around Power Plant II. Should the NFWF grant be secured, the grant work will be coordinated with Phase 1 and Phase 2 of this project to ensure the designed flood protection is compatible with and enhanced by the protection afforded by the natural system.

Freeport Electric, the Village of Freeport's power utility, owns and maintains power generation and distribution infrastructure throughout the Village. Power Plant II is one of two Freeport Electric's power plants and is the primary power generating facility for more than 43,000 residents and 1,800 businesses within Freeport. It is capable of producing up to 87% of Freeport's total electrical power output.

Power Plant II is highly vulnerable to coastal surges due to its location at the southern edge of the Industrial Park peninsula. Though major damage

was not sustained during Superstorm Sandy and Hurricane Irene, with the advent of a slightly larger storm surge many components of Power Plant II could be destroyed, potentially creating floating hazards and fuel spills. According to the Freeport Electric Director and staff, who led a site visit with Committee members, State planning officials and the Consultant Team, floodwaters reached the control center door and fuel tanks were shifted on their bases (despite being bolted down) by the large volume of water from Superstorm Sandy's surge.

The risk assessment presented in the 2013 Draft Freeport Hazard Mitigation Plan states that a Category three or four hurricane could damage or destroy all power generation equipment at the Plant, including generators, motors, transformers, and cooling towers, and could tear fuel storage tanks from their foundations, contaminating waterways and creating floating hazards in the process.

Estimated Project Cost

This featured project is estimated to cost between \$10,000,000 and \$20,000,000, depending on the design recommended in Phase 1.

Project Benefits

This featured project supports the Recovery Support Functions of Infrastructure, Health and Social Services, and Natural and Cultural Resources.

Risk Reduction & Resiliency Benefits

The construction of an environmentally conscious flood protection system will benefit Freeport Electric, residents of southern Freeport and businesses in the Industrial Park and along the coast. Freeport Electric would reduce its risk of losing fuel, power generation potential, and sustaining damage to other portions of the site due to a potential floating hazard in future storms. Residents and businesses are at a reduced risk of sustaining loss of life, injury, and property damage from floating and contamination hazards.

Economic Benefits

Freeport Electric benefits economically by protecting key assets and reducing the potential foregone costs of replacing fuel, generation equipment, and repairing



Freeport Canal, damage from Superstorm Sandy(source: Arup)

buildings after future storms. As noted by Freeport Electric staff, depending on the protection measures selected, the project could also offer protection for the adjacent Equus Freeport Power Plant, which supplies power to the Long Island Power Authority / Public Service Enterprise Group grid, as well as the broader Industrial Park peninsula, which is a potential key local economic driver.

Health and Social Benefits

By having a stable energy supply, emergency response facilities will have a greater chance of remaining operational, reducing risk to the population through faster emergency response. Buildings and homes throughout the Community will have a greater chance of retaining electricity and remaining habitable, reducing the need for immediate emergency response or shelter.

Environmental Benefits

The bays, marshes, wetlands, and wildlife will be better protected from contamination hazards in the event of a stronger storm surge dislodging one or more of the Power Plant's fuel tanks.

Cost-Benefit Analysis

By protecting Power Plant II, a significant economic benefit can be realized in the event of a future storm surge. The costs of an environmental cleanup and repairs to private properties or businesses would outweigh the costs of the construction of a flood protection system. In addition, through coordination with the NFWF grant, if secured, environmental benefits of this project will be enhanced.

Risk Reduction Analysis

The implementation of this project will reduce the risk of catastrophic loss of key Freeport Electric fuel storage assets, which are critical in a post-disaster scenario, due to flooding caused by storm surges.

Construction of the flood protection system will reduce flood risk to Power Plant II and enhance energy security for tens of thousands of residents, businesses, and key Community facilities. Environmental risk of contamination from leaking oil tanks and inundated machinery and equipment will be reduced.

General Timeframe for Implementation

This project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

This project may require permits and/or coordination with NYS Department of Environmental Conservation, NYS Department of State (NYS DOS), U.S. Army Corps of Engineers, and U.S. Coast Guard. NYS DOS Coastal Consistency approval may be required for any activity within the coastal zone.

Jurisdiction

The Village of Freeport and its power company, Freeport Electric, have jurisdiction over this project area.

Featured Project: Convert Home Heating to Natural Gas in Extreme and High Risk Areas

This project will develop policy recommendations and an incentive program for early adopters looking to convert home heating oil systems to natural gas, or other renewable methods such as solar, in extreme and high risk areas. Village of Freeport staff, NYRCR Committee members, and Community residents all reported that residential fuel tanks were a major source of damage during Superstorm Sandy. Home heating oil tanks across south shore Communities leaked during inundation as floodwaters displaced fuel inside the tanks. The leaked fuel caused permanent damage to residences, businesses, parks, marshlands, and waterways. In some instances, tanks were removed from their foundations by the force of floodwaters and became floating hazards to people, cars, buildings, and infrastructure. Residents, businesses, and community organizations are still cleaning up the damage from displaced oil more than a year after Superstorm Sandy and some residents can still smell heating oil fumes in their homes. Although existing fuel oil tanks are required to be strapped down, compliance with this regulation has been difficult for Nassau to enforce due to the added homeowner expense.

Home heating oil tanks and systems create significant safety and environmental hazards during a flooding event. Ideally, all structures in extreme, high, and moderate risk areas will convert over time to natural gas and/or other power sources for heat and hot water. The benefit of conversion is to remove heating oil systems in homes and other buildings in flood areas thereby reducing the risk that harmful pollutants will be released into the environment.

The cost for this project includes the administrative cost for changing applicable planning and building regulations and for establishing a budget for the incentive program.

Estimated Project Cost

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

Project Benefits

This project addresses the RSFs of Infrastructure, Housing, Natural and Cultural Resources, and Health and Social Services.

Risk Reduction & Resiliency Benefits

The primary benefit of this project lies in the reduced risk of contamination and damage to homes, businesses, parks and open spaces, waterways, and infrastructure in flood risk areas. Reduction of debris, such as oil tanks, will help maintain roads used to provide public safety services and access to community resources. Nearly one-quarter of Freeport's population of more than 43,000 residents live in NYS DOS identified high and extreme risk areas, and would benefit directly from these regulations.

Economic Benefits

The economic benefits include the reduced costs of repairs to damage caused by oil tanks that may detach and becoming floating debris in future storms, as well as mitigating the costs of cleaning up contamination that displaced fuel from the tanks may leave behind after flood waters retreat.

Health and Social Benefits

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

Environmental Benefits

The bays, marshes, wetlands, and wildlife will be better protected from contamination hazards. Environmentally, the benefits include reduced contamination of waterways, groundwater systems, and surrounding ecosystems caused by displaced fuel, as well as mitigating the potential damage to flora and fauna caused by floating tanks. Additionally, conversion to natural gas and solar heating systems will reduce the Community's emission of greenhouse gases. The Community will benefit through improved local air quality and reduce its contribution to climate change through reduced air pollution.

Cost-Benefit Analysis

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

Risk Reduction Analysis

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

General Timeframe for Implementation

This project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

This project will require coordination with National Grid, which has provision over the local public natural gas system. Regulatory changes will be made to the Village's planning and building construction code.

Jurisdiction

The Village of Freeport Building Department administers building codes. National Grid is responsible for construction and maintenance of the regional natural gas network.

Featured Project: Regional Stormwater Drainage Cleanout, Survey, and Verification

During storms like Superstorm Sandy, excessive amounts of stormwater runoff and coastal inundation left many drains and sewer lines clogged with debris. This led to an increased breadth and severity of flooding along stormwater drainage corridors, such as the Meadowbrook State Parkway corridor. The NYRCR Freeport Community also reported that the often clogged and poorly maintained stormwater drainage system in Freeport and across the County exacerbates and causes flooding across the Village.

This project seeks to clean out all storm drains south of (and including) Merrick Road in the Community. While the drains are being accessed, a comprehensive survey will be conducted to verify and document all stormwater infrastructure contained in the local data inventory for the Freeport area.

Estimated Project Cost

The proposed project will cost an estimated \$4,800,000 to implement.

Project Benefits

The area south of Merrick Road is subject to episodic flooding and has a high level of vulnerability during a storm event. The featured project addresses the Infrastructure, Housing, Economic Development, and Natural and Cultural Resources Recovery Support Functions (RSF) and provides risk reduction and resiliency, economic, environmental, and health and social benefits. The project will increase the efficiency of the existing drainage system by upgrading stormwater defense in critical areas prone to flooding.

