



VILLAGE OF **BAYVILLE**



NY RISING COMMUNITY RECONSTRUCTION PLAN

March 2014

NY Rising Community
Reconstruction Program

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This document was developed by the NYRCR Bayville Planning Committee as part of the NY Rising Community Reconstruction (NYRCR) Program within the Governor's Office of Storm Recovery. The NYRCR Program is supported by NYS Homes and Community Renewal, NYS Department of State, and NYS Department of Transportation. The document was prepared by the following consulting firms: AKRF, Inc.; CDM Smith; Sasaki Associates, Inc.



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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) program¹.

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

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

planning process and proposals. The NYRCR Program's outreach has included communities that are traditionally underrepresented, such as immigrant populations and students. All planning materials are posted on the NYRCR Program's website (www.stormrecovery.ny.gov/nyrcr), providing several ways for community members and the public to submit feedback on materials in progress.

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

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

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

The NYRCR Program has successfully coordinated with State and Federal agencies to help guide the development of feasible projects. The program has

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

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

The NYRCR Plan

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

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

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

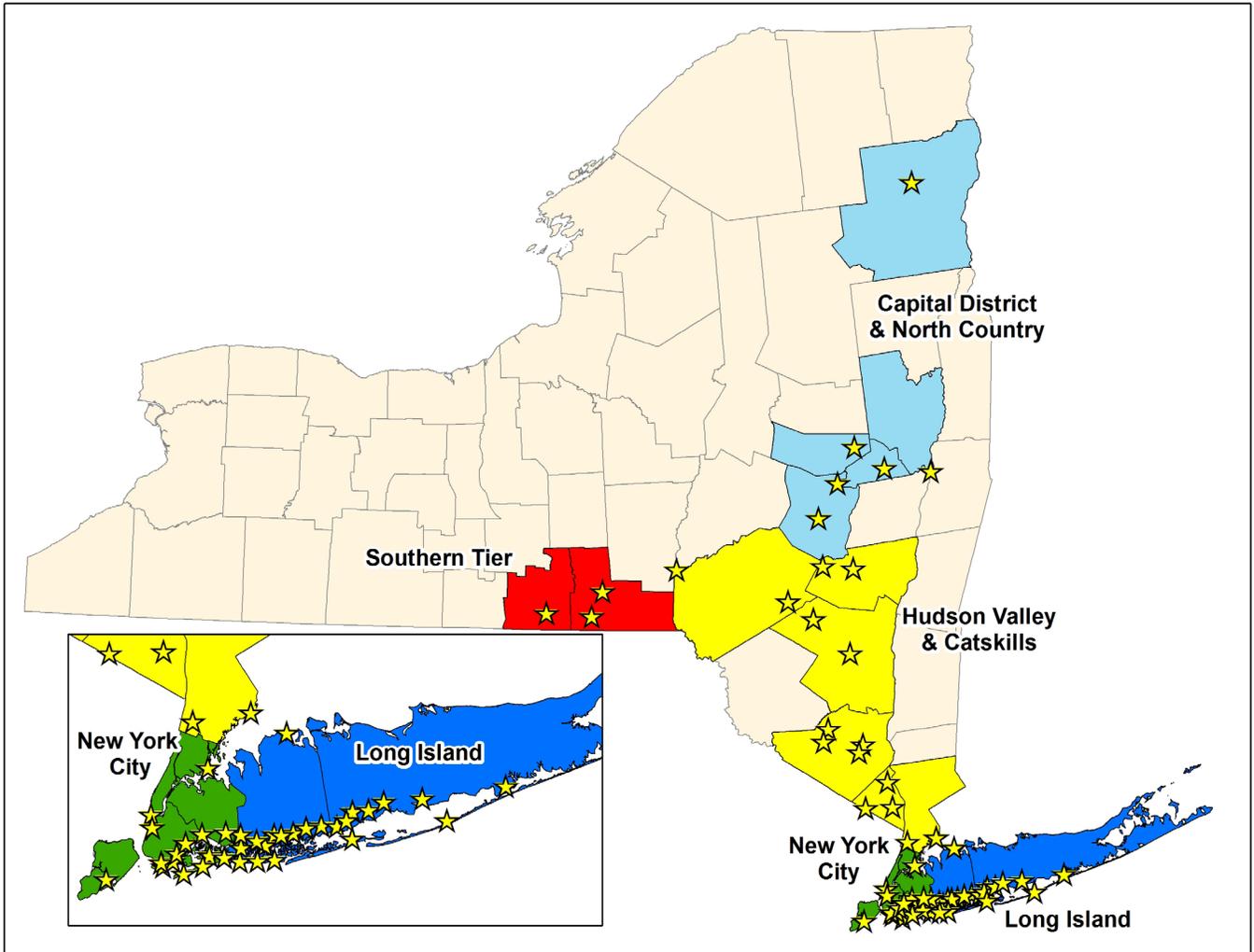
NYRCR Village of Bayville is eligible for up to \$3 million in CDBG-DR implementation funds.

While developing projects for inclusion in this NYRCR Bayville Plan, the NYRCR Planning Committee took into account cost estimates, cost-benefit analyses, the effectiveness of each project in reducing risk to populations and critical assets, feasibility, and community support. The Planning Committee 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.



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

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Executive Summary

The NY Rising Community Reconstruction (NYRCR) Program was established to provide rebuilding and revitalization assistance to communities severely damaged by Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee. A Planning Committee of local residents and community leaders from the Village of Bayville (Community) was established to create this NYRCR Plan to build a better and stronger Village of Bayville. The NYRCR Plan is based on local knowledge and needs that incorporated suggestions from the broader community. New York State (NYS) has allocated up to \$3.0 million dollars to NYRCR Village of Bayville to support the advancement of resiliency and recovery projects or programs. The NYRCR Plan has established the reconstruction and resiliency goals of the Community and has identified Community-specific projects, plans, and studies that would help to achieve a more resilient Village of Bayville.

Community Overview

The Village of Bayville is situated between the Long Island Sound and Oyster Bay on the north shore of Long Island, New York. The Village is within the Town of Oyster Bay. Natural assets within the Village provide aesthetic value, environmental services, and recreational opportunities such as swimming, boating, and bird watching. These environmental assets and the Village's secure location contribute to the high quality of life and unique identity of the Village.

Surrounding waterbodies constrain access to the Village of Bayville. There are only two points of overland access: Bayville Road and West Shore Road via the Bayville Bridge. Both routes are located in the Federal Emergency Management Agency (FEMA) designated 100-year floodplain. These two routes often become impassable during extreme weather

events, leaving the community isolated from necessary services.

The residents of the Village of Bayville are working together to build back better by identifying and implementing hazard mitigation actions that will reduce flood risk, increase resiliency, and improve the overall community. This will be achieved through a strategic combination of actions, including construction of "soft" and "hard" flood protective measures, preservation of natural flood management systems, encouragement of new and existing economic development, development of community programs in collaboration with Nassau County, and continuation of the Village's success with water quality improvement.

Geographic Scope of NYRCR Plan

The geographic scope of the Village of Bayville's NYRCR Plan is coterminous with the Village's municipal boundary. The Village is bordered by Long Island Sound to the North, Oyster Bay and Mill Creek to the South, by the Village of Centre Island to the east, and by the Village of Locust Valley to the west. The geographic scope considers important assets outside of the boundary when they relate to the Village's ability to recover from flood events, e.g., the Bayville Bridge and Locust Valley High School, which is the nearest American Red Cross-designated shelter.

Description of Storm Damage

The Village faces significant flood threats due to its location encompassed by the Long Island Sound, Oyster Bay, and Mill Neck Creek. Past storms demonstrate these risks, as seen by the abnormally high tides and winds associated with nor'easters in 1992 and 1993 that flooded roads and led to power outages in the Village.

During and following astronomical high tides and storm events, including August 2011's Hurricane Irene and October 2012's Superstorm Sandy, elevated water levels in the Long Island Sound, Oyster Bay, and Mill Creek flood the Village of Bayville in the following patterns:

- ▶ The Long Island Sound waves and surge cross over the beach and into streets such as Pine Lane. The surge flows down these streets into adjacent, low lying neighborhoods, where flood waters are unable to drain.
- ▶ The Long Island Sound surges into Oyster Bay, which backs up into Mill Neck Creek and floods neighborhoods along Shore Road.
- ▶ Overflow from Mill Neck Creek floods homes and businesses within a several block span of the Presidents Streets neighborhood and extends south to Bayville Avenue.

Historically, this flooding has resulted in difficult road travel and, in some areas, roads become impassable due to standing water. The two access roads to the Village may be closed, and damage to the lift bridge on West Shore Road sometimes results in long-term closure of one of the access routes. Following Hurricane Irene, Bayville Avenue was inundated with approximately three-feet of water, and residents traveled using row boats, kayaks, and surf boards. Pine Lane residents used buckets to bail out yards and homes that were flooded with approximately one-foot of water.

During Superstorm Sandy, high winds and an astronomical high tide combined with an 11-foot storm surge to inundate Ransom/Stehli Beach in the Village's west end. Superstorm Sandy also flooded the Village's entire low-lying east end. Flooding of the east end necessitated the emergency shut-down of the natural gas service in this area. Many businesses were closed. The inundation of Bayville Avenue made the road impassable and resulted in stalled vehicles, thus blocking access when emergency personnel and utility trucks converged.

Bayville Avenue flooding prevented travel for all types of vehicles and flooded the basement of the Village's only Firehouse. The Bayville Bridge connecting the Village of Bayville and Centre Island to the Town of Oyster Bay via West Shore Road and Ludlam Avenue was disabled in an open position when it was submerged by Superstorm Sandy's floodwaters, rendering its electrical equipment inoperable. As a result this access route was closed from the day of the storm, October 29, 2012, until the bridge was restored on April 17, 2013. With only one vehicular access route remaining for the Village after Superstorm Sandy, recovery was slowed, public safety compromised, and the local economy suffered.

West Shore Road leading to the Bayville Bridge was also impassable due to inundation. Approximately 300 homes were directly affected by Superstorm Sandy. Loss of electrical power, compromised phone service, and street flooding – combined with 10-day (average) regional gas and power outages – caused a lack of heat, electricity, and potable water, and halted the provision of emergency services, supplies, and communication in the Village during and after the storm. These conditions created public health and safety hazards for residents, including socially vulnerable populations, e.g., Jones Manor Senior Housing, and first responders. As severe as these affects were, the Village recognizes that winds from Superstorm Sandy reversed direction as the storm passed out of the region, blowing water out of Oyster Bay and preventing what could have become an even worse catastrophe. It is essential to improve storm resilience to minimize these storm effects.

Critical Issues

The Critical Issues facing the Village of the Bayville as a result of these storm threats include: reducing impacts to residents, critical facilities and the natural environment from extreme weather events; enhancing economic stability; maintaining the quality of surrounding waterways; and preserving community character. Maintaining accessibility to emergency services, e.g., police, fire, EMT, hospital, supplies, and

communication before, during, and after extreme weather events is a critical issue, too.

In addition to securing the two main access routes, Bayville Road and Ludlam Avenue/Bayville Bridge/West Shore Road, many local streets in the Village's west and east ends routinely flood during extreme weather events. Low lying neighborhoods are difficult to drain, resulting in ponding water. These conditions create public health and safety hazards by halting the distribution of emergency services and supplies, as well as impairing communication, within the Village.

The Village's firehouse and ambulance are located on Bayville Avenue, an avenue which is routinely flooded during and following extreme weather events. Emergency fire and medical service vehicles are unable to travel on the flooded avenue, disrupting these important services to residents. Although the Village's housing stock and business base were not permanently diminished as a result of Hurricane Irene or Superstorm Sandy, a significant number of homes and businesses were damaged by flood waters.

Community-Driven Process

Community Vision

In order to guide development of this plan a Community Vision, incorporating input from both the Planning Committee and the local community, was created and is as follows:

“The Village of Bayville is a unique community focused on building back better by protecting our assets and natural environment from extreme weather events and natural disasters. Our goals are to enhance economic stability, maintain and improve our water quality, preserve community character, and maintain access to emergency services.”

The Committee established the following goals for the NYRCR Plan to realize this vision:

1. Enhance economic stability – ensure the retention of existing business and encourage economic development.
2. Maintain and improve water quality – improve stormwater management and collaborate with the County regarding comprehensive drainage improvements.
3. Preserve community character – reduce threats from future storm and sea level rise to protect the community and natural resources.
4. Maintain access to emergency services – secure access to the Village's two ingress/egress routes and local roads within the Village's west and east.

Summary of Public Outreach

Public engagement was a critical component in developing the NYRCR Plan. To encourage public involvement, the Planning Committee utilized social media, direct e-mailing via the Village's "eBlast" system, postings to the Village's webpage, and flyers posted in Village storefronts and public venues. In addition, notices of Planning Committee meetings, Public Engagement Events and the availability of October 2013's preliminary NYRCR Village of Bayville Conceptual Plan were posted on the NYRCR webpage. Residents could also submit comments using the "Get Involved" button on the NYRCR webpage.

Three Public Engagement Events were held at strategic points in the planning process. The purpose of the events was to inform the public of the Committee's work to date and to elicit contributions to the NYRCR Plan. Public input received at the Public Engagement Events is reflected in the NYRCR Plan, ensuring that the public's voice remains a permanent and important part of the planning process.

Final Plan as Blueprint for Implementation

A risk assessment was conducted to help identify the community assets most at risk of damage from flooding and to test the risk reduction potential of proposed management measures. The risk assessment method utilized an inventory of community assets, maps identifying flood-prone areas, and a qualitative assessment of site factors and asset vulnerabilities to generate overall risk scores. The risk assessment process first derived risk scores for community assets without application of potential risk management measures. A second risk evaluation was then performed, assuming the proposed hazard mitigation and resiliency projects (or combinations of projects) would be implemented. The difference in risk scores for the community assets, between the current condition and the “with project” condition, represents a risk reduction benefit that was a contributing factor in identifying the recommendations in the NYRCR Plan.

Needs and opportunities for Bayville were identified, with respect to flood resilience and other community critical issues, based on the local knowledge of the Planning Committee, input from the community, and data on the damages caused by Superstorm Sandy and Hurricane Irene.

To improve the resilience of the Village of Bayville, it is essential to better understand: ongoing risks; lost economic activity and investment potential due to storm damage; options for rebuilding or expanding the local economy; and opportunities to make existing assets more resilient. Development of the NYRCR Plan included a review and coordination with hazard mitigation initiatives already completed or underway in the Village of Bayville.

The Planning Committee, with input received from the community, identified several strategies to both reconstruct Bayville following recent storm-related disaster events and to increase the Village’s resilience

to future storms and climate change. Strategies at the core of Bayville’s resilience plan involve securing and strengthening this 1.5-square-mile community against future storms and extreme climate events.

Because Bayville is largely built-out (i.e., not much undeveloped land remains in the Village) the reconstruction and resilience strategies focus on improving the security of community operations and daily activities in the face of climate-related disruptions, quicker recovery from storm events, and better protection for existing development. Based on review of risks and evaluation of needs and opportunities, four strategies were identified to help achieve the Community Vision. These strategies are:

- ▶ Enhance economic stability;
- ▶ Maintain surface and groundwater quality;
- ▶ Protect residents, assets and natural environment from extreme weather; and
- ▶ Maintain accessibility to emergency services.