Risk Reduction and Resiliency Benefits

The improvements associated with this project would offer more reliable performance of infrastructure systems on a day-to-day basis by ensuring adequate drainage of rainfall and preventing the backflow of flood waters during a significant high tide or storm surge. This, in turn, maintains access to the local community, offers greater protection for property in vulnerable areas, and reduces the potential for harm during storm events by reducing the volume and speed of floodwaters should they enter the Community.

Economic Benefits

By reducing the exposure to flood damage, this project will reduce the risk for economic losses associated with rebuilding and repair in future flood events. It also reduces the likelihood that businesses in the area would close by lessening the risk for flood damage to both personal and public property and assets. Finally, the project provides an information basis for additional system improvements, better asset management, and reduced future costs associated with deferred maintenance.

Health and Social Benefits

In addition to reduced flood damages, the benefits include reduced delays in accessing schools, parks, and homes during tidal flooding events or after heavy rainfalls. Local residents, including seniors, will benefit from being able to access critical services on Merrick Road, such as food stores and pharmacies. Health risks related to exposure to contaminated water are reduced.

Environmental Benefits

Installation of trash/bar screens will have an environmental benefit by reducing the amount of debris reaching bodies of water where it could potentially damage sensitive ecosystems.

Cost-Benefit Analysis

Stormwater and drainage issues are important to the Committee and Community. There is regular flooding throughout the Community and the current drainage system is directly exposed to both tidal and storm surge inundation events. For a cost of \$4,800,000, this investment will bring the current infrastructure systems into a state of good repair and offer another line of defense against flooding from rainfall, storm surge, or high tide. It also protects Community Assets, both public and private, reducing both the risk of flooding and the potential costs for rebuilding after a major event. The project will reduce flooding to thousands of homes south of Merrick Road in the Community, as well as several parks, schools, marinas, and fire department facilities.

Risk Reduction Analysis

This project will reduce flood risk by ensuring that stormwater infrastructure is cleaned of debris and returned to a state of optimal system function.

General Timeframe for Implementation

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

Regulatory Requirements Related to Project

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

Jurisdiction

The Village of Freeport DPW has jurisdiction of the majority of the storm drainage infrastructure.

Featured Project: Street Tree Maintenance and Guidelines

The Village and its key routes are susceptible to downed trees and tree limbs in future hurricanes, tropical storms, winter storms, ice storms, and during heavy wind gusts. Downed trees and tree limbs made roads impassable, delayed emergency response and damaged the power distribution system during Superstorm Sandy and Hurricane Irene.

This project will study current street tree provision and maintenance, and recommend policy changes to improve the resilience of the Village's infrastructure and increase overall public safety while maintaining a balance with the aesthetic and environmental benefits street trees provide. Streets containing or leading to Community Assistance Centers (see description above), such as Guy Lombardo Avenue, and areas with higher concentrations of street trees, such as the northwestern portion of the Village, could be included for treatment and improvement.

Estimated Project Cost

The proposed project will cost an estimated \$100,000 to implement.

Project Benefits

This featured project will support the Recovery Support Functions of Infrastructure and Natural and Cultural Resources.

Risk Reduction & Resiliency Benefits

The attention to managing trees will enhance energy security and resilience for the Community by removing obstacles and threats to the distribution system, such as electrical fires. It will also help reduce the occurrence of downed trees and limbs that may cause accidents, injuries and deaths, and block roadway access to key evacuation routes and routes to critical community facilities, and obstructs paths for emergency response vehicles.

Economic Benefits

Attractive tree-lined streets draw visitors to retail areas and encourage them to linger, providing benefits to businesses and the people they employ. Trees also reduce urban heat island effects, leading to lower air conditioning costs.

Health and Social Benefits

By having a stable energy supply, emergency response facilities will have a greater chance of remaining operational, reducing risk to the population through faster emergency response. Buildings and homes throughout the community will have a greater chance of retaining electricity, reducing the need for immediate emergency response or shelter. Trees create attractive spaces that promote pride of place and a more cohesive community.

Environmental Benefits

Having a better understanding of what trees can be utilized as street trees while minimizing the chances of trees or tree limbs falling will also enable a balance between public safety needs and environmental needs. Street trees provide the benefit of improving local air quality, reducing greenhouse gas emissions that enter the atmosphere, potentially reducing the quantity of stormwater that enters the drainage system and the amount of toxins that enter waterways, and providing shade and a cooling effect in built up environments on hot days.

Cost-Benefit Analysis

An informed tree planting, replacement and maintenance plan will allow the Village to continue to provide the benefits of street trees while minimizing the potential risks and associated economic and public safety risks they can create.

Risk Reduction Analysis

The improvement in managing trees will provide energy security and resilience for the Community by removing obstacles and threats to the distribution system, as well as reduce risk to the population by maintaining access to evacuation routes and critical community facilities and for emergency response vehicles.

General Timeframe for Implementation

This project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

The Village's Department of Public Works (DPW) may change some regulations as a result of this study. Coordination may be required with Nassau County and New York State, in addition to the Long Island Power Authority/Public Service Enterprise Group.

Jurisdiction

The Village of Freeport DPW has jurisdiction over the majority of the street trees within Freeport. Coordination may be required with the public agencies listed above.

Featured Project: Green Infrastructure Plan

It was made clear by residents that storm surge was not the only cause of flooding in the Community during Superstorm Sandy and Hurricane Irene. Flash flooding is an issue in many areas and it exacerbated inundation levels in certain areas. This is caused by the confluence of several factors. Runoff from upstream outfalls discharges into the Community and saltwater intrusion had reduced the capacity of wetlands to mitigate storm surge impacts. During Superstorm Sandy, the storm surge coming in from the bay and the water from stormwater outfalls converged near Moxie Rigby Apartments (Freeport Public Housing) and added to an already severe flood. Additionally, the paved surfaces and roofs that make a significant portion of Freeport's total area impervious contribute to stormwater runoff and the overflow of the stormwater system during heavy rains. During tidal flooding events and coastal surges, stormwater system capacity is reduced and runoff increases the extent and severity of flood damage.

Green infrastructure helps to mitigate these issues by diverting and/or delaying stormwater from entering the drainage system. Examples of green infrastructure include permeable paving, bioswales and green roofs, and stormwater ponds. It is recommended that a network of green infrastructure systems be developed across Freeport to reduce demands on

the drainage system, allow for infiltration, and reduce the level of contaminated runoff that reaches the Bay during rain events.

This project will fund development of a Green Infrastructure Plan that would identify green infrastructure opportunities based on feasibility, level of impact, funding and street reconstruction schedules. Opportunities to manage stormwater on public and private properties will also be identified and recommended in the Plan.

Estimated Project Cost

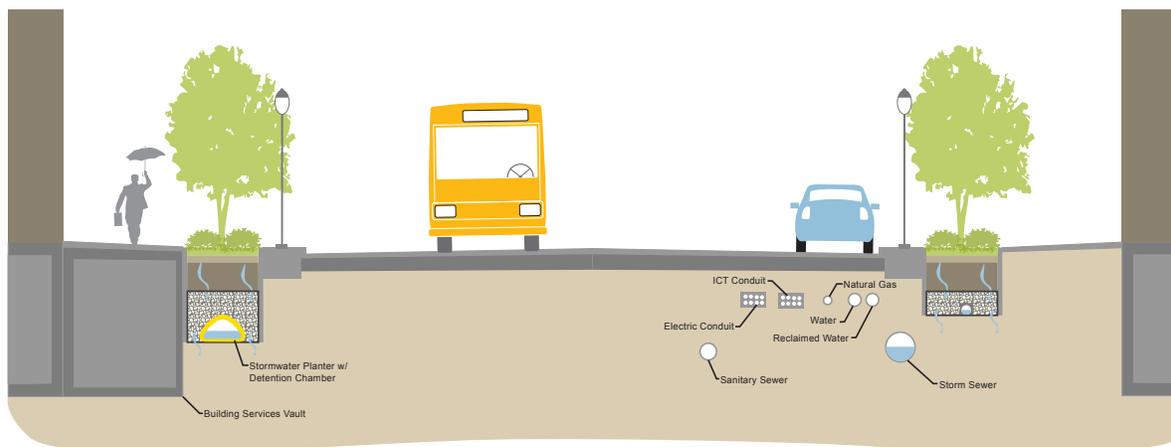
This featured project will cost an estimated \$500,000.

Project Benefits

This project will support the Recovery Support Functions of Infrastructure and Natural and Cultural Resources.

Risk Reduction & Resiliency Benefits

By diverting or delaying stormwater from entering the drainage system, green infrastructure helps reduce the risk of flooding of community assets, homes, and businesses. Having a specified plan for where and when green infrastructure can be implemented throughout the Community reduces the chances that



Example of a cross section through a green street (source: Arup)

opportunities to install these systems will be overlooked in the future. Often, green infrastructure projects can be combined with regular road maintenance or utility maintenance projects to realize cost savings.

Economic Benefits

Investments in green infrastructure have been proven to reduce capital costs of installing expansive and expensive grey infrastructure components (pipes, drains, outfalls). The aesthetic value that green infrastructure provides can encourage economic development in built-up environments where roads and buildings dominate the landscape.

Health and Social Benefits

Green infrastructure systems also create opportunities to improve social resilience and cohesiveness by creating open spaces for residents to recreate and communicate. Public health can also be improved through enhancing local air quality and providing places throughout communities for residents to exercise and enjoy the outdoors.

Environmental Benefits

The environmental benefits of green infrastructure are vast and varied depending on the improvements made; however, they can include groundwater recharging through facilitating absorption of stormwater, pollutant reduction in bays and wetlands by reducing the amount of runoff generated, air quality improvements through increasing carbon-absorbing foliage, and lower summer temperatures through increasing shade and reducing the footprint of contiguous heat absorbing materials such as steel, concrete, and pavement.

Cost-Benefit Analysis

A green infrastructure plan identifies areas for improvements and clearly outlines the economic, environmental, and social benefits of each proposed improvement. Having an upfront plan to reference when opportunities arise can minimize planning and design costs that may discourage implementation. Through this proactive process, the full benefits of green infrastructure in the Village can be realized.

Risk Reduction Analysis

This featured project would reduce asset risk due to flooding to infrastructure, housing, businesses, and parks and open spaces. It will also reduce the risk of ecosystem loss through pollution carried to wetland areas – which serve a storm protection function – and waterways through the stormwater system.

General Timeframe for Implementation

This project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

As the outcome of this featured project is a plan, there are no related regulatory requirements.

Jurisdiction

The Village of Freeport Department of Public Works has jurisdiction over this project.

Featured Project: Public Bulkhead Repair

Bulkheads are structures designed to prevent erosion along the shoreline. While not intended to serve a flood protection function, weak links or gaps in the system can increase the impact of coastal flooding in certain areas. Superstorm Sandy caused damage to many bulkheads in the Community and across the south shore. In addition, the storm surge height was greater than the current recommended bulkhead height, leaving many areas inundated with floodwaters.

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

The project will identify, design, and construct bulkheads along the Freeport waterfront. It includes a detailed inspection of all existing bulkheads to identify specific issues that need to be addressed as well as potential regulatory changes. Existing bulkheads at street ends and canal ends that are public property will be examined. Bulkheads would be at or above the recommended Village of Freeport height of 5.9 ft. above North American Vertical Datum (NAVD).

The Village of Freeport received funding through the Long Island Regional Economic Development Council to replace 1,065 linear feet of bulkhead at Waterfront Park, but the funding falls significantly short of the amount required to complete the project. This project seeks to fund the remainder. This project would also fund the reconstruction of 200 linear feet of damaged bulkhead at Fairview Park and 75 linear feet of damaged bulkhead at Hampton Place.

Estimated Project Cost

The proposed project will cost an estimated \$950,000.

Project Benefits

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



Erosion behind bulkheading along the shoreline of Waterfront Park (source: Columbia University)

Risk Reduction & Resiliency Benefits

The investment will bring the current infrastructure into a state of good repair and help avoid the cost of erosion that would otherwise occur during rainfall, storm surge, or high tide. This line of defense would directly protect roads, allow reliable performance on a day-to-day basis, maintain access to the local community, provide greater protection for property in vulnerable areas and reduce harm during storm events. This protection, in turn, reduces the ongoing need for maintenance and the future cost for road rebuilding and repair during the natural life cycle of the asset.

Economic Benefits

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

Health and Social Benefits

The repaired and improved bulkheads may contribute to reduced flooding impacts on local streets, helping to maintain access during and after flood events. The reconstruction of the bulkheads will provide help

improve the consistency of the coast, reducing the risk of damage to Freeport's existing open space and community recreational assets.

Environmental Benefits

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

Cost-Benefit Analysis

The reconstruction of the bulkheads will reduce erosion and potential damage to important community assets by having higher and stronger barriers at street ends or along public properties. There is also the potential benefit of coastal protection, reducing the risk of damage to the Community's assets such as parks, homes, and businesses. The bulkheads can reduce flooding impacts on local streets, helping to maintain access during and after flood events by reducing erosion effects. The foregone costs of environmental and public and private property damage justify the costs.

Risk Reduction Analysis

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

General Timeframe for Implementation

This project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

The Village grants permits for bulkhead installation, however, coordination may be required with the Town of Hempstead Department of Waterways and Conservation and New York State Department

of Environmental Conservation. This will also involve the USACE and CZM consistency concurrence (NYS DOS).

Jurisdiction

The Village of Freeport has jurisdiction over Village-owned bulkheads.

Featured Project: Key Intersection: Streetlight Retrofit Pilot Project

The NYRCR Freeport Community reported that there was a lack of clarity on which routes to use and which streets would provide access to critical facilities, relief services, and information centers during and after Superstorm Sandy and other recent storms. Similarly, residents expressed frustration with lack of information on what to do, where to go for help, and how to get there following the storm.

Two projects (this project and Key intersection signage, below) will help to provide clarity for which roads to use after a storm. This project proposes a proof of concept to provide solar power and battery backups for streetlights along Guy Lombardo Avenue and at designated Community Assistance Centers. The streetlights will remain illuminated in the event of a power outage and will allow residents to follow them toward the critical resources offered by the Community Assistance Centers. A complementary proposed project is to provide wayfinding signage, as detailed in Key Intersection Signage project that follows.

In addition to retrofitting five intersections along Guy Lombardo Avenue, streetlights will be retrofitted at the intersection of South Main Street and Mill Road and along the street frontages of the five designated Community Assistance Centers: Freeport Memorial Library, Freeport Recreation Center, Freeport High School, Atkinson School, and JW Dodd School.

Backup batteries for these units can typically store enough energy to function for three days, which is about the amount of time it took to fully restore Freeport Electric's distribution system after Superstorm Sandy. Upon a successful pilot project, a full solar streetlight system could be implemented, allowing Freeport Electric to divert their efforts to other areas of need during outages and system disruptions.

Estimated Project Cost

The pilot project will cost an estimated \$520,000.

Project Benefits

This project will improve nighttime public safety for emergency responders, officials, residents, and businesses who may require access to shelter, supplies, or assistance after a storm event – be it a hurricane,

wind storm, major rainfall, or winter weather. This project addresses the Recovery Support Functions of Infrastructure, Community Planning and Capacity Building, and Health and Social Services.

Risk Reduction & Resiliency Benefits

The solar power and battery backup systems for streetlights will improve public safety at night for emergency responders, officials, residents and businesses in NYRCR Freeport who may require access to shelter, supplies, or assistance after a storm event – be it a hurricane, wind storm, winter weather, or major rainfall. These events often knock out power lines and render entire areas dark making movement after dark difficult and treacherous. A lack of streetlighting also increases the risk of criminal activity which is one of the main reasons people chose not to leave their homes during storms, as they feel a need to personally protect their primary place of residence.

Economic Benefits

This project reduces government expenditures by reducing the cost of power supply to public facilities.

Health and Social Benefits

This project secures access to critical assets, including key routes from coastal areas to Community Assistance Centers. Recovery efforts can continue after daylight hours, improving the pace at which access to roadways and properties can be restored. This has multiple co-benefits, including improving access to Community facilities, reducing roadway congestion, improving travel time and fuel efficiency, and expediting local economic recovery.

Environmental Benefits

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

Cost-Benefit Analysis

This small investment has a significant return on the public safety of the area where these streetlights are located and allows for the protection of key asset classes of housing, public facilities, and infrastructure. The project will allow for emergency responders to move to the necessary locations at night quickly and safely. This would allow them to respond to calls for help, fires, potential threats to personal property, and to secure neighborhoods. It would also allow residents to safely move at night once they are allowed to return to an area. As a pilot project, the Village has the flexibility to test the technology prior to installing the new streetlights across the Village, which would result in a large cost savings should the lights not prove effective.