The NYRCR Plan identifies actions (e.g., projects, programs and studies) that will help the Village of Bayville execute these strategies. These actions are grouped into three distinct categories: Proposed Projects, Featured Projects, and Additional Resiliency Recommendations, which are defined as follows:

- ▶ **Proposed Projects** – proposed for funding through a community’s allocation of CDBG-DR funding.
- ▶ **Featured Projects** – innovative projects where an initial study or discrete first phase of the project is proposed for CDBG-DR funding or other identified funding, and regulatory reforms and other programs that do not involve capital expenditures.
- ▶ **Additional Resiliency Recommendations** – resiliency projects and actions that the Committee would like to highlight and are not categorized as Proposed or Featured projects.

The Proposed and Featured Projects below address the critical issues facing the Village of the Bayville as a result of extreme weather events. The order in which the projects are presented does not indicate ranking or priority.

The projects listed here comprise the results of the combined efforts of the NYRCR Village of Bayville

Planning Committee and contributions from the broader community. Implementation of these recommended actions will result in significant resilience improvements and better overall community health. Further information on the planning process and development of these recommendations can be found in the NYRCR Village of Bayville Plan.

Table ES-1 NYRCR Village of Bayville Proposed and Featured Projects

Strategy	Project Name	Short Project Description	Project Category
<ul style="list-style-type: none"> ▶ Maintain water quality, ▶ Maintain accessibility to emergency services 	Pump Stations	Construct a Pump Station(s) to increase resiliency through mitigating the flooding of roads, homes, and businesses in the Village's east end by controlling stormwater flow.	Proposed
<ul style="list-style-type: none"> ▶ Maintain water quality, ▶ Maintain accessibility to emergency services 	Mobile Water Pump	An engineering study to determine the optimal number(s) and size(s) of mobile pump(s) needed to restore accessibility to the Village road network and critical services after extreme storm events.	Featured
<ul style="list-style-type: none"> ▶ Maintain water quality, ▶ Maintain accessibility to emergency services 	Comprehensive Drainage System Improvements	An engineering study to assess the Village's existing stormwater drainage system and identify areas of improvement in coordination with the County.	Featured
<ul style="list-style-type: none"> ▶ Maintain accessibility to emergency services 	Bayville Bridge Equipment Protection	The mechanical and electrical equipment of Bayville Bridge, which is a draw bridge; Nassau County has applied for this project to be funded through the Federal Highway Administration (FHWA).	Featured
<ul style="list-style-type: none"> ▶ Protect residents, assets and natural environment from extreme weather events 	Pine Lane Barrier	Construct a barrier on Pine Lane, adjacent to Long Island Sound, to prevent tidal surge from flooding streets, homes and businesses in this area of the Village's east end.	Proposed
<ul style="list-style-type: none"> ▶ Protect residents, assets and natural environment from extreme weather events 	North Shore Dune Replenishment	Replenish, stabilize and construct dunes along the north shore of the Village's east end, adjacent to Long Island Sound, from the vicinity of intersection of Valley Rd/Bayville Ave east to Centre Island Sound Beach/ Centre Island Road to prevent tidal surge from flooding streets, homes and businesses.	Proposed
<ul style="list-style-type: none"> ▶ Protect residents, assets and natural environment from extreme weather events, ▶ Maintain accessibility to emergency service 	Egress Study	Conduct a study in collaboration with Nassau County to identify measures to maintain accessibility of the Village's two ingress/egress routes during and following extreme weather events.	Proposed
<ul style="list-style-type: none"> ▶ Protect residents, assets and natural environment from extreme weather events 	Citizens Auxiliary Group	Organize/formalize a group of residents that would be trained to serve to perform activities that would augment the County's existing Community Emergency Response Team (CERT).	Proposed
<ul style="list-style-type: none"> ▶ Protect residents, assets and natural environment from extreme weather events 	Public Education/ Outreach	Develop and distribute Public Education materials that contain flood preparation and evacuation information specific to students, business and socially vulnerable populations in the Village of Bayville.	Proposed
<ul style="list-style-type: none"> ▶ Protect residents, assets and natural environment from extreme weather events, ▶ Enhance economic stability 	Code Modifications	Identify improvements to the Village's Code that would include stormwater management requirements and incorporate increased resiliency measures and reduce flood damage to businesses and residences.	Featured

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2014 NY RISING COMMUNITY RECONSTRUCTION PLAN VILLAGE OF BAYVILLE

Section I Community Overview





Community Overview

The Village of Bayville is situated between Long Island Sound and Oyster Bay on the north shore of Long Island, New York (see Figure 1). This attractive coastal location provides the benefits of a secure, close-knit community, high property values, and quality education, as well as opportunities for boating, beach access, and other water-based recreational activities. Natural assets within the Village that provide aesthetic value, environmental services and/or opportunities for recreational activities such as swimming, boating, and bird watching, include:

- ▶ **Village Woods Park** – approximately 14 acres, located adjacent to School Street in the center of the Village
- ▶ **Village Marina** – located within Mill Creek Bay, on the south side of the Village Center
- ▶ **Bridge Marina and boat launch** – located adjacent to the west side of the Bayville Bridge, on Mill Creek, toward the Village’s eastern end
- ▶ **Mill Creek Preserve** – approximately 61 acres, located in the Village’s far west end
- ▶ **Oyster Bay National Wildlife Refuge** – approximately 3,405 acres, located on the bay side of the Village’s east end
 - » Long Island is located within the Atlantic flyway for migratory birds; Mill Creek Preserve and the Oyster Bay National Wildlife Refuge are known to be used by a variety of species.
- ▶ **Mill Creek & Mill Creek Bay** – the creek flows through the preserve and into the bay
- ▶ **Long Island Sound** – borders the Village to the north

- ▶ **Ransom/Stehli Beach** – owned by the Town of Oyster Bay and located on the Sound-side of the Village’s west end
- ▶ **Sound Beach** – owned by the Village and located on the Sound-side of the Village’s east end
- ▶ **West Harbor Beach** – owned by the Town of Oyster Bay and located on the bay side of the Village’s east end

Village access is constrained, as there are only two points of overland ingress and egress: Bayville Road and West Shore Road/ Bayville Bridge. Both routes are under the jurisdiction of Nassau County and located in the FEMA-designated 100-year floodplain (see Figure 2). These two routes are rendered impassable during extreme weather events and storms, including Superstorm Sandy, leaving the community isolated from necessary services.

The Village’s east end, which extends from Adams Avenue to the eastern terminus of the municipal boundary, is also within the 100-year floodplain. During extreme weather events, i.e., astronomical high tides, extreme rain events, hurricanes and winter storms referred to as northeasters, a variety of sources may contribute to flooding within the west and east ends of the Village. These include overland storm water flow, storm water discharge into Mill Creek, elevated water levels in Oyster Bay and Mill Creek, and storm waves and surges on Long Island Sound. Surges into Oyster Bay overflow into the Village’s east end, along West Harbor Drive and into the bayshore neighborhoods along Mill Creek. The water pools and floods roads and residences in the neighborhoods of the Presidents Streets, the Numbered Streets and the Pine Lane area, as well as businesses in the Ludlam Avenue/Bayville Avenue area (see Figure 3).

The Village of Bayville is focused on improving community resilience to storm flooding through the NYRCR Program. Important issues include protecting residents, assets, and the natural environment from extreme weather events to enhance economic stability, maintain water quality of surrounding waterways, and preserve community character. Maintaining accessibility to emergency services, e.g., police, fire, EMT, hospital, supplies, and communication before, during, and after extreme weather events is imperative.

The residents of the Village of Bayville are working together to build back better by identifying/implementing hazard mitigation actions that will reduce flood risk and increase resiliency. This will be achieved through a combination of efforts (strategies) including construction of ‘soft’ and ‘hard’ flood mitigation measures, preservation of natural flood management systems, encouraging new and existing economic development, developing community programs in collaboration with Nassau County, and continuing Village success with water quality improvement.

Geographic Scope of NYRCR Bayville Plan

“A community may define the geographic scope of the plan to include the areas where assets are most at risk, where reconstruction or future construction should be encouraged, and where key investments to improve local economy can be made.”¹²

Data from the sources listed below were used to create maps showing the limits of the geographic scope, important assets outside the municipal boundary, assets impacted by flooding, and the FEMA flood zones. Maps showing areas within the Village that were inundated by Hurricane Irene and Superstorm

Sandy were also created. The maps were available for viewing at the NYRCR Planning Committee (Committee) Meetings that were held in September 2013, October 2013, and November 2013, and at the Public Engagement Events that were held on October 15, 2013 and November 12, 2013.

The data sources used to create the above referenced maps are as follows:

- ▶ Environmental Systems Research Institute (ESRI) Geographic Information Systems (GIS) data for railroads and waterbodies (ESRI 2001 and ESRI 2003, respectively)
- ▶ New York State GIS Clearinghouse vector file of public/private streets and ferry crossings compiled from orthoimagery and other sources. Attributed with street names and route numbers; data created as part of the Accident Location Information System (ALIS) project, March 2013.
- ▶ National Oceanic and Atmospheric Administration (NOAA) coastline information (NOAA 2011)
- ▶ Federal Emergency Management Agency (FEMA) Hurricane Sandy Inundation information (FEMA 2013)
- ▶ 2010 U.S. Census—information on towns, places, and counties

Nassau County Village of Bayville Geographic Scope

Figure 1



March 2014



Legend

- Roads
- Bayville Buildings
- - - Village Boundary
- Coastal Water



ESRI - roads, railroads, water bodies
NOAA - coastline
FEMA - Sandy Inundation
US Census - towns, places, counties

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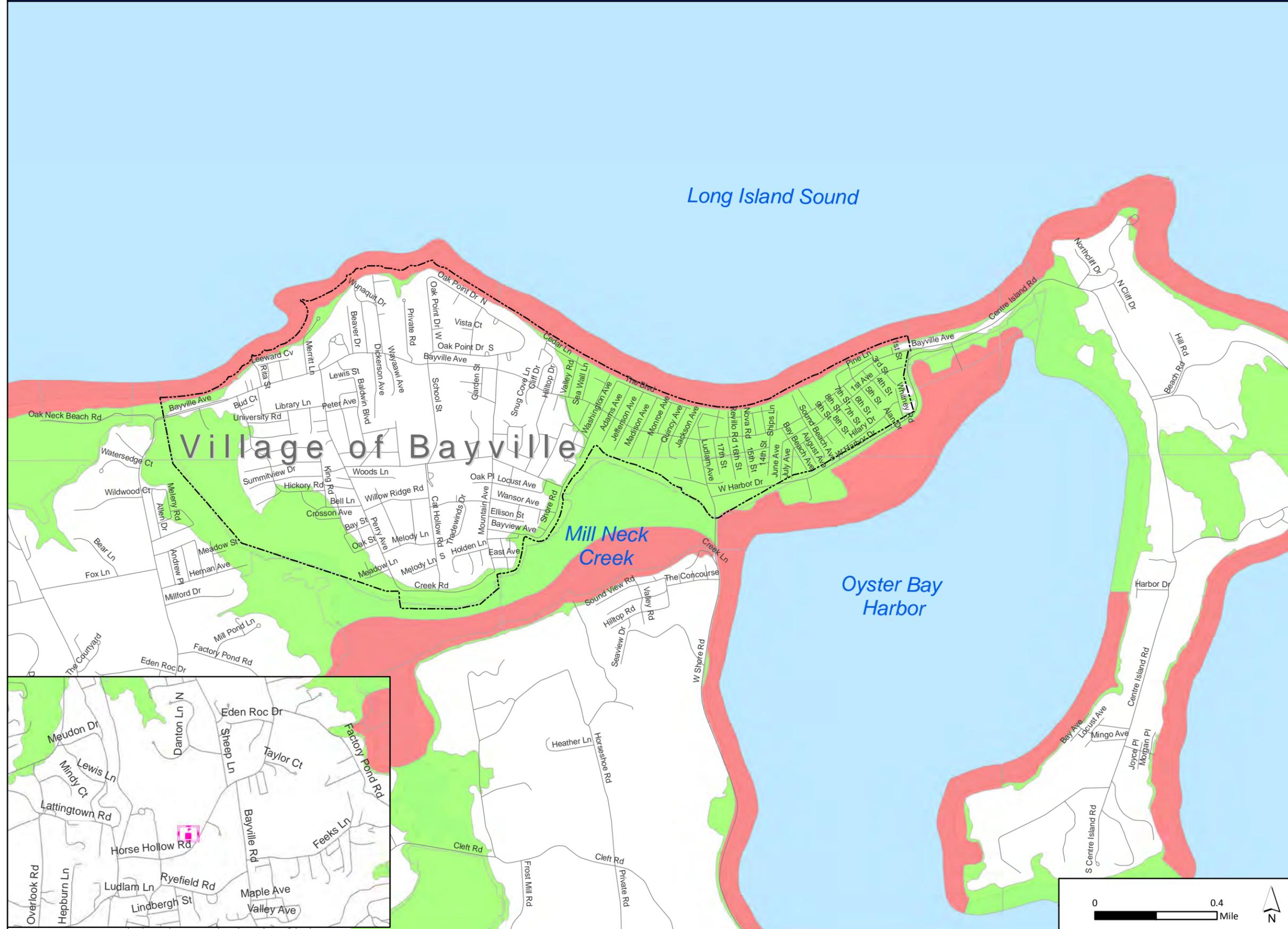
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Nassau County Village of Bayville FEMA Flood Zones

Figure 2



March 2014



Legend

FEMA Flood Zone

A - Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage.

AE - Areas with a 1% chance of flooding (inside the 100-year floodplain) and a 26% chance of flooding over the life of a 30-year mortgage. In most instances, base flood elevations may be available.

VE - Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves.

Bayville Village Boundary

Coastal Water

NY Roads

ESRI - roads, railroads, water bodies
NOAA - coastline
FEMA - Sandy Inundation
US Census - towns, places, counties



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Nassau County Village of Bayville Inundation Map

Figure 3



March 2014



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Description of Storm Damage

As indicated in Table 1, the New York coastal region, including the Village of Bayville, has historically seen significant impact from two types of storms: 1) Hurricanes, which can occur from June 1 to November 30 and 2) northeasters, which typically occur during the winter season (November to March). During both storm types, coastal areas experience elevated water levels and intense wave conditions, accompanied by flooding and flood-related damage(s)^{1, 2}. Elevated water levels resulting from astronomical high tides and extreme rain events are also routinely followed by flooding in the neighborhoods of the Village’s west and east ends.

Hurricanes are low pressure systems with thunderstorms and winds ranging from 74 miles per hour (mph) for Category 1, i.e. the storm strength, to greater than 155 mph for Category 5 storms. Since the speed and path of a hurricane depends upon its interaction with oceanic and atmospheric conditions, it is possible for a lower category storm to result in more damage than a higher category storm³.

Northeasters, which are often referred to as Nor’easters in common parlance and/or the media, are generally

less intense than hurricanes, longer in duration and may have localized winds that reach hurricane strength. Therefore, damages from a northeaster can meet or exceed that of a hurricane¹.

Historically the worst storm damage to North shore communities of Long Island has come from storms changing wind direction as they pass east of Long Island Sound and from storms that have lasted through several tidal cycles. Storms in eastern Long Island Sound blow from the northeast, but as they pass through, wind direction changes to the north/northwest. The wind increases the size of the waves that are produced and pushes water onto the shore.

Sixty-five moderate to severe northeasters have impacted the New York coastal region from 1865 to 1965 (Table 1). The abnormally high tides and winds associated with northeasters in 1992 and 1993 flooded roads and led to power outages in the Village of Bayville¹.