Risk Reduction Analysis

This project will reduce public safety risk to the population by illuminating the roads at night and by securing access to evacuation routes and Community facilities during and after a storm. It can reduce the number of people in high risk areas during a major storm event if the pilot lowers the number of people who choose not to heed warnings or evacuation orders and instead remain in order to secure their private property.

General Timeframe for Implementation

This project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

The Village of Freeport Department of Public Works has regulatory authority over these streets.

Jurisdiction

The Village of Freeport has jurisdiction over Guy Lombardo Avenue and the other implementation areas.

Featured Project: Key Intersection Signage

The NYRCR Freeport Community reported there was a lack of clarity on which routes to use and which streets would provide access to critical facilities, relief services, and information centers during and after Superstorm Sandy and other recent storms. Similarly, residents expressed frustration with lack of information on what to do, where to go for help, and how to get there following the storm.

Two projects will help to provide clarity for which roads to use after a storm. This project proposes to implement wayfinding and destination signage directing people toward designated Community Assistance Centers (described above). This project complements the solar streetlights and battery backup pilot described in Key intersection streetlight retrofit pilot project (above).

This project proposes to install signage along Guy Lombardo Avenue at the intersections of South Main Street and Mill Road, and at each of the five designated Community Assistance Centers: Freeport Memorial Library, Freeport Recreation Center, Freeport High School, Atkinson School and JW Dodd School.

Estimated Project Cost

The proposed project will cost an estimated \$60,000.

Project Benefits

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

Health and Social Benefits

Wayfinding signage will improve public safety after storms for residents and businesses in Freeport who may require a place to recharge cellphones or other devices, obtain supplies, or gather with neighbors following a traumatic event. While the direct benefits of the Community Assistance Centers (CACs) are discussed separately, securing access to the CACs by way of this project will enhance their effectiveness.

Cost-Benefit Analysis

This small investment has a significant return on the public safety as residents will be reminded on a daily basis as to which routes they should use to reach Community Assistance Centers and travel on after a disaster.

Risk Reduction Analysis

This project will reduce risk to the population by improving public awareness and knowledge of how to access Community facilities after a storm.

General Timeframe for Implementation

This project can be implemented within 12 months of project commencement.

Regulatory Requirements Related to Project

The Village of Freeport Department of Public Works (DPW) has regulatory authority over signage and the streets on which they are proposed to be installed.

Jurisdiction

The Village of Freeport has jurisdiction over Guy Lombardo Avenue and the other implementation areas and will be responsible for implementing this project.

Featured Project: Public Communication and Education Gap Analysis

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

Despite warnings from OEM, during Superstorm Sandy some Community members did not understand the severity of the storm and were unable to evacuate after conditions became unsafe, putting themselves and emergency responders at risk. Many residents also did not know where to look for emergency information. Following the storm, power outages and lack of cellphone service left residents unable to communicate with friends and family members, and without a means to find emergency resource information. Even those with power stated that there was no central place to go online to share or find out about available emergency supplies in their communities.

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

Phase 1 of this project will evaluate existing emergency communication systems and determine additional needs, with an emphasis on coordination across multiple jurisdictions, allowing community members to communicate with each other, and emergency readiness education. This initial study will provide recommendations for addressing gaps in communication and education and will identify potential public/private partnerships to implement the study's recommendations.

Phase 2, not funded by this project, and potentially implemented by the Red Cross and would be funded by local corporate sponsors, would establish a centralized location (such as a website) with consistent "branding" to make disaster information identifiable, and provide regular updates to keep information current. Phase 3 will include the creation of an educational component, using the website to promote educational seminars on disaster planning.

Estimated Project Cost

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

Project Benefits

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

Risk Reduction & Resiliency Benefits

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

Economic Benefits

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

Health and Social Benefits

Knowledge and understanding of emergency procedures, responsibilities, and resources will be increased across the Community. An enhanced

website that allows Community members, local organizations, and governmental agencies to communicate with each other will benefit disaster recovery and aid efforts, while enhancing social connections at a time when they are needed the most. Better awareness and information on how to properly securing personal property, including fuel tanks, household paint, and other toxic chemicals, prior to a storm provides environmental benefits by reducing the volume of harmful toxins entering the water during a flooding event.

Cost-Benefit Analysis

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

Risk Reduction

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

General Timeframe for Implementation

This project has the potential for implementation within 24 months.

Regulatory Requirements Related to Project

There are no regulatory requirements related to this project.

Jurisdiction

The Village of Freeport and Nassau County OEM handle emergency management and will coordinate with other key stakeholders, such as the Town of Hempstead and the State of New York.

Featured Project: Neighborhood Preservation Guidelines

Superstorm Sandy resulted in heavy damage, defined as damage totaling to more than 50% of the home value, to 3,500 housing units in the Community. In addition, approximately 3,900 homes out of the Community's 14,589 are located in high and extreme risk flooding areas. Only 27% of all houses in the Community are located outside of any designated risk area.

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

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

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

Estimated Project Cost

This featured project will cost approximately \$250,000.

Project Benefits

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

Risk Reduction & Resiliency Benefits

Neighborhood preservation guidelines will assist individual initiatives to respond to flood risk by providing education and information about issues that building owners need to be aware of as they protect their

property. Guidelines will also convey the Community's expectations for safety, quality, and character to which all development should abide.

Economic Benefits

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

Health and Social Benefits

These guidelines will aid in public safety and the long-term resiliency of the community as building owners will rely less on emergency response efforts or recovery resources.

Cost-Benefit Analysis

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

Risk Reduction Analysis

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

General Timeframe for Implementation

This project has the potential for implementation within 12 months.

Regulatory Requirements Related to Project

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

Jurisdiction

This project falls under the jurisdiction of the Village of Freeport and the Freeport Housing Authority.

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Section V: Additional Materials

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

A. Additional Resilience Recommendations: This section describes resiliency projects and actions for NYRCR Freeport (Community) that the NYRCR Planning Committee (Committee) would like to highlight that are not categorized as Proposed or Featured Projects.

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

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

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

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

F. Glossary: This glossary comprises a comprehensive list of acronyms used in the NYRCR Plan.

A. Additional Resiliency Recommendations

Table 12: Additional resiliency recommendations

Strategy	Project Name	Short Description	Regional
Invest in Resilience Enhancements for Critical Assets	Downtown Microgrid Phase 4: Power Plant I and II, Recreation Center, North Freeport Pump Station	Phase 4 of the Downtown Microgrid project involves the installation of distributed renewable energy sources to diversify generation resources and add capacity and redundancy to the power supply.	N
Invest in Resilience Enhancements for Critical Assets	Lifeline Corridor Implementation: Flood Valves	Establish a program to regularly inspect and maintain and replace flood valves located along identified Lifeline roads.	N
Invest in Resilience Enhancements for Critical Assets	Lifeline Corridor Implementation: Underground Utilities	Use planned roadway improvements as an opportunity to bury overhead utility lines along identified Lifeline roads.	N
Establish Programs and Policies for Resilient Planning and Design	Develop a Strategic Adaptation Plan	Develop a plan to identify long-term retreat and resilience options for Freeport to protect future residents and businesses from more frequent and more intense storms.	N
Improve Transportation Access and Connectivity	Raise Guy Lombardo Avenue and South Long Beach Avenue	Identify roads to raise based on highest risk of flooding, start with previously identified key roads from the Freeport Hazard Mitigation Plan.	N
Improve Transportation Access and Connectivity	Community Assistance Centers: Emergency Backup (Option 2)	Outfit proposed Community Assistance Centers with solar PV systems and battery storage to reduce energy costs and provide power during outages.	N
Improve Transportation Access and Connectivity	Advocate for Local Participation in the Citizen Preparedness Corps Training Program	Take advantage of existing training and capacity building programs in New York State to train Freeport residents to be first responders in their Community.	Y
Plan for Business Continuity and Growth	Enhance, Diversify, and Protect the Nautical Mile	Perform a study to investigate options to protect the Nautical Mile from storm surge, sea level rise, and coastal flooding. In addition, explore opportunities to transform the Nautical Mile into a year-round destination.	N
Plan for Business Continuity and Growth	Freeport Library Digitization Center	Provide Freeport and surrounding communities with a place to scan and store important documents to prevent losses during flooding/fire events.	Y
Plan for Business Continuity and Growth	Clean Energy Education and Apprenticeship Program	Apply for and utilize New York Energy Research and Development Authority (NYSERDA) funding to develop a clean energy education and apprenticeship program for high school students.	N

Table 12 (cont'd): Additional resiliency recommendations

Strategy	Project Name	Short Description	Regional
Improve Stormwater Management and Drainage Systems	Green Infrastructure: JW Dodd Middle School Demonstration Installation (Option 1)	This option involves the installation of a green roof to detain rainwater and reduce runoff. Dodd School serves as an ideal location for a green infrastructure demonstration project due to its high profile location and ability to educate students on an emerging technology and employment generator. Green infrastructure here can also offer flood mitigation for a proposed Community Assistance Center.	N
Improve Stormwater Management and Drainage Systems	Green Infrastructure: JW Dodd Middle School Pilot Installation (Option 2)	This option involves the installation of a of a retention pond on the school grounds to capture and store stormwater runoff. Dodd School serves as an ideal location for a green infrastructure demonstration project due to its high profile location and ability to educate students on an emerging technology and employment generator. Green infrastructure here can also offer flood mitigation for a proposed Community Assistance Center.	N
Improve Stormwater Management and Drainage Systems	Lifeline Corridor Implementation: Stormwater System Upgrades	Install bioswales, permeable pavement and other stormwater system improvements during regular street maintenance and reconstruction projects along identified Lifeline roads.	N
Improve Stormwater Management and Drainage Systems	Flood Diversion and Control	Strategically locate structural and natural drainage features to divert flood waters into designated catchment areas. Commission a study and determine overland flow patterns in flood-prone areas to identify locations for drainage and detention.	N
Establish Programs and Policies for Resilient Planning and Design	Regional Energy Action Plan	This project proposes the development of an energy action plan using a collaborative, regional approach. The many stakeholders involved in energy generation, distribution, and use will be brought together to identify options for distributed generation, microgrids, and smart grid technology integration along the South Shore and in the broader Nassau County area.	Y

B. Master Table of Projects

Table 13: Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Invest in Resilience Enhancements for Critical Assets	Relocation Feasibility Analysis: Move Freeport Department of Public Works Away from Extreme Risk	Study opportunities to relocate DPW out of the SFHA while minimizing impact on existing neighborhoods - provide concept design for recommended solution and possible site acquisition.	Proposed	\$3,000,000	N
Invest in Resilience Enhancements for Critical Assets	Freeport Electrical Cable Channel Crossing Improvements	The project would extend the buried portion of the cables beyond the boat yard to protect the lines from freed boats and debris during storm surges.	Proposed	\$3,000,000	N
Invest in Resilience Enhancements for Critical Assets	Outage Management System	The system upgrade creates a web-based reporting and response system for outages or issues with essential services (power, water mains, gas). It would link directly to existing systems and enables asset protection before an event, incident mitigation during an event, and faster incident management and service restoration after an event.	Proposed	\$265,000	N
Invest in Resilience Enhancements for Critical Assets	Protection for Freeport's Power Plant II: Phase I: Study, Design, and Proof of Concept	This project would seek to study protection options, design flood protection, and identify further funding from NYS and US grant programs to implement and construct the design. A proof of concept would be constructed along the most vulnerable portion of the site.	Proposed	\$1,750,000	N

Table 13 (cont'd): Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Invest in Resilience Enhancements for Critical Assets	Downtown Microgrid Phase I: Financial and Engineering Feasibility Study	This project seeks to identify funding and financing methods for the development of the microgrid - including State and Federal grant programs, capital budgeting and contributions from benefitting private entities. In addition, it will explore preliminary engineering feasibility concepts for the development of the microgrid, examine costs and identify necessary construction.	Proposed	\$750,000	N
Invest in Resilience Enhancements for Critical Assets	Downtown Microgrid Phase 2: Redundant Energy Supply at Power Plant I	This project would purchase a dual-fuel (diesel/natural gas) generator with black-start capability and replace an outdated diesel generator at Freeport Power Plant I.	Proposed	\$5,000,000	N
Invest in Resilience Enhancements for Critical Assets	Backup Power for Sewer Lift Stations	This project seeks to install permanent backup natural gas generators at each of the Village of Freeport's three sewer lift stations located in a SFHA.	Proposed	\$150,000	N
Improve Transportation Access and Connectivity	Community Assistance Centers	Community Assistance Centers are places for residents to gather information about emergency preparedness under normal conditions. During and after a storm, these centers would become a place to gather, collect and distribute resources, charge cell phones, access the internet/TV, and seek comfort. This project would install backup power generation, dynamic electronic notification and alert signage, and additional charging and wifi capacity at each center. In addition, a Local Disaster Recovery Manager would be hired for two years.	Proposed	\$2,200,000	N

Table 13 (cont'd): Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Establish Programs and Policies for Resilient Planning and Design	Operation SPLASH: Resilience Education Center	<p>This project seeks to fortify and protect Operation SPLASH with innovative flood protection design and infrastructure (two passive self-closing flood barriers, sewage back flow preventers and personnel door barriers).</p> <p>In addition, partnerships with Nassau County higher education institutions will be sought to raise awareness of climate related risks on the South Shore and promote environmental stewardship. Finally, surveillance cameras will be installed at high points along the coast and the video feeds will be displayed at Operation SPLASH as a scientific monitoring, community awareness, and educational tool.</p>	Proposed	\$1,100,000	N
Plan for Business Continuity and Growth	Nautical Mile Buoyant Architecture	<p>This project will design and construct a buoyant building along the Nautical Mile to demonstrate the ability to economically and resiliently maintain a coastal economy. In addition to improving resilience of coastal structures, this allows buildings and neighborhoods the ability to maintain their character, retain access for elderly and disabled populations, prepare for sea level rise and in some cases reduce the cost of construction to comply with new building elevation requirements.</p>	Proposed	\$195,000	N

Table 13 (cont'd): Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Plan for Business Continuity and Growth	Modernize the Industrial Park Study	This project seeks to outline implementation steps for the formation of a local nonprofit development authority that is committed to transforming the Industrial Park into a modern, environmentally conscious and resilient business center. The study will also propose design guidelines for safe, affordable and environmentally conscious light-industrial and commercial development. Short-term and long-term goals, strategies, actions and design concepts will be developed.	Proposed	\$500,000	N
Plan for Business Continuity and Growth	Business Continuity Program	This program would help small businesses create their own business continuity plans, and provide a custom roadmap for businesses to continue operations under adverse conditions. This includes planning assistance and access to alternate spaces and facilities and grant assistance.	Proposed	\$40,000	Y
Improve Stormwater Management and Drainage Systems	Meadowbrook Corridor Stormwater System Modeling, Analysis, and Pilot	This project would include the reconstruction of five stormwater outfalls currently entering Freeport Creek. And reconnecting the Creek with the natural floodplain. A floating wetland pilot and drainage study would also be conducted for East Meadow Pond to improve water quality and reduce future flooding. A daylighting study for Freeport Creek would examine the potential benefits of uncovering the current underground portion of the Creek.	Proposed	\$650,000	Y

Table 13 (cont'd): Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Improve Transportation Access and Connectivity	Lifeline Corridor Study and Pilot Implementation: Merrick Road Corridor	Merrick Road is an important lifeline for many people, businesses and institutions. Due to the importance of the road, it is proposed that a study and subsequent pilot projects to improve its post-storm functionality take place. Based on the findings and results, the Lifeline Project could then be applied to additional streets that are critical at the neighborhood and community level. The study will identify best practices and develop design guidelines for resilient streetscapes and implement a pilot project.	Proposed	\$300,000	Y
Invest in Resilience Enhancements for Critical Assets	Downtown Microgrid Phase 3: Redundant Distribution Surrounding Microgrid	Phase 3 of the Downtown Microgrid project involves the installation of four new underground circuits on the streets that border of the microgrid. These circuits increase redundancy and replace outdated circuits, while increasing capacity.	Featured	\$30,500,000	N
Invest in Resilience Enhancements for Critical Assets	Protection for Freeport Electric's Power Plant II Phase 2: Construction	This project would seek to construct the recommended design of protection options from Phase 1 of the Protection for Freeport Electric's Power Plant II project. Further funding from NYS and US grant programs for construction is required.	Featured	\$10,000,000 - 20,000,000	N