The Great Nor’easter of December 1992 is clearly recalled by Village residents due to the severity of its damage to the area. Following the storm, 19,000 Long Island residents were without power and the homes of the Village’s 3,000 residents were standing in water as

Table 1. Historical Storms that have Impacted the New York Coast

Hurricane		Northeasters (aka Nor’easter)	
Date	Name	Date	Name
09-14-1904		03-03-1931	
09-08-1934		11-17-1935	
09-21-1938	Hurricane of ‘38	11-25-1950	
09-14-1944		11-06-1953	
08-31-1954	Carol	03-06-1962	
09-12-1960	Donna	02-06-1978	
08-06-1976	Belle	03-28-1984	Nor’easter of ‘84
09-27-1985	Gloria	10-30-1991	Halloween Nor’easter or the Perfect Storm
08-19-1991	Bob	12-11-1992	Great Nor’easter of ‘92
		03-06-1993	Storm of the Century

much as 8 feet deep ¹. Federal and state disaster officials touring damaged areas, including Long Island, noted thousands of battered homes, miles of eroded beaches, downed trees and power lines, and shattered boats. After a helicopter survey of collapsed homes on Long Island and coastal areas of Queens and Brooklyn, New York Governor Mario Cuomo was reported to have seen "...huge chunks torn out of seawalls..." ⁴. President George H.W. Bush declared New York State a disaster area on December 21, 1992, enabling residents to apply for federal assistance, grants and loan programs ^{5,1}.

Three months after the Great Nor'easter of '92, the Storm of the Century struck in mid-March 1993. Rapid snow accumulations and widespread whiteout conditions (zero visibility) resulted in New York and six New England States declaring disaster emergencies at the height of the storm. High winds combined with heavy, wet snow downed thousands of miles of power lines, and caused over \$1.5 billion in damage ⁶.

The New York City area also experienced coastal flooding as a result of 15 other nor'easters (from 1960 to 2006) that produced storm surges above the mean-high water mark, including: November 1995 (4.06 feet), January 1996 (4.42 feet) plus one in March 2010 (4.19 feet) ⁷. The "Historic Nor'easter of 2010" is also clearly recalled by Village residents for the flooding that occurred due to the storm surge and heavy rains (2 to 3 inches) ⁷. The basement(s) of home(s) in the Presidents Street area were flooded with approximately three feet of water ⁸. Strong winds downed trees and power lines, and caused power outages from New Jersey to the south coast of New England. The Long Island Power Authority estimated that approximately 145,000 customers were affected by blackouts ⁹.

During and following astronomical high tides and storm events, including Hurricane Irene and Superstorm Sandy, elevated water levels in Long Island Sound, Oyster Bay, and Mill Creek flood the Village of Bayville in the following patterns:

- ▶ Long Island Sound floods homes within a several block span of the Pine Lane area and extending south to First Avenue and Numbered Streets;
- ▶ Overflow from Mill Creek floods homes and businesses within a several block span of the Presidents Streets neighborhood and extends south to Bayville Avenue; and
- ▶ Winds force Long Island Sound waters into Oyster Bay, which overflows into the West Harbor Drive area and backs up into Mill Creek and floods homes along Shore Road (see Figure 3).

Bayville Ave/Ludlam Ave and roads in low lying areas of the Village's east end become difficult to travel and/or become impassable due to flooding.



Storm Surge at Ransom/Stehli Beach photo (Danielle Finkelstein, Newsday, 29 October 2012)

Following Hurricane Irene, Bayville Avenue was inundated with approximately three feet of water; residents traveled using row boats, kayaks, and surf boards. Pine Lane residents used buckets to bail out yards and homes that were flooded with approximately one foot of water ¹⁰.

During Superstorm Sandy, high winds and an astronomical high tide combined with an 11-foot storm surge to inundate Ransom/Stehli Beach in the Village's west end ¹¹. Superstorm Sandy also flooded the Village's entire low-lying east end. The storm surge breached the center of an existing sand dune on the

beach in the area of Pine Lane. The breach allowed the water to flow south along the paved surface of 5th Avenue, south toward Oyster Bay, and flood Bayville Ave and 1st Ave in the process. Flooding of the east end necessitated the emergency shut-down of the gas utility service and numerous businesses in this area. The inundation of Bayville Avenue made the road impassable and resulted in stalled vehicles, blocking access for emergency personnel and utility trucks. Residents once again used row boats and kayaks to navigate Bayville Avenue.

The fire trucks and ambulance based out of the Village's only Firehouse on Bayville Avenue were relocated to Village Hall as a storm preparedness measure. The flooding of Bayville Avenue prevented the travel of all vehicles, including the fire trucks and ambulance, during the early morning high tide (from approximately 12am to 6am) and flooded the Firehouse's basement. The water level on Bayville Avenue decreased with the ebbing tide, but standing water remained in the areas of lowest elevation; emergency and personal use vehicles were only able to push through the standing water at approximately 6am^{12,13}.

The Village's only Firehouse was the site of a regionally popular haunted house that had drawn crowds to the Village each October since 1991. The attraction bolstered the local economy by drawing visitors after the summer season and funds raised from the haunted house allowed the fire company to pay for a \$100,000 ambulance. The costumes and equipment used for the haunted house were stored in the Firehouse basement. The Village was unable to open the Haunted House in 2013 as it did not have the funds to replace the flood damaged costumes and equipment¹⁴.

The Bayville Bridge spans Oyster Bay and connects the Village of Bayville and Centre Island to the Town of Oyster Bay via West Shore Road and Ludlam Avenue. The Coast Guard requires that the Bridge be left open during storm emergencies to allow the passage of boat traffic. Superstorm Sandy's floodwaters inundated Ludlam Avenue/Bayville Bridge/West Shore Road, submerged the Bayville Bridge and rendered

the bridge's electrical equipment inoperable. The bridge remained in the open position after tide waters receded and was unable to be closed to restore the ingress/egress roadway, until it reopened on April 17, 2013¹⁵.

According to an August 23, 2013 article published in Roads & Bridges², three days of storm surge from Superstorm Sandy resulted in the equivalent of approximately 30 years of normal erosion damage to West Shore Road. The reconstruction of West Shore Road began in December 2012 and ended in mid-June 2013. Until then residents could not enter and leave the Village via this route.

The damage to the Bridge and West Shore road left the Village with only one vehicular access route for seven months following Superstorm Sandy, which diminished public safety and disrupted the local economy by delaying the re-opening of businesses and limiting tourism.



Neighborhood homes bordering Long Island Sound photo (Nanette Vignola-Henry, CDM Smith, 28 August 2013)

The Village estimates approximately 300 homes were affected by Superstorm Sandy¹⁶. Additionally, winds from Superstorm Sandy damaged trees, which created road closures due to debris and brought down electrical power lines and telephone lines. This contributed to regional and local losses of electrical power, internet, cell phone, and land-line telephone

service. In the immediate aftermath of Superstorm Sandy, the primary method of communication that remained was the use of cell phones for calling and/or texting. Regional damage to cell phone towers resulted in intermittent and/or unreliable cell phone service, e.g. text messages would be sent but not received by the recipient, text messages would arrive hours or days after they were initially sent, etc.¹⁷ The Village and County service crews typically assist the residents with debris removal following extreme weather events and storms. However, road closures limited the ability of the Village and County services crews to assist with debris removal following Superstorm Sandy. Therefore, residents assisted each other with debris removal and the pumping of residual flood water.

Compromised phone service, and the flooding of homes, businesses and roads, combined with a 10-day (average) regional gas shortage and power outage that resulted in a lack of heat, electricity, and potable water, and halted the distribution of emergency services, supplies, and communication within and to the Village during and after the Superstorm Sandy. These conditions created public health and safety hazards for residents, including socially vulnerable populations, e.g., Jones Manor Senior Housing, and first responders.

Critical Issues

The critical issues facing the Village of the Bayville as a result of these storm threats include protecting residents, assets, and the natural environment from extreme storm events, recovering quickly post-storm events (resiliency), enhancing economic stability, maintaining the water quality of surrounding waterways, and preserving community character. Maintaining accessibility to emergency services, e.g., police, fire, EMT, hospital, supplies, and communication before, during, and after extreme weather events is imperative.

Transportation

The Village of Bayville has two overland ingress/egress routes, Bayville Road and Ludlam Avenue/Bayville Bridge/West Shore Road. Both routes are located in the FEMA-designated 100-year floodplain (see Figure 2). The flooding that occurs during and following extreme weather events, e.g., astronomical high tides, and storms, e.g., northeasters and hurricanes, renders these routes impassable. Inaccessibility of these routes to vehicular traffic prevents ingress/egress and halts the distribution of emergency services, supplies and communication to the Village.

The Bayville Bridge, which is a critical component of one of the Village's two ingress/egress routes, spans Oyster Bay and connects the Village of Bayville and Centre Island to the Town of Oyster Bay via West Shore Road and Ludlam Avenue. Electrical equipment, which is located under the bridge, allows the bridge to be opened for the passage of boat traffic in Mill Creek and Oyster Bay and closed for the passage of vehicular traffic. During emergencies, the Coast Guard requires that the Bridge be left open to allow for the passage of boat traffic. When the electrical equipment fails to operate due to floodwater inundation, the bridge remains open and is unavailable for use by vehicular traffic until the electrical equipment can be repaired and/or replaced. The County is in the process of applying for Federal Highway Administration (FHWA) funding to protect the electrical equipment from flood inundation and ensure operation of the bridge during and following extreme weather events.

West Shore Road, which is adjacent to Oyster Bay and leads to the Bayville Bridge, was impassable due to flooding and wave action during Superstorm Sandy. Three days of storm surge from Superstorm Sandy resulted in the equivalent of approximately 30 years of normal erosion damage to this road¹⁸. The road was closed on October 29, 2012, reconstruction began in December 2012 and the road was not re-opened to traffic until mid-June 2013.

Damage to the Bayville Bridge and West Shore road left the Village with only one vehicular ingress/egress route for seven months following Superstorm Sandy, which diminished public safety, disrupted the local economy, and was a hardship for the Community.

Many local streets in the Village’s west and east ends are also in the 100-year floodplain and routinely flood during and following extreme storm events. The areas at the lowest elevation(s) remain flooded after the tide recedes and/or the storm passes. The flood water during and residual water following extreme weather events renders local roads impassable. These conditions create public health and safety hazards by halting the distribution of emergency services, supplies and communication within the Village.

Emergency Services

The Village’s only Firehouse and Ambulance are located on Bayville Avenue, which is in the 100 year floodplain and is routinely flooded or inundated during and following extreme weather events. Emergency fire and medical service vehicles are unable to travel on the flooded avenue and provide emergency fire and medical services to residents. The vehicles can be moved to Village Hall to prevent them from being damaged by flood waters, but flooding of local roads prevents the use of these vehicles in the Village during extreme storm events.

Economic

The warm-weather recreational (e.g., boating, bird watching, swimming, and social opportunities such as outdoor dining) opportunities that are available due to the Village’s unique geographic location and natural assets form the base of the local economy and contribute to the regional economy. Visitors are drawn to the Village in other seasons by events at the Firehouse and businesses that serve as venues for social functions, e.g., holiday parties. Prolonged closure of the Village’s ingress/egress routes and local roads disrupts the local economy through lost revenue in the

short-term and impacts long term economic stability by degrading confidence that the area is safe and accessible.

The Village’s housing stock and business base was not permanently diminished as a result of Hurricane Irene or Superstorm Sandy as the damage was not to the extent that demolition and retreat or abandonment of entire neighborhoods was required.

Community Vision

The Bayville Committee developed a vision statement based on existing local and regional planning documents. The vision was revised to reflect public input obtained during NYRCR Public Engagement meetings (described in Section V-C). The resulting Bayville Community Vision is:

“The Village of Bayville is a unique community focused on building back better by protecting our assets and natural environment from extreme weather events and natural disasters. Our goals are to enhance economic stability, maintain and improve our water quality, preserve community character, and maintain access to emergency services.”

The Bayville Planning Committee developed specific goals listed below to realize this vision, while increasing resiliency and reducing future risk through implementation of the NYRCR Plan. The goals address damage caused by Hurricane Irene and Superstorm Sandy and reflect community objectives and revitalization strategies, as well as the priorities of Governor’s Long Island Regional Economic Development Council.

1. Enhance economic stability – ensure the retention of existing businesses and encourage economic development

2. Maintain and improve water quality – improve stormwater management and collaborate with the County regarding comprehensive drainage improvements
3. Preserve community character – reduce threats from future storms and sea level rise to protect the community and natural resources
4. Maintain access to emergency services – ensure access to the Village’s two ingress/egress routes and local roads within the Village’s west and east

Relationship to Regional Plans

The damage from Hurricane Irene and Superstorm Sandy highlighted the need for preparedness, protective and recovery measures, and projects that would help the Village of Bayville build back better. The need for such measures and projects was included in numerous local and regional planning documents that were created before and after these storms. The Village’s Local Waterfront Revitalization Plan (2002) contained detailed information on areas within the Village that were prone to flooding and erosion, and flood prevention methods that remained to be implemented. In January 2013 the Village’s Mayor assembled a Flood Mitigation Plan which contained information on damage sustained during Hurricane Irene and

Superstorm Sandy and proposed projects, e.g., a berm along on the Sound side of Pine Lane, which focused on decreasing property damage and increasing public safety.

Table 2 presents a list of available local and regional planning documents and data that were reviewed for information and data pertaining to the NYRCR planning process. The goal of this comprehensive document and data review was to avoid duplication of existing planning studies and projects, recognize gaps, and assess the potential synergies between local and regional needs and opportunities while considering how the NYRCR Plan might support and incorporate local and regional goals. Key shared local and regional issues identified as a result of the review included:

- ▶ Necessity of stormwater management and comprehensive drainage improvements
- ▶ Maintaining accessibility of ingress/egress routes
- ▶ Development of public education programs to increase public safety
- ▶ Code modifications to protect communities and natural resources

Table 2. Existing Planning Documents and Data Collection and Resulting NYRCR Plan Components

Local Resources	Relevance	NYRCR Plan Components
Village of Bayville, Flood Mitigation Plan, Mayor of Bayville (January 2013)	Contains information on damage sustained during Irene and Sandy and presents projects that would increase public safety and decrease property damage.	Need of additional pumps to remove residual flood waters from low lying areas of the Village’s west and east end, public education, construction of new and/or replenishment of existing barriers in area of Presidents streets, Pine Lane and Shore Road, maintain water quality of surrounding waterways
Local Waterfront Revitalization Plan (2002)	Detailed information on areas prone to flooding and erosion, and existing flood prevention methods that have been implemented or remain to be implemented; data and project list are outdated, but still of some use.	Preserve community character, maintain and improve water quality of surrounding waterways, improve drainage and stormwater management, participation in NFIP program, enhance economic stability

Table 2. Existing Planning Documents and Data Collection and Resulting NYRCR Plan Components (Cont'd)

Local Resources	Relevance	NYRCR Plan Components
Village Code (1978+updates)	Contains existing codes relevant to the project, i.e. areas prone to flooding and erosion, protection of water quality, stormwater management, etc.	Code modifications, improve drainage and stormwater management, improve water quality of surrounding waterways, preserve community character
North Shore of Long Island, New York Storm Damage Protection and Beach Erosion Control Reconnaissance Study (1995+)	<p>The study originally included the Village of Bayville and the Village of Asharoken. The USACE is coordinating with NYS DEC to complete a feasibility study and Environmental Assessment for Asharoken Beach.</p> <p>The USACE will advance the earlier initiated feasibility study addressing beach erosion and flooding in the east end of the Village of Bayville, adjacent to Long Island Sound, Mill Creek and Oyster Bay. Approximately \$600,000 in Federal funding, for fiscal year 2014, has been allocated for general investigation. Expected completion in early 2016.</p>	Construction of new and/or replenishment of existing barriers in area of Presidents streets, Pine Lane and Shore Road, maintain water quality of surrounding waterways, maintain access to emergency services
GIS data	Data available in many areas. Using FEMA, ESRI a private developer of GIS data (used here for roads, waterbodies data), NOAA (coastlines) and U.S. Census on current planning maps.	Geographic scope development and asset identification, preserve community character, construction of new and/or replenishment of existing barriers in area of Presidents streets, Pine Lane and Shore Road, maintain water quality of surrounding waterways
National Oceanic and Atmospheric Administration (NOAA) coastline information http://www.nhc.noaa.gov/gis/	Contains historic aerial imagery, coastal flooding information, and aerial imagery showing Superstorm Sandy impacts to the Village of Bayville.	Geographic scope development and asset identification, construction of new and/or replenishment of existing barriers in area of Presidents streets, Pine Lane and Shore Road, maintain access to emergency services
Regional Resources	Relevance	NYRCR Plan Components
USACE Near Shore Investigation (2005)	Analysis of local marine fauna in Bayville's surrounding waters; while not focused on water quality, the study notes that levels of pesticides and VOCs in the water bodies surrounding Bayville were below the level of laboratory detection.	Construction of new and/or replenishment of existing barriers in area of Presidents streets, Pine Lane and Shore Road, preserve community character, maintain water quality of surrounding waterways
Draft Nassau County Hazard Mitigation Study Plan (in development)	Extensive analysis of hazards to the county: risk assessment, capabilities/resources, and mitigation goals. Significant risks identified in Bayville include coastal erosion, flooding/ storm surge, tropical and winter storms. Includes summary of historic storm damages in Bayville	Public education, construction of new and/or replenishment of existing barriers in area of Presidents streets, Pine Lane and Shore Road, maintain access to emergency services, Citizens Auxiliary Group
Hurricane Sandy Rapid Assessment Final Report created by the Atlantic Flyway Shorebird Business Strategy Planning Team (no date)	Contains relevant information on Hurricane Sandy's impact on migratory birds; Long Island is within Atlantic flyway and vegetated wetland habitats, e.g. Mill Creek Preserve, known to be used by migratory birds are adjacent to the Village of Bayville.	Preserve community character

Table 2. Existing Planning Documents and Data Collection and Resulting NYRCR Plan Components (Cont'd)

Regional Resources	Relevance	NYRCR Plan Components
Cleaner Greener Long Island Regional Sustainability Plan (2013)	Regional context, goals, aspirations. Limited discussion of flooding/natural hazards. No specific discussion of Bayville. The plan contains a list of sea-level rise adaptation strategies which could be useful in Bayville.	Preserve community character
Nassau County Capital Improvement Plan 2013-2016 (2013)	Full list of capital projects with budgets for all county projects. Useful for information on relevant projects, such as West Shore Road. Several general disaster resiliency projects including hardening water treatment infrastructure and creating a disaster recovery plan for the county data center, and a project to design a sewage collection system to prevent pollution of the Mill Creek Preserve.	Construction of new and/or replenishment of existing barriers in area of Presidents streets, Pine Lane and Shore Road, public education, improve drainage and stormwater management, maintain water quality of surrounding waterways
Strong Island: The Strategic Economic Development Plan for Nassau and Suffolk Counties (2013 Update)	Regional context, goals, aspirations. Some discussion of flooding/natural hazards in the context of effects to regional economy. No specific discussion of Bayville.	Improve drainage and stormwater management, enhance economic stability
Long Island Comprehensive Economic Development Strategy (2012)	Regional context, goals, aspirations; limited discussion of flooding/natural hazards. Primarily a list of economic development projects throughout Long Island. No specific discussion of Bayville.	Improve drainage and stormwater management, enhance economic stability
Sound Vision: An Action Plan for Long Island Sound 2011-2020 (2011)	Ecosystem plan for the Sound; provides context, goals, and aspirations. No discussion of flooding/natural hazards. No specific discussion of Bayville or sea level rise.	Maintain water quality of surrounding waterways, preserve community character
Long Island Regional Economic Council Strategic Plan (2011)	Regional context, goals, aspirations; limited discussion of flooding/natural hazards. No specific discussion of Bayville. Focus on tourism may be relevant.	Improve drainage and stormwater management, enhance economic stability
Long Island Sound Waterborne Transportation Plan (2010)	Regional mobility plan; provides regional context. Bayville briefly mentioned as a potential “long list” ferry location.	Maintain access to emergency services.
Long Island Sound Coastal Management Program (1999)	Regional management program; discusses land/water resources of Long Island as Developed, Natural, Public, and Working Coasts and presents findings and recommendations. Bayville listed as one of 17 traditional waterfront communities that define the regional development pattern of the Long Island Sound coastal area.	Preserve community character and natural resources, maintain water quality of surrounding waterways, enhance economic stability, improve drainage and storm water management, construction of new and/or replenishment of existing barriers in area of Presidents Streets, Pine Lane and Shore Road
Nassau County Master Plan Draft (2010)	Long-term vision for the County: its assets, challenges and priorities, with a focus on the economy and adapting to demographic change. No specific discussion of Bayville.	Enhance economic stability
Nassau Five Year Plan 2010-2014 (2010)	Spending report for the HUD programs in the county. Several mentions (but no discussion) of housing and community development needs and projects in Bayville.	Public education, requirements of socially vulnerable populations, enhance economic stability

Table 2. Existing Planning Documents and Data Collection and Resulting NYRCR Plan Components (Cont'd)

Regional Resources	Relevance	NYRCR Plan Components
Nassau County Stormwater Management Program Plan (NCSWMP) (2009)	<p>Developed in accordance with NYSDEC guidelines to receive coverage under SPDES General Permit No. GP-0-08-002. Village of Bayville listed as one of 60 municipalities that passed an in-kind services agreement to provide for a 50% match with the state to assist with implementation of the NCSWMP.</p> <p>Presents six Minimum Control Measures (MCMs) required by SPDES GP-0-08-002.</p> <p>Mentions installing catch basin inserts as a storm water control measure in the Village of Bayville.</p>	Maintain water quality of surrounding waterways, enhance economic stability, Improve drainage and stormwater management, public education
Long Island 2035 Regional Visioning Initiative (2009)	Regional context, goals, aspirations. Limited discussion of flooding/natural hazards. No specific discussion of Bayville.	Improve drainage and stormwater management, enhance economic stability
Long Island Non-Motorized Transportation Study (2007)	This regional mobility plan is not fully available online. Appears to be of limited relevance in regard to flooding/natural hazards.	Improve drainage and stormwater management
Nassau County Capital Improvement Plan 2007-2010 (2007)	Full list of capital projects with budgets for all county projects. While outdated, could be useful for information on relevant past projects, including rehabilitation of West Shore Road and the Bayville Bridge.	Improve drainage and stormwater management, construction of new and/or replenishment of existing barriers in area of Presidents streets, Pine Lane and Shore Road
LI Sound Stewardship Initiative (2006)	Ecosystem planning for the Sound; provides context, goals, aspirations. No discussion of flooding/natural hazards. Mill Creek is a focus area. The plan makes no mention of priority resources/ impairments to the Creek, focusing instead on its ecological significance.	Preserve community character
New York Metropolitan Transportation Council Regional Freight Plan (2005)	Regional context regarding freight mobility. Very limited discussion of flooding/natural hazards. No specific discussion of Bayville.	Maintain access to emergency services, including operation of Bayville Bridge
North Shore Heritage Area Management Plan (2005)	Study and inventory of the heritage area's natural and cultural resources, with components of a comprehensive plan, since this is such a large area. No mention of impacts of flooding or natural hazards on historic resources. Numerous mentions of Bayville in inventory, but limited discussion of the village.	Preserve community character, maintain water quality of surrounding waterways
Nassau County Economic Development Plan (2002)	Contains information on industries to support/promote, areas to target for development and types of infrastructure investments; could serve as secondary information.	Enhance economic stability

Several of the proposed projects in the NYRCR Plan could be considered for incorporation into existing County and/or NYS programs, and/or an existing study by a federal agency. They are as follows:

1. Citizens Auxiliary Group – proposed activities for this group include confirming survivorship of neighbors following extreme storm events. This could be combined into Nassau County’s existing Community Emergency Response Team (CERT) program, which would identify a CERT member in the Village that would be responsible for conducting this task following extreme storm events. Residents could also designate Block Captains that would gather/convey information, e.g. neighbors known to have evacuated, traveling for vacation, etc., for their block to the Village CERT member(s).

Members of this group could also receive training through the Governor’s Citizens Preparedness Corps Training Program. The program aims to increase public safety by training approximately 100,000 New Yorkers in 2014 through the use of 2-hour training sessions. Attendees are educated on disaster preparedness, response and recovery. One participant per family is provided with a Citizens Preparedness Corps Response starter kit, which includes items such as a first aid kit and a flashlight.

Information gathering by individuals would be coordinated with the Village and the gathering of information by the Village would be coordinated with the County.

2. Public Education and Outreach – proposed activities for this project include preparing and disseminating information through presentations at schools and meetings held at places such as Village Hall. The County’s Office of Emergency Management (OEM) staff is available to provide presentation materials or the presentations themselves.

3. Storm Water Management and Comprehensive Drainage System Improvements – the Village recognizes that the use of pump stations would benefit stormwater management in the short-term and that drainage improvements would augment stormwater management and would therefore benefit from being addressed as a system. The County has recognized that the region is in need of drainage improvements. The Village drainage improvements would be done in collaboration with the County.
4. Construction of new and/or replenishment of existing barriers in the area(s) of the President Streets, Pine Lane, and Shore Road – the United States Army Corps of Engineers (USACE) is in the process of updating a study of storm damage protection and beach erosion control that was initiated in 1995. The study originally included the Village of Bayville and the Village of Asharoken. The USACE is coordinating with NYS DEC to complete a feasibility study and Environmental Assessment for Asharoken Beach.

The USACE will advance the feasibility study that was previously initiated for the Village of Bayville. The study will address beach erosion and flooding in the east end of the Village of Bayville, adjacent to Long Island Sound, Mill Creek and Oyster Bay. Approximately \$600,000 in Federal funding, for fiscal year 2014, has been allocated for general investigation. The feasibility study is expected to be complete in early 2016.

The construction and/or replenishment of any barriers for flood protection that may move forward as the result of the NYRCR Village of Bayville Plan would be done in collaboration with the USACE.

2014 NY RISING COMMUNITY RECONSTRUCTION PLAN VILLAGE OF BAYVILLE

Section II Assessment of Risk and Needs





A. Description of Community Assets and Assessment of Risk

A central goal of the NY Rising Community Reconstruction (NYRCR) Plan is to preserve essential community functions in the event of future storms. In order to achieve this goal, it is important to first identify the risk and vulnerability of the community assets that support these functions, including homes, businesses, infrastructure, public facilities, and natural resource systems. We begin the analysis by creating a detailed inventory of existing assets in locations that were impacted by Hurricane Irene and Superstorm Sandy or in locations that could be susceptible to impact, and then evaluate the degree of risk to those community assets.

i. Description of Community Assets

The first step in assessing the risk to a community's functions is identifying assets such as facilities, infrastructure systems, open space and natural areas that serve important functions and that may be at risk in storm events, or which have already been affected by historic storms. The asset inventory compiles information about each individual asset and serves as the foundational source of information throughout the NYRCR Plan.

Asset Identification

The asset inventory has two purposes. First, it serves as the definitive list of physical assets and systems identified by the community as important to community function, and potentially at risk of damage from severe storms. Second, it serves as a repository for key information about the identified assets that can aid in identifying and evaluating management actions.

The asset inventory information is used in the community risk assessment, and then to help evaluate potential management actions.

Community assets in the NYRCR Plan can take a variety of forms, including housing, transportation infrastructure, schools, hospitals, water and wastewater treatment plants, parks and natural areas, and commercial/business areas. Any asset whose loss or impairment would compromise essential functions of the community was considered in the asset inventory. The NYRCR Program developed an asset inventory tool to support the development of NYRCR Plans; the tool offers five asset classes by which assets can be characterized, representing the spectrum of essential community functions:

- ▶ Economic;
- ▶ Health and social services;
- ▶ Housing;
- ▶ Infrastructure systems; and
- ▶ Natural and cultural resources.

Community assets were identified in an iterative process over the course of about two months. An Infrastructure Sub-Committee was formed by the NYRCR Planning Committee to identify assets through field reconnaissance and report these findings to the NYRCR Planning Committee. The Infrastructure Sub-Committee included members of the community who were led by members of the Bayville NYRCR Planning Committee. This group was able to efficiently visit and identify assets within the Village to be included in the inventory. Information gathered as to how these assets 'weathered' the storm was reflected in assessing risk to assets.

To ensure the asset list was robust and representative of the community, input on assets was collected from the public during the first and second Public Engagement events (described in Section V.C:Public Engagement Process). The assets identified through this process included neighborhoods, homes, businesses, and natural features and infrastructure elements that were affected by past storm events and that are important to the Village. Critical facilities such as the Fire Station and districts such as the Ludlum/Bayville Avenue business area were identified as assets. These emergency response and business assets were significantly impacted by Superstorm Sandy and Hurricane Irene. As of March 2014 some stores on Ludlum Avenue remain closed as a result of the damage. The Fire Station relocated its equipment to higher-ground to avoid damage during the storm events, but the Fire Station structure was flooded and was rendered inoperable for a time.

Assets identified during this process are depicted in Figure 4. As can be seen, there are a number of residential neighborhoods in the eastern portion of the Village located north and south of Bayville Avenue and east and west of Ludlum Avenue. Commercial areas are centered in this area of the Village as well as at the western end near the Town of Oyster Bay beaches. Marinas are located on the Mill Creek Bay side of the Village, west of the Bayville Bridge. Natural areas such as parks and beaches are located both on the eastern end and the western end of the Village. Public services including the Fire Station, ambulance, both volunteer, and Nassau County Police booth are located in the Bayville Avenue/Ludlum Avenue business area, which is a flood prone area. Also in this area is the County's Association of Helping Retarded Children (AHRC) facility, a day resident facility serving a socially vulnerable population.

Once the list of community assets was complete they underwent multiple rounds of analysis and screening. First, the location of the assets was identified on a map that classified geographic areas by flood risk as extreme, high, and moderate (see Figure 7 located below in Section IIB). These mapped risk areas were

defined by New York State Department of State (NYS DOS) and National Oceanic and Atmospheric Administration (NOAA) based on a variety of data sources and generally correspond to the 10-year, 100-year, and 500-year floodplains in Bayville (constituting the extreme, high, and moderate risk areas, respectively). The NYRCR Planning Committee examined the risk areas to identify any additional assets not previously listed.

Assets compiled during the inventory that were not located within one of the flood risk areas (i.e., that were located in areas above the elevation of the 500-year floodplain), remained in the inventory but were not included in further risk analysis as the likelihood of future flood damage is low. For example, the Village Hall, Primary, and Intermediate schools are identified assets that are highly valued by the community but are located above the 500-year floodplain. Although assets such as these have a 'low' risk of impact from flooding, they are indirectly affected by flood events because access is limited when the main thoroughfares in the Village are rendered impassable as a result of flood waters, and because electrical service and communication is compromised by downed power lines.

Where landscape conditions were comparable, assets were generalized by grouping those within contiguous geographic areas rather than identifying individual businesses, homes or home owner associations. This is appropriate for a community level risk assessment as provided by the NYRCR Program. By using this neighborhood approach the risk assessment process is manageable (thousands of assets are condensed into less than 100) and all residents and businesses within each identified asset area were evaluated equitably. (See Section V.D: Community Asset Inventory, for a complete listing of assets by neighborhood grouping.)