Table 13 (cont'd): Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Establish Programs and Policies for Resilient Planning and Design	Convert Home Heating to Natural Gas in Extreme and High Risk Areas	This project will develop policy recommendations and an incentive program to convert home heating oil to natural gas in extreme and high risk areas. Temporary regulations to require proper anchoring of tanks in risk areas will be developed and incorporated. A deadline for all structures in extreme, high and moderate risk areas to convert to Natural Gas and/or other heat/hot water supply will be established.	Featured	\$50,000	N
Improve Stormwater Management and Drainage Systems	Regional Stormwater Drainage Cleanout, Survey, and Verification	This project seeks to clean out all storm drains in the Freeport area. While they are being accessed, it is recommended that a comprehensive survey is conducted to document and verify all missing stormwater infrastructure from the local data inventory. The data collected will feed into the hydraulic and hydrologic model to analyze the current drainage system and identify critical drainage projects. This will include the implementation of green infrastructure projects and will quantify the benefits of green infrastructure solutions.	Featured	\$4,800,000	N
Invest in Resilience Enhancements for Critical Assets	Street Tree Maintenance and Guidelines	This project seeks to recommend policy changes to identify roads for tree trimming, maintenance and/or replacement with more resilient trees.	Featured	\$100,000	N
Improve Stormwater Management and Drainage Systems	Green Infrastructure Plan	This Plan seeks to identify green infrastructure opportunities based on feasibility, level of impact, funding and street reconstruction schedules. Opportunities to manage stormwater on public and private properties will also be identified and recommended.	Featured	\$500,000	N

Table 13 (cont'd): Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Improve Stormwater Management and Drainage Systems	Green Infrastructure Plan Implementation: Main Street Improvements	This project builds on the existing "Building a Better Freeport" plan - which recommends street improvement projects along North Main Street. This project would operate in tandem with the proposed improvements, ensuring that any pedestrian improvements incorporate bioswales or open channel infiltration areas, to the extent possible. It also recommends reconstruction of areas along South Main Street that have been improved recently but missed opportunities to incorporate green infrastructure.	Featured	\$790,000	N
Establish Programs and Policies for Resilient Planning and Design	Public Bulkhead Repair	Publicly-owned bulkheads will be replaced at an appropriate height and with modern materials that are more resilient to erosion and wind. The reconstruction of the bulkheads will provide coastal protection in public areas, helping to maintain Freeport's open space and recreational areas. In addition, the bulkheads can reduce flooding impacts on local streets, helping to maintain access during and after flood events.	Featured	\$950,000	N
Improve Transportation Access and Connectivity	Key Intersection Streetlight Retrofit Pilot Project	This project seeks to provide solar powered lighting with backup power leading to key intersections, to ensure these roads always stay lit in the event of a power outage and residents can follow these lit streets toward safer areas and critical resources. In addition to providing solar power and backup energy for street lights, traffic signals at each of these intersections will also be provided.	Featured	\$520,000	N

Table 13 (cont'd): Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Improve Transportation Access and Connectivity	Key Intersection Signage	This project provides wayfinding and destination signage to guide people toward critical assets, assistance centers and information after storms and during power outages. This will enhance route clarity and orient residents toward streets that should be used after future emergencies.	Featured	\$60,000	N
Improve Transportation Access and Connectivity	Public Communication and Education Gap Analysis	This project would begin with a gap analysis to determine additional emergency community needs in the region. Findings would guide the creation of a central website with a community-driven communication component, and eventually include education and outreach activities.	Featured	\$20,000	Y
Establish Programs and Policies for Resilient Planning and Design	Regional Transit Oriented Development, Access and Parking Study	This study will identify opportunities to combine parking areas and develop structured parking facilities in key areas, and provide recommendations on their best use based on community need. Guidelines for the design of resilient, sustainable and aesthetically pleasing parking structures will be identified. This study will also develop a concept for local public transportation that connects Freeport's key business, retail and recreational areas.	Featured	\$500,000	N

Table 13 (cont'd): Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Establish Programs and Policies for Resilient Planning and Design	Neighborhood Preservation Guidelines	This project seeks to undertake a planning study and make recommendations to revise Freeport zoning, planning and building code regulations for resilient design. The study will work with Freeport planning and building agencies to ensure that needs specific to the community's rebuilding efforts are not omitted or overlooked.	Featured	\$250,000	N
Invest in Resilience Enhancements for Critical Assets	Downtown Microgrid Phase 4: Power Plant I and II, Recreation Center, North Freeport Pump Station	Phase 4 of the Downtown Microgrid project involves the installation of distributed renewable energy sources to diversify generation resources and add capacity and redundancy to the power supply.	Additional Resiliency Measure	N/A	N
Invest in Resilience Enhancements for Critical Assets	Lifeline Corridor Implementation: Flood Valves	Establish a program to regularly inspect and maintain and replace flood valves located along identified Lifeline roads.	Additional Resiliency Measure	N/A	N
Invest in Resilience Enhancements for Critical Assets	Lifeline Corridor Implementation: Underground Utilities	Use planned roadway improvements as an opportunity to bury overhead utility lines along identified Lifeline roads.	Additional Resiliency Measure	N/A	N
Establish Programs and Policies for Resilient Planning and Design	Develop a Strategic Adaptation Plan	Develop a plan to identify long-term retreat and resilience options for Freeport to protect future residents and businesses from more frequent and more intense storms.	Additional Resiliency Measure	N/A	N
Improve Transportation Access and Connectivity	Raise Guy Lombardo Avenue and South Long Beach Avenue	Identify roads to raise based on highest risk of flooding, start with previously identified key roads from the Freeport Hazard Mitigation Plan.	Additional Resiliency Measure	N/A	N
Improve Transportation Access and Connectivity	Community Assistance Centers: Emergency Backup (Option 2)	Outfit proposed Community Assistance Centers with solar PV systems and battery storage to reduce energy costs and provide power during outages.	Additional Resiliency Measure	N/A	N

Table 13 (cont'd): Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Improve Transportation Access and Connectivity	Advocate for Local Participation in the Citizen Preparedness Corps Training Program	Take advantage of existing training and capacity building programs in New York State to train Freeport residents to be first responders in their Community.	Additional Resiliency Measure	N/A	Y
Plan for Business Continuity and Growth	Enhance, Diversify, and Protect the Nautical Mile	Perform a study to investigate options to protect the Nautical Mile from storm surge, sea level rise, and coastal flooding. In addition, explore opportunities to transform the Nautical Mile into a year-round destination.	Additional Resiliency Measure	N/A	N
Plan for Business Continuity and Growth	Freeport Library Digitization Center	Provide Freeport and surrounding communities with a place to scan and store important documents to prevent losses during flooding/ fire events.	Additional Resiliency Measure	N/A	Y
Plan for Business Continuity and Growth	Clean Energy Education and Apprenticeship Program	Apply for and utilize New York Energy Research and Development Authority (NYSERDA) funding to develop a clean energy education and apprenticeship program for high school students.	Additional Resiliency Measure	N/A	N
Improve Stormwater Management and Drainage Systems	Green Infrastructure: JW Dodd Middle School Demonstration Installation (Option 1)	This option involves the installation of a green roof to detain rainwater and reduce runoff. Dodd School serves as an ideal location for a green infrastructure demonstration project due to its high profile location and ability to educate students on an emerging technology and employment generator. Green infrastructure here can also offer flood mitigation for a proposed Community Assistance Center.	Additional Resiliency Measure	N/A	N

Table 13 (cont'd): Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Improve Stormwater Management and Drainage Systems	Green Infrastructure: JW Dodd Middle School Pilot Installation (Option 2)	This option involves the installation of a of a retention pond on the school grounds to capture and store stormwater runoff. Dodd School serves as an ideal location for a green infrastructure demonstration project due to its high profile location and ability to educate students on an emerging technology and employment generator. Green infrastructure here can also offer flood mitigation for a proposed Community Assistance Center.	Additional Resiliency Measure	N/A	N
Improve Stormwater Management and Drainage Systems	Lifeline Corridor Implementation: Stormwater System Upgrades	Install bioswales, permeable pavement and other stormwater system improvements during regular street maintenance and reconstruction projects along identified Lifeline roads.	Additional Resiliency Measure	N/A	N
Improve Stormwater Management and Drainage Systems	Flood Diversion and Control	Strategically locate structural and natural drainage features to divert flood waters into designated catchment areas. Commission a study and determine overland flow patterns in flood-prone areas to identify locations for drainage and detention.	Additional Resiliency Measure	N/A	N
Establish Programs and Policies for Resilient Planning and Design	Regional Energy Action Plan	This project proposes the development of an energy action plan using a collaborative, regional approach. The many stakeholders involved in energy generation, distribution, and use will be brought together to identify options for distributed generation, microgrids, and smart grid technology integration along the South Shore and in the broader Nassau County area.	Additional Resiliency Measure	\$200,000	Y

C. Public Engagement Process

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

NYRCR Planning Committee

The Committee dedicated their time and expertise to work closely with the technical Consultant Team and local and state officials to propose projects, plans and programs that fit community needs but respond to the requirements of NY Rising. The Committee guided the development of material for the NYRCR Plan and the community engagement process. Committee members have had a major role in defining the geographic scope and vision for the Community and were critical to the development of strategies and projects for future implementation.

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

The Committee held eight (8) official meetings over the course of the project and had numerous other meetings amongst themselves and with stakeholders throughout Freeport. In addition, the Committee participated in two Joint Committee Meetings with the neighboring NYRCR Communities of Baldwin, Bellmore/Merrick, Massapequas, and Seaford/

Wantagh to learn about the coastal environment, natural habitat, housing and economic issues, and resilience measures and to explore shared issues and opportunities for collaboration and cooperation.

- **Committee Meeting 1:** The first Committee Meeting was held on September 11, 2013, and was the initial meeting between members from New York State, Planning Committee, and Consultant Team to discuss the purpose of the NYRCR Program and initial goals and objectives.
- **Committee Meeting 2:** The second Committee Meeting was held on October 2, 2013. It included a discussion of existing planning efforts, Community assets, Community needs and opportunities, and preparation of the first Public Engagement Event.
- **Committee Meeting 3:** The third Committee Meeting was held on October 25, 2013. It included a report of feedback from the first Public Engagement Event, a review of the NYRCR Conceptual Plan, and preparation for the second Public Engagement Event.
- **Committee Meeting 4:** The fourth Committee meeting was held on November 7, 2013. In this meeting Committee Members continued to review the NYRCR Conceptual Plan and began to discuss opportunities for sustainable reconstruction, recovery, and resilience, and further preparation for Public Engagement Event 2.
- **Committee Meeting 5 (Joint Committee Meeting):** The fifth Committee Meeting was held on December 10, 2013, and was attended by Committee Members from neighboring NYRCR Communities. The meeting provided an overview of flood risk scenarios and flood mitigation strategies.
- **Committee Meeting 6:** The sixth Committee Meeting was held on January 14, 2014. In this meeting Committee Members reviewed the Community asset inventory and risk analysis, discussed proposed projects, and reviewed the findings of the business surveys.

- **Committee Meeting 7 (Joint Committee Meeting):** The seventh Committee Meeting was held on February 19, 2014, and was attended by Committee Members from neighboring NYRCR Communities. The meeting addressed housing and economic development opportunities within the five Communities that were represented.
- **Committee Meeting 8:** The eighth Committee Meeting was held on March 10, 2014. In this meeting Committee Members voted on the proposed and featured projects to be included in the NYRCR Plan.

Public Engagement Events

Community residents and other stakeholders participated in three Public Engagement Events to review the evolving work of the Committee and Consultant Team, and to contribute their voices to the planning process. Outlined below is a brief summary of the proceedings and the outcomes.

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

The first public engagement event was held on October 16, 2013. The meeting, which included an open house, presentation, and small group discussions, introduced the NY Rising Community Reconstruction (NYRCR) Program to the community and provided numerous opportunities for public input. Participants viewed project materials at three different Open House-style stations. The first station provided an overview of the NYRCR Program. The second station presented six Community Asset Maps. The third station presented the draft Vision as prepared by the Committee. Participants were encouraged to provide their feedback to the asset maps and vision statement. Comments received on the Vision Statement were used to revise it prior to incorporation in the NYRCR Conceptual Plan.

The next portion of the meeting was dedicated to small group discussions where participants cooperatively and creatively considered the future of their Community. Participants identified the Community's

most important needs and generated project ideas for recovery and resiliency. They discussed the following two questions:

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

Key Outcomes

Participants at the meeting had clear and specific ideas about what they believed could effectively help the Community to recover and become more resilient. The small groups generated 50 different ideas. These ideas were reviewed to identify emerging themes that represented issues of concern and ideas for the future that would inform the development of strategies and projects. Listed below are the emerging themes organized by Recovery Support Function.

- **Community Planning & Capacity Building:** Adequate equipment and facilities for effective emergency response; Responsive and knowledgeable recovery and reconstruction administration (e.g. government agencies and insurance providers); Effective public information and communication (pre- and post-emergency), particularly for hard to reach populations such as the elderly; Codes/regulations that promote storm resistant homes and businesses

- Economic: A vibrant, strong Downtown; Industry; Private facilities that provide critical goods or services should have backup generator power; Storm resistant gas distribution
- Health & Social Services: Recreation centers
- Housing: Residential neighborhoods protected from future storm impacts; Vibrant neighborhood character (e.g. address deserted buildings, shift to renters, etc.)
- Infrastructure: Effective storm water and wastewater management; Roadways resistant to major storm impacts
- Natural and Cultural Resources: Restored/enhanced coastal landscapes provide natural habitats and storm protection; Parks and natural areas provide recreation and education

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

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

The second Public Engagement Event was held on November 19, 2013. The event had three main components. The meeting was designed to present the emerging Conceptual Plan, solicit community feedback on issues related to the six elements of the plan, and generate strategy and implementation ideas.

After the opening presentation, participants joined small groups to weigh in on important community issues and to expand upon the strategies and projects included in the NYRCR Conceptual Plan. Participants reviewed material related to two of the six Recovery Support Functions: Community Planning and Cultural Resources; Economic Development; Health, Social Services, and Socially Vulnerable Populations; Housing; Infrastructure; or Natural Resources. They completed an independent participant questionnaire. The group members then worked cooperatively to provide reactions and observations on a map of the community. Finally, they reviewed the list of strategies and projects included in the NYRCR Conceptual Plan

and discussed what others should be included. The group documented its most important ideas on summary sheets.

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

Key Outcomes

Although the full event results are too extensive to summarize here there were some interesting findings. Participants expressed much greater concern with reconstruction and recovery related projects than with those more targeted to promoting long-term resiliency. The exceptions were input received on economic development, which focused on improving the Nautical Mile, improving downtown, improving the Industrial Park and strengthening the workforce. For each of the recovery support functions, participants were asked to rate a variety of issues identified by the Consultant Team on their level of importance in the community on a scale from 1 to 5 (not important to very important). In general, participants rated nearly everything as being important to very important on issues ranging from vacant / abandoned commercial space in business districts, to potential of future flooding in residential areas, and bulkheads and coastal barriers

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

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

This event, held on February 26, 2014, marked the third public engagement event of the NYRCR Program. The meeting's objectives were to provide the Community with a progress update, gather community feedback on the projects being considered

for inclusion in the NYRCR Freeport Plan (Plan), and begin to generate public support for implementation. The Community Development Block Grant Disaster Recovery Program (CDBG-DR), funded by the U.S. Department of Housing and Urban Development (HUD) and administered by New York State, has allocated funds to the Community to support eligible reconstruction and resiliency projects.

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

- Proposed Projects are proposed in whole or in part for the community's allocation of CDBG-DR funding.
- Featured Projects meet CDBG-DR funding requirements but exceed Community allotments, are eligible for other identified funding or regulatory reforms, or do not involve capital expenditures.
- Additional Resiliency Recommendations are projects the Committee would like to highlight that are not included above.

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

Key Outcomes

After the meeting all input received on Project Comment Cards and participant questionnaires was documented verbatim and tabulated. Projects were also posted on the NY Rising website and an online survey was released to solicit feedback from people not able to attend the community meeting. No feedback was received to the online survey. The Project Comment Cards were reviewed to make final enhancements to the project descriptions for review by the Committee and potential inclusion in the NYRCR Plan.

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

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

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

Online Presence and Tools

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

Business Surveys

A survey was deployed specifically to businesses in the Community to gather additional information on storm impacts – which have been difficult to quantify from other sources – and to generate ideas that could encourage economic development and support resiliency. Business surveys were open from January 15 to February 25, 2014. The respondents were distributed among many industry types including retail, healthcare, fitness, business/legal/financial, construction, manufacturing, restaurants and

warehousing/logistics and had varying degrees of damage from Superstorm Sandy. There were, however, many similar issues and recommendations.