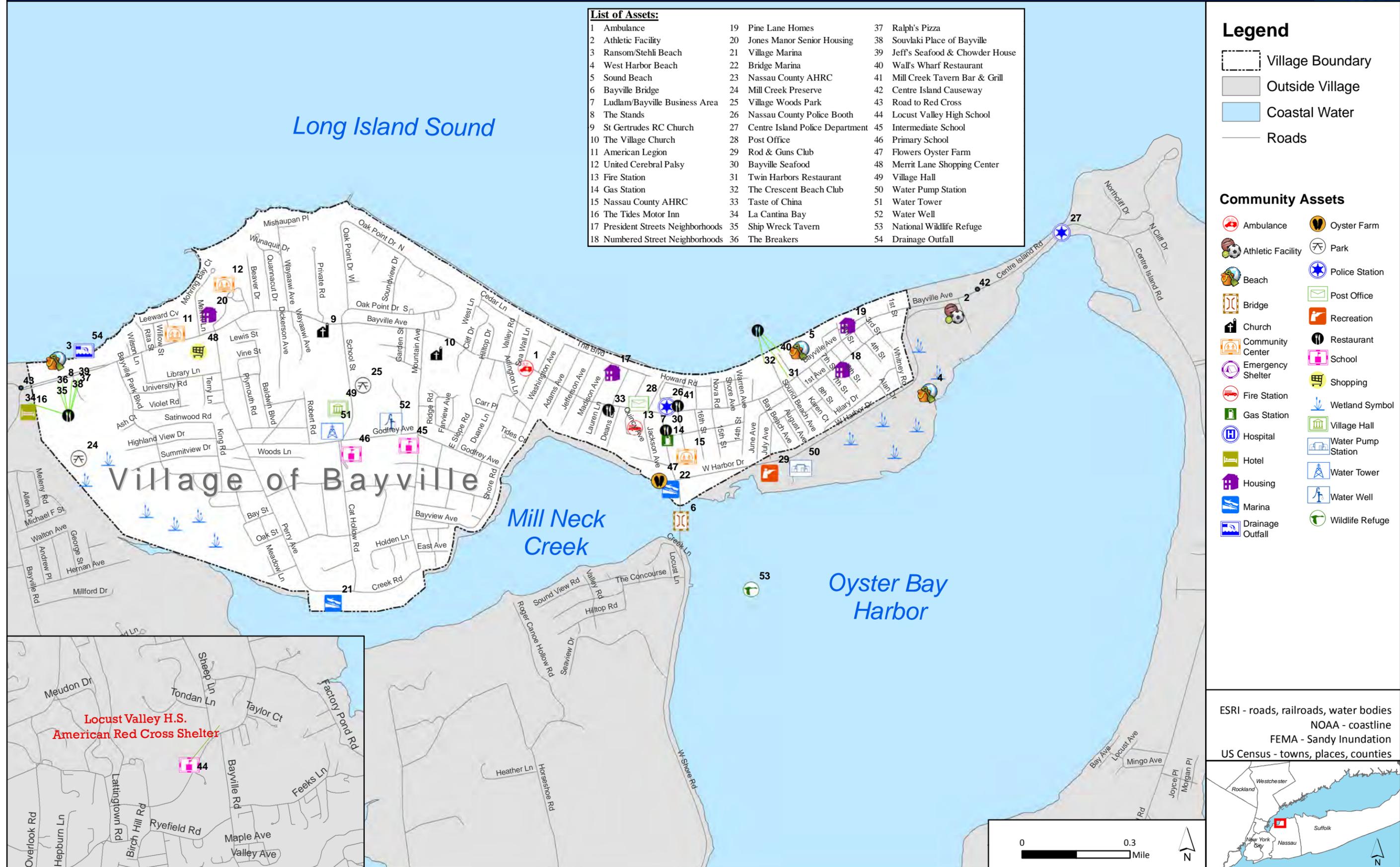
The neighborhoods and associated assets of the Village were divided into "four quadrants" - with Bayville Avenue serving as a north/south geographic division boundary and Ludlam Avenue serving as an east/

Nassau County Village of Bayville Community Assets

Figure 4



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west geographic division boundary. Some assets that were identified as critical or of significant value to the community could not be grouped by type within a geographic area or neighborhood and so they were considered individually. These assets include the Bayville Bridge, the road to the Red Cross Shelter, and the Centre Island causeway. (See Figure 7 located below in Section IIB.)

Asset Inventory

The list of individual assets and asset groups that resulted from the process outlined above was used to populate the NYRCR asset inventory table and risk assessment tool. The asset inventory compiles information about the location, flood risk zone, function, community value, and landscape attributes of the assets.

The six key NYRCR Recovery Support Functions (RSFs) were established by President Barack Obama in 2011 through the National Disaster Recovery Framework (<http://www.fema.gov/national-disaster-recovery-framework>). The RSFs were designed to “support local governments by facilitating problem solving, improving access to resources, and fostering coordination among State and Federal agencies, nongovernmental partners and stakeholders” (<http://www.fema.gov/recovery-support-functions>).

- ▶ Community Planning and Capacity Building
- ▶ Economic Development
- ▶ Housing
- ▶ Health and Social Services
- ▶ Infrastructure Systems
- ▶ Natural and Cultural Resources

To coordinate with programs for federal assistance, assets were grouped by the NYRCR Program according to the Recovery Support Functions (RSF). The six federal RSF are described by the NYRCR Program Guidance in the following bullets.

- ▶ **Community Planning and Capacity Building** – addresses the community’s ability to implement storm recovery activities and to plan to mitigate effects of future storms.
- ▶ **Economic Development** – returning economic and business activities to a healthy state and developing new economic opportunities that would result in a sustainable/economically strong community.
- ▶ **Health and Social Services** – restore public health, public health care facilities and social services.
- ▶ **Housing** – identify/implement strategies that will help achieve local housing goals.
- ▶ **Infrastructure** – investment in infrastructure to provide economic development and improve community’s capacity to respond to future disasters.
- ▶ **Natural and Cultural Resources** – develop/maintain natural systems to address stormwater, tidal/wave action, improve wildlife habitat, fishing and water quality.

These RSF are revisited in Section III as they pertain to reconstruction and resiliency strategies identified by the Village.

To help evaluate flood risks in the community a risk assessment process designed around the community assets was provided by the NYRCR Program. This process incorporates information about the location of assets within the mapped risk areas, the landscape characteristics, and vulnerabilities of the assets.

The completed asset inventory is presented in Section V.D. An asset map (Figure 4) depicting the location and type of each asset, as well as the boundaries of the

high, medium and low risk areas, is presented in Figure 7 (see Section IIB). The asset ‘value’ to the community was determined from input received at the first and second Public Engagement Events (October 15 and November 12, 2013).

During the first Public Engagement Event, community members added assets directly to large-scale maps provided at the venue. Community members used markers or post-it notes to make their additions. At the Second Public Engagement Event members of the public were organized into several groups, and through a facilitated discussion, were asked to review the list of assets generated at the first event, and to identify additional assets that may have inadvertently been left off the list. As a result of these discussions it was determined that Flowers Oyster Farm should be added to the list of community assets. Community members then identified (using a high/medium/low scale) the importance of the asset to the community. The asset identification is shown in Table 3.

In general, the assets identified by the NYRCR Planning Committee and Public Engagement Event attendees centered on housing and neighborhoods. Eight residential neighborhoods located within risk areas

were identified as asset groups, and all were identified as having high community value. This is due, at least in part, to the significant damage sustained by housing during previous storms. Three clusters of economic assets within the defined risk areas were identified. These were identified as having medium community value. The two marinas within the community were included in the asset inventory, as they facilitate important marine economic activities, and, due to their inherently exposed locations, are at considerable risk during storms.

The other individual assets included in the asset inventory were primarily infrastructure and emergency response assets, including the community’s water pump station, the Bayville Bridge, two roads that provide the only routes into and out of the Village, the Village volunteer Fire Department/Ambulance station, Nassau County Police Booth, and Centre Island Police Department. These individual assets support access to and protection of the housing and economic assets that were identified as most highly valued by the community. Overall, the inventory identified the importance of assets that focus on social and economic functions and existing infrastructure.

Table 3: Bayville – List of Assets

Recovery Support Function	Identified Assets	H/M/L
Community Planning and Capacity Building	Jones Manor Senior Housing	Medium
	United Cerebral Palsy	Medium
	Nassau County AHRC	Medium
Economic Development	Village Marina	Medium
	Bridge Marina and Boat Launch and Flowers Oyster Farm	Medium
	Ludlam/Bayville Avenue Business area	Medium
	Merritt Lane Shopping Center	Medium
	School Bus Depot at Merritt Lane	Medium
	“The Stands” (west end business area)	Medium
	Rod and Gun Club	Low

Table 3: Bayville – List of Assets (cont’d)

Recovery Support Function	Identified Assets	H/M/L
Health and Social Services	Village Hall	High
	Primary and Intermediate Schools	High
	Ambulance	High
	Post Office	Medium
	Community Center	Medium
	American Legion	Medium
	Police Booth	Medium
	Fire Station	High
	Centre Island Police Department	Medium
	Bayville Road access to Red Cross Shelter and North Shore/LIJ Hospital at Glen Cove	High
Housing	President Streets neighborhood	High
	Pine Lane homes	High
	Numbered Streets neighborhood	High
Infrastructure	Gas station	High
	Water tower and pump station	High
	Water well	High
	West Shore Road and Bayville Bridge*	High
	Water pump station*	High
	Village of Bayville stormwater collection system	High
	Nassau County stormwater collection system	High
	Above-ground electrical and telephone lines	Medium
Natural and Cultural Resources	The Village Church	Medium
	St. Gertrude’s Church	Medium
	Village Woods Park	Low
	Mill Neck Preserve	Medium
	Mill Neck Creek	Medium
	Mill Neck Bay	Medium
	Long Island Sound	Medium
	Ransom/Stehli Beach (Town of Oyster Bay)*	Medium
	Sound Beach (Village of Bayville)	Medium
	West Harbor Beach (Village of Bayville)	Medium
	Center Island Beach (Town of Oyster Bay) and Community Sports Centers*	Medium
	Village of Bayville Coastal Erosion Hazard Area (CEHA)	Medium
Oyster Bay National Wildlife Refuge	Medium	

*Assets located outside of the Village of Bayville’s municipal boundary but important to Village resiliency

ii. Assessing Risk to Assets and Systems

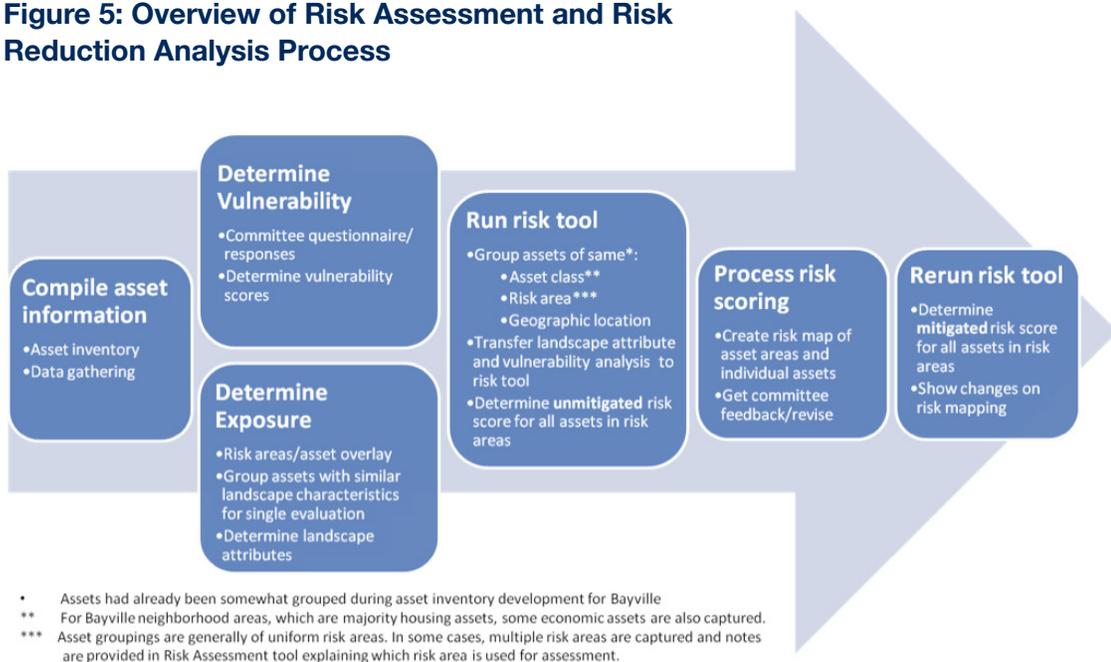
As discussed above a risk assessment was conducted to help identify the community assets most at risk of damage from flooding, and to test the risk reduction potential of proposed management measures. It was performed using the Risk Assessment Tool provided by the NYRCR Program.

The risk assessment process involved first identifying the current risk to community assets. This is identified as the ‘unmitigated’ risk, that is, the risk to assets without the application of potential risk management measures. A second risk analysis was then performed by running the Risk Assessment Tool again, this time assuming specific projects or combinations of projects would be implemented. This second risk assessment identified potential risk reduction if a specific

project or projects was implemented. This second evaluation identified the “mitigated” risk.

The difference between the unmitigated and mitigated risk scores represents the benefit of the proposed risk management action(s) or project(s). The potential benefits of specific projects under consideration in the Plan are described in Section IV. Developing risk scores required determining the exposure and vulnerability of assets through a process of mapping and gathering information from the NYRCR Planning Committee and other data sources. The process utilizes national and regional maps, and followed consistent methodologies to landscape attributes and the vulnerability score for each asset or asset area. Figure 5 below provides an overview of the general risk assessment process which is further described in the sections that follow. The Risk Assessment Tool can be found in Section V.D.

Figure 5: Overview of Risk Assessment and Risk Reduction Analysis Process



Risk Assessment Tool

Using the asset inventory prepared by the NYRCR Planning Committee and the Community, the risk assessment process was completed using the Risk Assessment Tool. A snapshot view of the Risk Assessment Tool is presented in Figure 6. The Risk Assessment Tool uses asset information to calculate a quantitative risk score. The tool, developed by the NYS Department of State (NYS DOS), utilizes information from the asset inventory, flood hazard maps, and qualitative assessments of asset exposure (landscape conditions) and vulnerability (asset conditions).

Some information assembled in the asset inventory, including asset risk area, hazard score, exposure score, and vulnerability score, directly affects the numeric risk score of the assets. Other inventory information including the asset class, whether the asset serves socially vulnerable populations (e.g., people with disabilities, low and very-low income populations, elderly, young children, homeless and people at risk of becoming homeless), whether the asset is a critical facility (e.g., per U.S. Federal Emergency Management Agency [FEMA] definition or if locally significant), and the asset’s community value, is used to help inform a community about the benefits of potential projects, but does not affect the quantitative risk scores of the assets.

Determining Hazard Score

The Risk Assessment Tool utilizes scores for three contributing factors to determine the overall risk score: Hazard, Exposure and Vulnerability. The Hazard score is based on the likelihood a storm event will occur and the magnitude (destructive capacity) of the event. Likelihood is derived from the storm recurrence interval within the selected time frame. For the NYRCR Program, the default storm event is a 100 year storm (1% annual probability), which was used in determining the hazard score for all assets.