Housing Survey

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

Health and Social Services Interviews

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

D. Community Asset Inventory

The asset inventory and risk assessment performed for the NYRCR Plan includes individual information for each Community asset, landscape attributes that may influence risk, and the risk assessment which establishes a risk score based on landscape attributes, a hazard score, an exposure score, and a vulnerability score for each asset. The asset inventory and risk assessment inputs can be seen in Table 14.

Asset Information

The asset information columns in Table 14 include the following information:

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

Landscape Attributes

The landscape attribute columns in Table 14 include the following information:

- **Erosion Rate:** Marked “yes” if the long-term average erosion rate is 1 ft. or more per year, or unknown.
- **Beach Width:** Marked “yes” if the water line is frequently in contact with a shore defense structure or upland vegetation.

- **Shore Defenses:** Marked “yes” if shore defenses are absent, not constructed to anticipated storm or sea level rise conditions, or are deteriorating.
- **Vegetation:** Marked “yes” if protective vegetation, wetlands, or intervening structures between asset and flood source are absent.
- **Dunes or Bluffs:** Marked “yes” if dunes are absent, below the base flood elevation (BFE), eroding, discontinuous, or have little vegetation. Marked “yes” if bluff slopes are unstable or partially vegetated.
- **Soils:** Marked “yes” if the asset is located on a coastal barrier island or filled wetland.

Risk Assessment

The risk assessment columns in Table 14 include the following information:

- **Hazard Score:** The hazard score is based on the likelihood an event will occur and the magnitude (destructive capacity) of the event. Likelihood is derived from the storm recurrence interval within the selected planning time frame.
- **Exposure Score:** The coastal risk assessment area maps are used to provide a “base exposure score” for each asset. Generally, assets in the extreme risk area are closer to the shoreline and are more exposed to potential damage. Therefore, assets in extreme risk areas receive a base exposure score of 2; assets in high risk areas receive a base exposure score of 1, and assets in moderate risk areas receive a base exposure score of 0.5. Landscape attributes are used to further exposure scores, contributing an additional 0.5 for each “yes” in the landscape attribute columns.
- **Vulnerability Score:** Each asset receives a vulnerability score based on the impact of its damage relative to its asset class.
- **Risk Score:** Risk scores are based on the formula Hazard x Exposure x Vulnerability.

Table 14: Community asset inventory

Community asset inventory															
Asset Information					Landscape Attributes						Risk Assessment				
Asset Name	Risk Area	Asset Class	Critical Facility	Community Value	Erosion Rate	Beach Width	Shore Defenses	Vegetation	Dunes or Bluffs	Soils	Landscape Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
25 Buffalo Ave - Freeport Public Housing	High	Housing	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	3	2	18
Anchorage Condo complex	High	Housing	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	3	2	18
Archer St School	Moderate	Health & Social	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Atlantic Ave	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Bank of America	Moderate	Economic	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Cablevision	Moderate	Infrastructure	Yes	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	4	30
Caroline G Atkinson School	Moderate	Health & Social	Yes	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Cell Tower - Ray St & S Main St	High	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	4	3.5	4	56
Cell Tower - W Seaman & N Main St	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	2.5	4	40
Compare Foods	Moderate	Economic	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Cow Meadow park	Extreme	Natural & Cultural	No	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	2	27
Department of Labor Unemployment Office	Moderate	Health & Social	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Dept of Waterways	Extreme	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	5	67.5
Dodd Jr High School	Moderate	Health & Social	Yes	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Freeport DPW	Extreme	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	4	4.5	5	90
Fire Department 1	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	4	3	5	60
Fire Department 3	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Fire Department Headquarters	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Freeport Fire Department Training Facility	High	Infrastructure	Yes	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	4	3.5	5	70
Freeport Health Care Center	Moderate	Health & Social	Yes	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Freeport High School	Moderate	Health & Social	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Freeport Historical Museum	Moderate	Natural & Cultural	No	Low	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3	2	18
Freeport Kidney Center	Moderate	Health & Social	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	4	30

Table 14 (cont'd): Community asset inventory

Asset Information					Landscape Attributes						Risk Assessment				
Asset Name	Risk Area	Asset Class	Critical Facility	Community Value	Erosion Rate	Beach Width	Shore Defenses	Vegetation	Dunes or Bluffs	Soils	Landscape Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Freeport library	Moderate	Natural & Cultural	No	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Freeport LIRR	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Freeport Mayor's Office	Moderate	Health & Social	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	3	22.5
Freeport Plaza West	Moderate	Economic	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Freeport Recreation Center	Moderate	Natural & Cultural	No	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Freeport Transfer Facility	Extreme	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	4	54
Guy Lombardo Ave	Extreme	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	2	27
Guy Lombardo Marina	Extreme	Infrastructure	No	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	2	27
Hi Hello Childcare Center 2	Moderate	Health & Social	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Hudson Ave	High	Economic	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	3	2	18
Industrial Park Inner Loop	High	Economic	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	3	4	36
Industrial Park Outer Loop	Extreme	Economic	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	4	4	48
John J Randall Park	Extreme	Natural & Cultural	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	4	2	24
Liberty Park Apartments	Moderate	Housing	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Meadowbrook Commons	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Merrick Rd	Moderate	Infrastructure	No	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Moxie Rigby Apartments	Moderate	Housing	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
N Main Street	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Nautical Mile	Extreme	Economic	No	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	2	27
Operation SPLASH	Extreme	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	2	27
Power Plant I	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Power Plant II	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	4	3	5	60
Pump Station - Howard & Guy Lombardo	Extreme	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	4	4.5	5	90
Pump Station - Ray & Sportsman Ave	Extreme	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	4	4.5	5	90

Table 14 (cont'd): Community asset inventory

Asset Information					Landscape Attributes						Risk Assessment				
Asset Name	Risk Area	Asset Class	Critical Facility	Community Value	Erosion Rate	Beach Width	Shore Defenses	Vegetation	Dunes or Bluffs	Soils	Landscape Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Pump Station Meister & Stirling	Extreme	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	4	4.5	5	90
Rev. Madden Senior Housing	Moderate	Housing	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3	2	18
Roslyn Savings Bank	Moderate	Economic	No	Low	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3	2	18
S Main Street	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Schooner	Extreme	Economic	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	4	2	24
Sea Breeze Park	Extreme	Natural & Cultural	No	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	2	27
Sewer Lift Station (Suffolk & Miller)	Extreme	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	4	4.5	2	36
Stop and Shop	Extreme	Economic	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	4	2	24
Substation - Mill Rd & South Main St	Extreme	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	4	2	32
Substation 4f	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	2.5	2	20
Substation B (S Main St & Mill Rd)	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	2.5	2	20
The Armory	Moderate	Infrastructure	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
US Petroleum (E Merrick)	High	Economic	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	3	2	18
US Petroleum (W Merrick)	Moderate	Economic	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Verizon Hub	Moderate	Infrastructure	Yes	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
WTP	Moderate	Infrastructure	Yes	Medium	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
WTP (Prince Ave)	Moderate	Infrastructure	Yes	Medium	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
WTP (Sunrise)	Moderate	Infrastructure	Yes	Medium	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50

E. End Notes

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

BFE: Base Flood Elevation

CDBG-DR: Community Development Block Grant - Disaster Recovery

CHHA: Coastal High Hazard Area

DPW: Department of Public Works

ESRF: New York State Empire State Relief Fund

FEMA: Federal Emergency Management Agency

FD: Fire Department

GIS: Geographic Information System

HRRF: New York State Homeownership Repair and Rebuilding Fund

HUD: U.S. Department of Housing and Urban Development

IHP: Individual and Households Program

kW: Kilowatt

LIPA: Long Island Power Authority

LIRR: Long Island Rail Road

MW: Megawatt

NDRF: National Disaster Recovery Framework

NFIP: National Flood Insurance Program

NGVD: National Geodetic Vertical Datum of 1929

NOAA: National Oceanic and Atmospheric Administration

NOAA-CSC: National Oceanic and Atmospheric Administration Coastal Services Center

NYRCR: New York Rising Community Reconstruction

NWS: National Weather Service

NYS: New York State

NYS CMP: New York State Coastal Management Plan

NYS DOS: New York State Department of State

PD: Police Department

PSEG: Public Service Electric and Gas Company

RSF: Recovery Support Function

SBA: U.S. Small Business Administration

SFHA: Special Flood Hazard Area

SLOSH: Sea, Lake and Overland Surges from Hurricanes

TOD: Transit-Oriented Development

TOH: Town of Hempstead

TSD: Transit-Supportive Development

UFSD: Union Free School District