Determining Exposure Score

Exposure in the Risk Assessment Tool is based on both the risk area where the asset or group of assets is located, and the local topographic and geographic conditions (or shoreline conditions) of its surroundings, or its landscape attributes as shown in Figure 6. Once both the risk area and landscape attributes are determined, an exposure score is calculated. Both risk area and landscape attribute determination are further described below.

Risk Area

The preliminary coastal hazard risk maps provided by NOAA and the NYS DOS describe the likelihood of flooding along coastal areas in three risk categories: moderate, high, and extreme. A specific asset’s risk area was then determined by overlaying maps of the assets with flood risk areas. Assets not located in a risk area were not considered for exposure evaluation as these assets are located outside of risk areas have a risk score of ‘zero’ in the Risk Assessment Tool.

Figure 6 Risk Assessment Tool

Risk Assessment Tool																
Asset Information						Landscape Attributes						Risk Assessment				
Asset	Risk Area	Asset Class	Socially Vulnerable Populations	Critical Facility	Community Value	Erosion Rate ≥1 foot per year or unknown	Waterline frequently at shore defense or upland vegetation	Shore defenses absent, not constructed to anticipated conditions, or deteriorating	Protective vegetation between asset and flood source absent	Dunes absent, below BFE, eroding, little vegetation; Bluff slope unstable, little vegetation	Asset on coastal barrier island or filled wetland	Landscape Attribute Score ("Yes" = +0.5)	Hazard Score	Exposure Score	Vulnerability Score	Risk Score

Landscape Attribute Determination

As shown in the Risk Assessment Tool in Figure 6, the landscape attributes considered when evaluating a coastal asset's exposure include six features.

Cumulatively, along with the risk area maps, the nature, condition, and presence or absence of these attributes defines the degree of exposure of an asset in a particular geographic location, resulting in an exposure score.

Landscape attribute determinations were based on data sources that included natural resource and flood mapping, aerial imagery, site visits, and input from local residents and authorities. Mapping data included the United States Geological Survey (USGS) Land Cover Database, the Fish and Wildlife Service National Wetlands Inventory, FEMA Flood Insurance Rate Maps (FIRMs), and New York State LiDAR elevation data. Aerial imagery was used for assessment of current and past conditions of assets. In addition, site visits and input from local residents and Village of Bayville employees were used to determine characteristics for specific assets.

It should be noted that, while there may be specific locations in the Village subject to increased erosion, no such locations were identified by either the NYRCR Planning Committee or the appropriate Coastal Erosion Hazard Area (CEHA) maps. CEHA is a State regulatory program with maps that delineate Natural Protective Features such as dunes and bluffs, and Structural Hazard Areas, which are shorelines with an identified erosion rate of greater than one foot per year. The methodology for evaluating erosion (using the appropriate CEHA maps) for the erosion rate landscape attribute was applied across the community regardless of the presence or absence of shoreline armoring.

Determining Vulnerability Score

The vulnerability of an asset is defined in the NYRCR Program Guidance as “an expression of the capacity of an asset to return to service after a storm, taking into account its material strength relative to the flood hazard as well its regenerative capacity.”

In order to effectively evaluate this metric, several asset characteristics were considered, including the impact suffered during historic storm events, materials of construction, the physical condition, the presence of any critical features in flood-prone locations, occupation by vulnerable populations, and elevation relative to the base flood elevation. All of these factors contribute, to varying degrees, to an asset's ability to withstand and recover from storm events.

To understand the impacts of historic storms on a community's identified assets, the NYRCR Planning Committee was asked to complete a questionnaire outlining how each asset functioned during and after recent storms. Other information needed to complete the vulnerability scoring was obtained from site visits, aerial imagery, and/or national and regional mapping data.

The vulnerability score in the Risk Assessment Tool is a numeric value from 1 through 5, with 5 representing the most vulnerable condition, and 1 representing the least vulnerable. Based on the estimate of how long an asset would be out of service as a result of a storm, the corresponding vulnerability score was selected from Table 3 in the NYRCR [Guidance for New York Rising Community Reconstruction Plans](#)²⁴.

Risk Scoring

Once all of the required information was entered into the Risk Tool, risk scores were calculated within the tool for each asset by multiplying together the hazard score, exposure score, and vulnerability score (i.e., $Hazard \times Exposure \times Vulnerability = Risk$). The risk scores provide a quantitative comparison of the risk among different assets within a community. Risk

scores range from 0 to 75, with the following ranges signifying the following degrees of risk:

- ▶ <6: Residual risk;
- ▶ 6-23: Moderate risk;
- ▶ 24-53: High risk; and
- ▶ >53: Severe risk.

Assets that shared the same risk categories were grouped. When viewed on a map it was easy to see how assets in a relatively similar geographic location were in similar risk categories.

The asset areas and individual assets depicted on risk area maps visually illustrate asset risk as well as identifying the areas of a community with the highest concentration of assets at risk. These maps, in conjunction with the completed Risk Assessment Tool, were provided to the Planning Committee to assess completeness and confirm agreement with local experience.

Results: Unmitigated Risk Scoring

Following the risk assessment process, risk scores for assets with no proposed management actions in place, or “unmitigated” risk scores, were compiled for the assets and asset areas for Bayville. The completed Risk Assessment Tool with the unmitigated scores is provided in Section V.D. The risk assessment map is provided in Figure 7 below. Several assets valued to the Community are located within the extreme risk area. They include the Bayville Bridge, Bridge Marina, and the Mill Neck Creek Business area. The only Community identified asset that received a Severe Risk Score was the Bayville Bridge. Many assets that were identified as important or highly valued were not evaluated with the Risk Tool as they are located outside of the mapped risk flood areas. Although these assets may not be directly affected by flooding during storm events they may experience loss of function because power and access is often compromised. As shown on the Risk Score table in Section V.D.,

assets located in the eastern portion of the Village generally showed the higher risk scores. These assets include neighborhoods (residents and businesses), water pump stations, and recreation areas.

Neighborhoods, public services and business areas show a risk for flooding.

Assets at Risk

From the unmitigated risk score map, it was observed that the eastern part of Bayville—from approximately Arlington Road on the west to the eastern boundary of the Village—showed the highest concentration of assets in the “high” risk score category. This result is consistent with the community’s experiences during historic storms, as the eastern portion of the Village is subject to frequent flooding due to storm surges along both the Long Island Sound and Mill Neck Creek shorelines. Such flooding issues are exacerbated by erosion and beach sand shortages along both of these shorelines, which result in limited buffers to attenuate wave action and storm surge. Assets located in these high risk areas include neighborhoods made up of both single family housing and local businesses. The Bridge Marina and Village Sound Beach are also located in this general area. The Bridge Marina, located in an extreme risk area, experienced significant flooding during Superstorm Sandy as a result of tidal surge on the bayside. The Village Sound Beach, located on the Sound side, was less affected as it has shore defenses; a constructed dune provided protection from the tidal surge associated with Superstorm Sandy.

The eastern portion of Bayville, historically, has been particularly inundated during Nor’easters, but is subject to flooding during other storms as well. Regardless of the type of storm causing the flooding, the inability to rapidly remove floodwaters in low-lying areas is a pervasive problem throughout Bayville. This is reflected in the risk assessment results by the concentrated region of high risk assets in areas of low

elevation. The low elevations areas include the assets identified as Neighborhoods 6A/6B, Fire Department and Ludlum/Bayville Avenue business area.

Accordingly, the neighborhoods located in the eastern portion of the community, namely Neighborhoods 5A, 5B, 6A, and 6B, are in the “high” risk category. Similarly, the Ludlum/Bayville Avenue and Mill Neck Creek business areas are at high risk. The individual assets in this low-lying region of the Village were also identified as high risk. The Fire Department and surrounding assets were identified as high risk, which is in line with expectations due to historic vulnerabilities associated with the lack of rapid removal of floodwater, as outlined above. The Bayville Bridge showed a severe risk score, primarily because it was out of service for a long period of time after Superstorm Sandy, resulting in a high vulnerability score. Loss of function of the Bayville Bridge disrupts the street network and emergency services systems and negatively affects the economic stability of the Village businesses. The community’s water distribution system is at high risk as well, as the Water Pump Station, located on the southern shoreline of the eastern region of Bayville, is at high risk due to its exposed geographic location. There are no shore defense structures, dunes, or vegetated buffers between the pump station and the flood source.

The West End Business Area and Village Marina were also identified as high risk, though they are located outside of the concentrated risk area in the community. Both assets are in locations that are highly exposed to flood sources. The West End Area is located landside of a constructed seawall. During Superstorm Sandy, tidal surge overtopped this structural defense resulting in the flooding of Bayville Avenue and the associated businesses.

Other Existing Risk Factors

Bayville neighborhoods, including Neighborhoods 1, 2, 3, and 4, are at moderate risk, as these assets are in less exposed locations and generally at a higher elevation relative to the FEMA defined base flood elevation (BFE). In general low-lying residential area residents have adapted to the frequent flooding events. Some residents for example have noted that the lower level of their homes is not fully utilized so as to limit damage when the inevitable flooding occurs and most have sump pumps. Although proactive measures such as in this example can reduce the potential for personal property damage, the potential for impacts to the ground and surface water quality remain. Frequent inundation by salt water of septic and leaching rings reduces the effectiveness of these sanitary systems and can result in the unintentional impact to the sensitive water bodies surrounding the Village. Post-Superstorm Sandy underground home heating oil tanks reportedly ‘floated’ out of the ground. These risks are equal in all Neighborhoods evaluated in the Risk Tool.

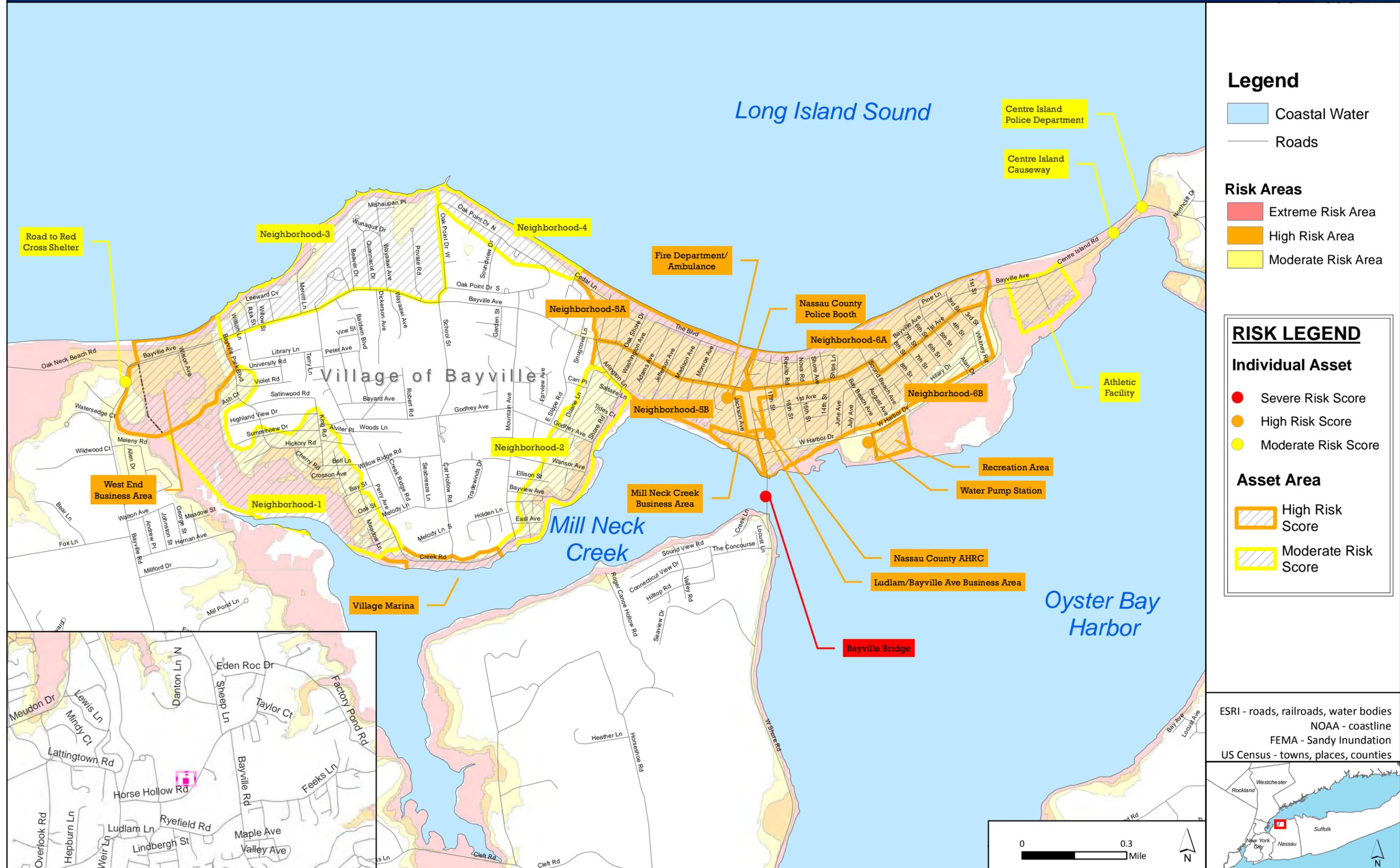
The road to the Red Cross Shelter, Centre Island Causeway, Centre Island Police Department, and Athletic Facility are all at moderate risk as well. These reduced risk scores are generally attributable to the limited effects of historic storms, as reported by the NYRCR Planning Committee. Although receiving a moderate risk score, the road to the Red Cross Shelter is an important Community asset as this is one of only two egress routes into and out of the Village. The other egress route is via the Bayville Bridge which, as noted above, is located in an extreme risk area and was not operational as a direct result of flooding from Superstorm Sandy. All of the identified flood risks are likely to intensify given the 3 feet in sea level rise that is currently projected as a mid-range estimate over the next century.

Nassau County Village of Bayville Risk Areas

Figure 7



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Legend

- Coastal Water
- Roads

Risk Areas

- Extreme Risk Area
- High Risk Area
- Moderate Risk Area

RISK LEGEND

Individual Asset

- Severe Risk Score
- High Risk Score
- Moderate Risk Score

Asset Area

- High Risk Score
- Moderate Risk Score

ESRI - roads, railroads, water bodies
 NOAA - coastline
 FEMA - Sandy Inundation
 US Census - towns, places, counties



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B. Assessment of Needs and Opportunities

The Assessment of Needs and Opportunities is a key step in the development of proposed strategies, projects, programs, policies, and actions for the Village of Bayville. The Needs and Opportunities analysis is based on the local knowledge of the NYRCR Planning Committee and the Community concerning damages caused by Superstorm Sandy and Hurricane Irene. To create a more resilient future, it is essential to better understand ongoing risk to local assets, lost economic activity and investment potential attributed to storm damage, options for rebuilding or expanding the local economy, as well as opportunities to make existing assets more resilient. The analysis also included a review of hazard mitigation needs already present when Superstorm Sandy and Hurricane Irene impacted the Village of Bayville.

The NYRCR Planning Committee, Village representatives and the State consultant team visited locations within the Village of Bayville that suffered frequent historic flooding and that were inundated as a result of Superstorm Sandy and Hurricane Irene. Based on the field visit, and discussion of past storm events that resulted in damage to the Community (see Description of Storm Damage in Section I: Community Overview), a number of locations were identified as areas of ‘need’, and are described below. These locations are also identified in Figure 8:

- ▶ The area around the Presidents Streets neighborhood and other areas with low elevations, which directly borders the Long Island Sound along the northward facing shores of Bayville.
- ▶ There are only two means of vehicular access to/egress from the Village of Bayville: West Shore Road (along Oyster Bay/West Harbor) and Bayville Avenue/Bayville Road (in the west end along the Sound). West Shore Road is a primary access road to Bayville that travels adjacent to the eastern edge of the Village of Mill Neck and becomes the road that traverses the Bayville Bridge. Sections of the Bridge vulnerable to storm surge were undermined during Superstorm Sandy. Both West Shore Road and Bayville Avenue are located adjacent to the water and are vulnerable to inundation and/or damage by flooding.
- ▶ The neighborhoods adjacent to the Mill Neck Creek shoreline west of the Bayville Bridge, which are affected by flood waters that enter this neighborhood during tidal surges originating in Oyster Bay.
- ▶ The Bridge Marina area to the west of the Bayville Bridge, where the path of flood waters flows from Mill Creek across Ludlum Ave.
- ▶ The Bayville Bridge per Coast Guard requirements must remain open during storm emergencies for boat traffic. The bridge electrical equipment was submerged during Superstorm Sandy and required repair. Several needs arise from the storm conditions experienced during Superstorm Sandy: including bridge electrical equipment flood proofing and the need for alternate modes of egress while the bridge is in the open position.
- ▶ Vulnerabilities in the east end of Bayville include experiencing the storm surge from Long Island Sound into neighborhoods adjacent to the beach, and over land storm flows causing standing water and ponding in the neighborhoods of the ‘numbered streets’ east of Ludlam Avenue and south of Bayville Avenue.
- ▶ The commercial/business area at the west end of Bayville Avenue is vulnerable to surge flooding because of its location directly along the shoreline. The existing seawall did not provide protection from the surge during Superstorm Sandy.
- ▶ The Bayville Avenue west end commercial/business area could benefit from providing sewer services into this area from outside of Bayville. Bayville does not have sanitary sewers and failing individual septic systems leads to groundwater and surface water degradation. This opportunity was specifically identified by the Committee to improve the economic stability of the business districts and the services they provide in this area of the Village.

Failed septic systems especially in flood prone areas lead to impacted water quality (nitrogen) and public health concerns from pathogens. Better management and control of wastewater flows during storm events will both help to protect public health and the environment.

- ▶ The narrow causeway that connects the Village of Bayville and Centre Island is vulnerable to erosion and overwash. The causeway (road) virtually comprises the entire width of land along this narrow neck of land that leads to Centre Island. There is limited natural sand supply to offset the erosive force of the tides and storms. During Superstorm Sandy the causeway was submerged whereby the Sound ‘met’ the bay temporarily isolating Centre Island.

Aerial images of the Village were annotated by the Committee and by members of the Community to identify locations where flooding typically occurs during extreme weather events, as well as possible locations for potential projects. The defined areas of risk, which include the nine locations listed above, are shown in Figure 8.

A brief description of the six Recovery Support Functions (RSF) and their relevance to the Community within the NYRCR Program are provided. The Needs followed by the Opportunities as they pertain to the Village of Bayville are highlighted below each NYRCR Program RSF. It is important to note that the Community may not have identified a corresponding Opportunity for every Need. In addition, there may be an Opportunity that addresses more than one Need.

Community Planning and Capacity Building



This category focuses on those municipal/community functions that advance storm recovery activities and focus planning efforts on ways to mitigate the effects of future storm events. The

Bayville Planning Committee has identified projects

with a focus towards increasing safety, protecting assets, and increasing resiliency. Because Bayville is largely developed and the eastern and western extents of the Village have limited naturally occurring flood protection, Community Planning strategies seek to preserve the existing natural resource buffers and storm protective land uses, and to strengthen existing regulatory systems relating to residential and business structure resiliency. Innovative, advisory, and code-based approaches to building the capacity and effectiveness of the local planning process have been evaluated to advance this recovery support function.

Need:

- ▶ Ensure accessibility of entrance/egress routes prior to and following storm events, including the Bayville Bridge and its associated equipment.
- ▶ Building codes should better address stormwater management requirements and incorporate resiliency measures.
- ▶ Services to assist residents, especially socially vulnerable populations, with storm preparedness and recovery.

Opportunity:

- ▶ Better plan, identify, and communicate to residents preferred evacuation and travel routes prior to and following storm events, including crossing the Bayville Bridge. Tidal cycles dictate the proper time to evacuate.
- ▶ Review/revise existing Master Plan, Zoning, and municipal codes to include stormwater management requirements and incorporate resiliency measures, e.g., protection of natural drainage pathways and storm buffer areas, use of rain gardens and other green infrastructure to manage storm runoff and improve drainage, raise buildings and key roads above flood elevations, as feasible.
- ▶ Create citizens groups enhancing Nassau County Citizens Emergency Response Team (CERT) protocols to assist residents, especially socially vulnerable populations, with storm preparedness and recovery.

Nassau County Village of Bayville Community Needs

Figure 8

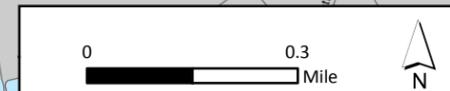
March 2014



Legend

- Bayville Buildings
- Village Boundary
- Coastal Water
- Areas of Need
- Roads

ESRI - roads, railroads, water bodies
 NOAA - coastline
 FEMA - Sandy Inundation
 US Census - towns, places, counties



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Economic Development



Bayville hosts several small retail/commercial centers that serve both local residents and the summer tourism economy. Following the most recent damages related to Superstorm Sandy, the

Village seeks the return of economic and business activities to a state of health and, further, to facilitate the development of new economic opportunities that contribute to a more sustainable and economically strong community. The Bayville Planning Committee recognizes that resiliency measures, such as pump stations for use with stormwater management, would speed post-storm economic recovery and assist with developing the local economy, and that better protection to key access roads, and to infrastructure will help ameliorate the often long-term effects experienced by businesses following major storms.

Need:

- ▶ Improve existing infrastructure to protect service to residential and commercial/business areas during storm events and improve post storm and tidal water drainage.
- ▶ Install sanitary sewers to provide service to currently unserved commercial areas, including restaurants in the west end of the Village.
- ▶ Encourage and support economic growth of the small business owners in the Village. Attract new businesses and promote seasonal tourism.

Opportunity:

- ▶ Improve the resilience of existing water, wastewater, electric, transportation, and communications infrastructure for residential and commercial/ business areas so as to avoid interruptions of service and provide economic stability. Recognize the interdependencies of these systems and provide integrated and coordinated improvements to withstand hazards. For example, roads require electric service to control signals, water systems require communication and electric to control operations, communications systems (e.g., internet) require electric

support to operate. Consider use of emergency generation for key systems.

- ▶ Provide sanitary sewer infrastructure (initially to west-end business area, then moving east) to allow for “wet” restaurants and other water dependent businesses to grow.
- ▶ Develop and roll-out a positive advertisement campaign, one that focuses on the natural beauty and recreational opportunities in the Village.

Health and Social Services



The Bayville Planning Committee seeks to restore and protect public health, health care facilities, and social services, such that health and social services are not compromised during future storm

events. The Committee recognizes that resiliency measures, such as establishing a Citizens’ Auxiliary Group in support of the Nassau County Citizens Emergency Response Team (CERT), to assist residents—including socially vulnerable individuals—following storm events provides a critical service needed to maintain public health. In addition, improving the resiliency of all support infrastructure systems is critical, because health and social service centers cannot operate effectively without electricity, road access, and water supply.

Need:

- ▶ Improve public information and education with respect to storm preparedness.

Opportunity:

- ▶ Develop and disseminate information (school children educational material, direct mailings and community forums) to better educate the public about storm preparedness measures and the importance of evacuating if the order is so given. Also, provide information about the location of medical emergency response systems that will be available and operating during high hazard events. Provide for continued access to firefighting services during and post storm event.

Housing



While Bayville did not permanently lose any housing stock directly to recent storm events, significant repair and reconstruction was required for a number of units. Certain neighborhoods are chronically vulnerable to flooding. The quality and quantity of available housing following storm events is crucial to community recovery and sustainability, and in the case of Bayville, protecting existing housing from storm damage is the key to minimizing the need for temporary, life-disrupting shelter options. Although the Village's housing stock was not diminished as a result of Superstorm Sandy numerous homes experienced flood damages of varying degree. The geographic boundaries and extent of current development limit open parcels available for redevelopment or construction of new homes. The Village recognizes that modifying local planning reviews, and improving building codes to increase resiliency of existing housing stock is necessary to allow for minimal dislocation from homes following storm events. For example, better integration of base flood elevation and habitable floor requirements should be considered, as well as options that would preserve natural drainage characteristics along and between homes.

While Bayville did not permanently lose any housing stock directly to recent storm events, significant repair and reconstruction was required for a number of units. Certain neighborhoods are chronically vulnerable to flooding. The quality and quantity of available housing following storm events is crucial to community recovery and sustainability, and in the case of Bayville, protecting existing housing from storm damage is the key to minimizing the need for temporary, life-disrupting shelter options. Although the Village's housing stock was not diminished as a result of Superstorm Sandy numerous homes experienced flood damages of varying degree. The geographic boundaries and extent of current development limit open parcels available for redevelopment or construction of new homes. The Village recognizes that modifying local planning reviews, and improving building codes to increase resiliency of existing housing stock is necessary to allow for minimal dislocation from homes following storm events. For example, better integration of base flood elevation and habitable floor requirements should be considered, as well as options that would preserve natural drainage characteristics along and between homes.

Need:

- ▶ Revise municipal codes to better address storm-water management requirements and resiliency measures.
- ▶ Housing within the Village of Bayville consists of single-family owner-occupied residences, rental apartments atop commercial establishments, and an apartment complex for the elderly. To better protect existing housing stock, require better storm protection/resiliency when housing is extensively reconstructed. (Note: The housing stock was not reduced as a result of Superstorm Sandy or Hurricane Irene, however, the Village's current extent of build-out limits improvement to the existing stock because there are few sites available for new construction.)

Opportunity:

- ▶ Review/revise existing residential zoning and municipal codes to improve stormwater management requirements and incorporate resiliency measures. Because land for new development is limited in Bayville, efforts should focus on promoting housing resiliency improvements during expansion, upgrade, and reconstruction, as well as for any new development. Opportunities might include emergency/photovoltaic energy/power systems, and maintenance of natural conditions that support better drainage.

Infrastructure



Evaluating, strengthening, and improving the many infrastructure systems serving Bayville is one of the key elements of the locally identified strategy for resilience. Uninterrupted operation of and

access to essential services such as water, roads, bridges, electric, gas, and communications are crucial to public safety, community recovery, and sustainability. Loss of access to Bayville along West Shore Road and the Bayville Bridge (especially for the long duration needed to repair those structures) created significant economic loss and emergency access risk for the businesses and residents of Bayville. Flooding of homes and businesses in Bayville resulted in septic tank failures and releases from underground home heating oil tanks. Loss of and isolation from emergency services also created significant risk to Village residents and operations. The Committee recognizes that increasing resilience by improving existing infrastructure will benefit its residents by maintaining public safety, increasing economic/business activity, improving access to health and social services, and protecting natural resources. Exploring options for backup power supply (especially off-the-grid approaches), for securing road access through better engineering designs or protective measures, and improving drainage of storm water runoff and tidal surges will significantly enhance community operations following major storms. Also,

expanding provision of public water and providing a public sanitary sewer system may reduce public health risks during and following storm events.

Need:

- ▶ Assure uninterrupted operation of emergency services, potable water, electrical, transportation, and communications infrastructure for residential and commercial areas.

Opportunity:

- ▶ Improve existing infrastructure systems to increase resiliency to storm interruptions, especially for residential and commercial/business areas. Consider full range of electric, gas, water, wastewater, transportation, and communications systems. Increase the reliability of electric power service to locations, and consider “off-the-grid” emergency alternatives. Mechanisms might include both physical infrastructure improvements, preventive measures to protect existing systems (tree trimming), as well as planning for emergency backup systems as part of Bayville’s infrastructure planning processes under a regional Master Plan and/or planning regulations.

Natural and Cultural Resources



Bayville was originally established as a fishing village situated between the Long Island Sound and Oyster Bay. The Committee is aware of the need to protect the Village’s many natural buffers,

storm drainage pathways, and stormwater storage resources (e.g., wetlands). Bayville has made significant efforts to conserve existing wetland and water storage areas. The waterside perimeter of the Village is extensive relative to its limited land area. Important natural and cultural features include wetlands, bays, shoreline, and structures with unique architecture, such as churches. Natural land areas and resources along Oak Neck Creek, Mill Neck Creek, West Harbor, and Long Island Sound, including tidal wetlands, mitigate coastal risk and offer co-benefits, such as storm water filtration and retention, which reduces surface

flooding and helps to improve overall water quality in nearby waters. The Village recognizes that use of natural solutions and green infrastructure, e.g., sand dunes and berms, wetlands, and swales, to prevent tidal surges and divert runoff from flooding businesses and homes in the east end is a desirable resilience strategy, and is in accordance with the Community’s preference for maintaining the character of the area. Green infrastructure solutions to stormwater management issues within developed areas have been identified as part of the Village’s recommended Code Modification.

Need:

- ▶ Prevent/mitigate tidal surges from flooding streets, homes and businesses in the area of Pine Lane. Re-establish natural dune system on north shore and maintain wetlands on bay-side.
- ▶ Protect water quality, in coordination with other measures undertaken by the Village including the continued conformance with USEPA/NYSDEC MS4 requirements.

Opportunity:

- ▶ Assess capacity of natural flood buffer and drainage systems to help mitigate and respond to storm events. As needed, construct barriers and/or replenish and stabilize sand dunes/wave blocks adjacent to Long Island Sound in the Village’s east end to prevent tidal/nor’easter surges from flooding streets, homes and businesses. Identify natural barriers for ‘bayside/creek side’ area of the Village considering the importance of the natural system.
- ▶ Identify measures that protect and improve water quality during and following storm events, in coordination with other measures undertaken by the Village including conformance with USEPA/NYSDEC MS4 requirements. Such actions might include both mechanisms to prevent discharges of inadequately treated wastewater (phase out septic systems with the introduction of sanitary sewers), as well as natural system enhancements to improve the filtration of runoff and storm surge.

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Section III Reconstruction and Resiliency Strategies







Reconstruction and Resiliency Strategies

The Bayville NYRCR Planning Committee, with the input and support of the local community, has identified several strategies to both reconstruct Bayville following recent storm-related disaster events (i.e., Superstorm Sandy and Hurricane Irene) and increase the resiliency of the Village to future storms and climate change. Strategies that lie at the core of Bayville's planning involve stabilizing and strengthening the disaster resilience of this 1.5-square-mile community. As the Village is located between the Long Island Sound and Oyster Bay, the community continuously braces for the next storm event. The strategies focus on improving the ability of Bayville to continue with community operations and activities in the face of climate-related disruptions, to more quickly recover from storm events, and to reduce negative effects on existing development.

The Village of Bayville NYRCR Planning Committee identified a series of approaches that address the Recovery Support Functions (RSF) introduced and defined in Section II. The general approaches identified within the RSF framework inform the Village's more specific and actionable reconstruction and resiliency strategies identified below.

Descriptions of how each strategy fulfills one or more of the RSFs, addresses risks, meets needs, makes the best use of community assets, capitalizes on opportunities, resolves critical issues, and (where applicable) addresses vulnerable populations, is provided in the text below and presented in Section IV in the project profiles. The NYRCR Planning Committee and the community have identified projects that respond to more than a single strategy. This is a clear example of the Village's 'community based approach' to storm resilience and recovery.

Following the Strategy is a table that includes a list of Proposed and Featured projects identified by the NYRCR Planning Committee and the community that addresses the strategy. Information summarized in the tables includes the project name, a short project description, the estimated cost of the project, the project type (Proposed or Featured), and whether the project has a regional component. Additional detail on each project is located in Section IV: Proposed and Featured Project Profiles. Section V contains information on Additional Resiliency Recommendations.

Projects and actions set forth in this NYRCR Plan are divided into three categories.

- ▶ Proposed Projects: projects proposed for funding through a NYRCR Community's allocation of CDBG-DR funding.
- ▶ Featured Project: projects and action 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: projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects.

Strategy – Maintain water quality: Surface and groundwater quality are important to the community as noted in the Vision. Identifying measures that protect and lead to the improvement of these important resources was a goal. Although stormwater has resulted in the damage to homes and businesses, its impact on surrounding water quality is also recognized by the community. Measures that can at a minimum maintain and potentially result in the improvement of water quality were discussed. Projects identified by the Planning Committee and receiving community support include projects and studies that focus on improving existing stormwater drainage infrastructure and constructing new infrastructure that will aid in the removal of stormwater after the storm tide has receded. These projects would assist the Village in recovery efforts, and would allow for residents to re-enter their homes and businesses to

reopen. Stormwater management projects also support the community’s goal to enhance the Village’s economy.

Construction of optimally located stormwater pump stations in the low-lying eastern end of the Village will help to remove post-storm water in a timely manner, allowing for shorter recovery time. Although the Village currently operates a portable pump to move the flood waters to storm drains it can only be used at a single location at a time. The use of additional portable pumps could help ensure the Village returns to full function similarly to the implementation of permanent pump stations.

Long-term measures such as the implementation of sanitary sewers to address groundwater quality are identified as Additional Resiliency Recommendations that address this strategy and are detailed in Section V.

Table 4a
Maintain Water Quality: Potential Contributing Projects

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project
Pump Stations	Construct a Pump Station(s) to increase resiliency through mitigating the flooding of roads, homes, and businesses in the Village's east end by controlling stormwater flow. The optimal location, size of pump etc., will be determined by an engineering study although the greatest need for a Pump Station(s) appears to be in the Village's east end.	\$1.5 million –\$2.5 million each	Proposed	No
Mobile Water Pump(s)	An engineering study to determine the optimal number(s) and size(s) of mobile pump(s) needed to restore accessibility to the Village road network and critical services after extreme storm events.	\$700,000	Featured	No
Comprehensive Drainage System Improvements	An engineering study to assess the Village’s existing stormwater drainage system and identify areas of improvement in coordination with the County.	\$2,000,000	Featured	No

Strategy – Protect residents, assets and natural environment from extreme weather: Measures to reduce tidal surge on the Sound side and the bayside were identified by the Planning Committee and members of the community. Measures to reduce the effects of tidal surge will help to prevent septic tank failures as a direct result of long standing flood waters. Specific projects identified to prevent tidal surge from entering neighborhoods include the construction of barriers and the replenishment of existing dune areas along the Sound side. Resiliency measures such as

these address the Village’s goal to protect the residents, assets, and natural environment from extreme weather events.

Sustainable building measures including green infrastructure can also aid a community to manage stormwater. Additionally, long-term measures such as the implementation of sanitary sewer can eliminate the effect of septic tank failures. Details on these Additional Resiliency Recommendations that address this strategy are listed in Section V

Table 4b
Protect Residents, Assets and Natural Environment From Extreme Weather: Potential Contributing Projects

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project
Pine Lane Barrier Construction	Construct a barrier on Pine Lane, adjacent to Long Island Sound, to prevent tidal surge from flooding streets, homes and businesses in this area of the Village's east end.	\$420,000	Proposed	No
North Shore Dune Replenishment	Replenish, stabilize and construct dunes along the north shore of the Village's east end, adjacent to Long Island Sound, from the vicinity of intersection of Valley Rd/Bayville Ave east to Centre Island Sound Beach/ Centre Island Road to prevent tidal surge from flooding streets, homes and businesses.	\$3 million-\$4 million	Proposed	Yes
Egress Study	Conduct a study in collaboration with Nassau County to identify measures to maintain accessibility of the Village's two entrance/egress routes during and following extreme weather events, being sure to consider/include socially vulnerable populations.	\$100,000	Proposed	Yes
Citizens Auxiliary Group	Organize/formalize a group of residents that would be trained to serve to perform activities that would augment the County's existing Community Emergency Response Team (CERT) program. Proposed activities for this group include confirming survivorship of neighbors following extreme storm events.	\$150,000	Proposed	Yes
Public Education/ Outreach	Develop and distribute Public Education materials that contain flood preparation and evacuation information specific to students, business and socially vulnerable populations in the Village of Bayville. The materials would be distributed bi-annually and the content would be updated annually.	\$75,000	Proposed	Yes
Code Modifications	Identify improvements to the Village's Code that would include stormwater management requirements and incorporate increased resiliency measures and reduce flood damage to businesses and residences.	\$50,000	Featured	No

Strategy – Maintain accessibility to emergency services: As the Village residents are restricted to two egress routes, actions include identifying measures to fortify these roads and identifying measures that ensure the egress routes are restored to full function following a storm event in a timely manner. Because the Village is isolated by flooding in major storm events, storm preparedness education is critical. Understanding the need to respond and evacuate when required is important to the safety of the Village’s residents including the socially vulnerable. Maintaining the function of the County operated Bayville Bridge

is critical to the safe movement of residents, goods and service in/out of the Village. Communication systems were functioning intermittently at best during the height of Superstorm Sandy as well as following the event. Identifying a reliable communication system is vital to the Community. Portable communication devices were identified as potential equipment needed for CERT members. Emergency power exists at the Village Hall but not at other assets important to the function of the Community such as the single gas station.

Table 4c
Maintain Accessibility to Emergency Service: Potential Contributing Projects

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project
Pump Stations	Construct a Pump Station(s) to increase resiliency through mitigating the flooding of roads, homes, and businesses in the Village's east end by controlling stormwater flow. The optimal location, size of pump etc., will be determined by an engineering study although the greatest need for a Pump Station(s) appears to be in the Village's east end.	\$1.5 million–\$2.5 million each	Proposed	No
Egress Study	Conduct a study in collaboration with Nassau County to identify measures to maintain accessibility of the Village's two entrance/egress routes during and following extreme weather events, being sure to consider/include socially vulnerable populations.	\$100,000	Proposed	Yes
Mobile Water Pump(s)	An engineering study to determine the optimal number(s) and size(s) of mobile pump(s) needed to restore accessibility to the Village road network and critical services after extreme storm events.	\$700,000	Featured	No
Comprehensive Drainage System Improvements	An engineering study to assess the Village’s existing stormwater drainage system and identify areas of improvement in coordination with the County.	\$2,000,000	Featured	Yes
Bayville Bridge Equipment Protection	Flood proof the mechanical and electrical equipment of Bayville Bridge, which is a draw bridge; Nassau County has applied for this project to be funded through the Federal Highway Administration (FHWA).	\$450,000	Featured	Yes

Strategy – Enhance economic stability: The Planning Committee and community members expressed the goal of strengthening the Village’s economic base. The economic stability of the Village is founded on both the health of local businesses and the vitality of housing stock. Local businesses are owned by local residents and often have other local residents in their employ. Measures that would aid in making the housing opportunities in Bayville desirable would add to the economic stability of the community. Modification to the existing Codes could address the basic storm preparedness requirements for businesses and homeowners to prepare and respond to post-storm conditions. An example modification would be to require the elevation of ground floor level to above the flood surge height during reconstruction of damaged properties, which would also require the Village to rethink its building height restrictions. Incorporating green infrastructure into redevelopment requirements (porous pavement, for example), limiting plantings beneath overhead power lines, elevating electrical connects to buildings and homes above the flood zone, and encouraging the incorporation of emergency generators into redevelopment plans are a few of the measures identified by the NYRCR Planning Committee and the community to help improve economic stability. The success of many of the proposed or featured projects would have a positive economic effect on the Village. Improving infrastructure to reduce the risk of flooding and or hasten the removal of flood waters would reduce the time businesses would need to be closed following a disaster. The

implementation of sewers into the Village will allow for ‘wet’ restaurants and other water-dependent services that are not practical with the current development density and septic limitations. This has been identified as an Additional Resiliency Recommendation and is detailed in Section V.

Regional Considerations

Although the Village of Bayville is the only north shore Nassau County community in the NYRCR Program, the Bayville Planning Committee and Village residents have identified programs that have a regional focus or element. These projects include support for socially vulnerable populations through an enhanced Citizens Emergency Response Team (CERT) program. The Nassau County CERT program is run by the Nassau County Office of Emergency Management (OEM). Under the CERT program Nassau County is divided into ‘Divisions’ which respond to the needs of several communities over a specified geographic area. For example, the geographic area covered by the County’s Division 3 CERT includes Bayville as well as the City of Glen Cove, and the Villages of Locust Valley and Mill Neck to name a few. The public education segment of the proposed project includes the development of material specific to school age children, residents, and businesses. This material will reach residents beyond the geographic scope of Bayville as Bayville is located within the Locust Valley Central School District and so a program such as this will service an area outside of the Village’s geographic boundary.

Table 4d
Enhance Economic Stability: Potential Contributing Projects

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project
Code Modifications	Identify improvements to the Village's Code that would include stormwater management requirements and incorporate increased resiliency measures and reduce flood damage to businesses and residences.	\$50,000	Featured	No

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Section IV Implementation – Project Profiles





The NYRCR Program has allocated to the Village of Bayville up to \$3.0 million. The funding is provided through the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) program. While developing projects and actions for inclusion in the NYRCR Plan, the Bayville NYRCR Planning Committee (the Committee) took into account cost estimates, cost-benefit analyses, the effectiveness of each project in reducing risk to populations and critical assets, feasibility, and community support. Planning Committees also considered the potential likelihood that a project or action would be eligible for CDBG-DR funding.

The projects and actions set forth in the NYRCR Plan are divided into three categories. The order in which the projects and actions are listed in the NYRCR Plan does not necessarily indicate the Community’s prioritization of these projects and actions. **Proposed Projects** are projects proposed for funding through the Community’s allocation of CDBG-DR funding. **Featured Projects** are projects and actions that the Planning Committee has identified as important resiliency recommendations and has analyzed in depth, but has not proposed for funding through the NYRCR Program. **Additional Resiliency Recommendations** (see Section V) are projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects.

The total cost of Proposed Projects in the NYRCR Plan exceeds the NYRCR Community’s CDBG-DR allocation to allow for flexibility if some Proposed Projects cannot be implemented due to environmental review, HUD eligibility, technical feasibility, or other factors. Implementation of the projects and actions found in the NYRCR Plan are subject to applicable Federal, State, and local laws and regulations,

including the Americans with Disabilities Act (ADA). Inclusion of a project or action in the NYRCR Plan does not guarantee that a particular project or action will be eligible for CDBG-DR funding or that it will be implemented.

Project profiles are provided for each of the six Proposed Projects and each of the four Featured Projects that have been identified by the Committee and supported by the community.

Each project profile answers the question “Why is this project being proposed in the Village of Bayville?” by including, where applicable and/or available, the following information:

1. Project title;
2. Project rendering, e.g., site plan or other graphics that illustrates the project site; if applicable;
3. A description of the project;
4. Estimate of the cost of implementation;
5. The benefit or co-benefits to be derived from the project;
6. A qualitative cost benefit analysis of undertaking the project;
7. The anticipated reduction of risk associated with the project;
8. The general implementation time frame;
9. The local, state and federal government regulatory requirements related to the project, if applicable; and
10. The entity with jurisdiction over the project, e.g., the Village of Bayville.

This section also provides a description of the analytical tools, i.e. Cost Benefit and Risk Reduction Assessment, which were used by the Bayville NYRCR Planning Committee (the Committee) to assist in identifying the Proposed and Featured projects.

Cost Benefit Analysis

The Cost Benefit Analysis (CBA) is a project evaluation tool that calculates the associated cost(s) and compares it to the associated benefit(s). The information is then used to weigh the merits of the project on the basis of its cost(s) in comparison with the benefit(s). Since many of the Proposed and Featured projects identified by the Committee and the community were studies and/or projects still in the preliminary development phase, costs were estimated using available quantitative and qualitative information and compared to associated benefits. The information was then provided to the Committee for use in finalizing the list of Proposed and Featured projects.

Committee and community input played a crucial role in identification of the Proposed and Featured projects included in this Plan. An explanation of the costs and benefits used to evaluate projects through the CBA follows.

Project Costs: Project Profiles include a planning level cost estimate associated with the development, implementation and/or construction of each Proposed or Featured project. Operation, maintenance and overall life-cycle costs are not included in the project costs.

Project Benefits: The CBA provides an estimate of the benefits that could accrue to the community when a particular Proposed or Featured project is implemented. The benefit categories considered in the CBA were:

- ▶ **Risk Reduction:** The extent to which a project reduces the risk of flood damage to community assets and the population from a future storm event (discussed further below under “Risk Reduction Analysis”).
- ▶ **Economic Benefits:** The project’s potential to help minimize economic costs and reduce the time it takes for the local economy to rebound from a storm event. Economic data considered, where applicable, an estimate of permanent jobs secured/added; relationship to, and/or furtherance of, Regional Economic Development Plan goals; poten-

tial for additional economic activity; and the net effect on local municipal expenditures.

- ▶ **Health and Social Services Benefits:** Qualitative information was provided on the overall population benefits of improved access to health and social service facilities and public safety services; type and size of socially vulnerable population 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 Benefits:** Benefits include the protection of securing important environmental assets or high-priority habitat, benefits for threatened and endangered species, migration or habitat connectivity; environmental clean-up resulting from the action; creation of open space or a new natural resource or recreational asset.

Risk Reduction Analysis

The Risk Reduction Analysis estimates the extent to which Proposed and Featured projects would 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” or mitigated risk is different from the risk “assessment” (referred to as unmitigated risk) 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 or scenarios (i.e., the current 100 year storm water level). 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.

To determine how the risk scores for assets and asset areas would be affected by potential projects identified by the Committee and the Community, the Risk Assessment Tool was run for proposed projects and featured projects that are intended to reduce the risk of flood damage to assets in order to arrive at “mitigated” risk scores. Those assets and asset areas that were considered related to each proposed project were examined. This required using assumptions regarding how exposure and/or vulnerability factors would change as a result of the effects of the project.

Since landscape attributes and asset vulnerabilities were already defined in the community risk assessment it was not necessary to repeat the evaluation of all the contributing factors in estimating the risk benefits of the proposed measures. Instead, the factors in the risk assessment tool were simply revised for the assets and asset areas that were presumed to be affected by the potential project. This procedure is in accordance with the qualitative nature of the risk tool as a whole. The changes that were made were then highlighted and the reasoning and assumptions for making those changes in the Risk Assessment Tool was explained for each project. For example, the Pine Lane Barrier Construction project, a Proposed Project discussed below, reduces the exposure of the assets immediately inland of the project location by providing a shore defense structure. To reflect this, the response for the “Shore Defense” landscape attribute was revised, thereby reducing the overall exposure score by 0.5 points.

Other recommended actions may result in resilience improvements for the Village, but are not suitable for evaluation with the risk assessment tool because they are not well enough defined yet. For example, the egress study could result in improvements to roadways that would significantly reduce the time they are out of service as a result of a flood, and/or improve site conditions that reduce the Exposure scores. These changes would significantly reduce the overall risk scores for the roads, but their effectiveness cannot be estimated at this time because the features that would be recommended by the egress study are currently unknown.

The results of the risk reduction analysis demonstrate a reduction in the risk scores for particular assets based on a number of assumptions regarding exposure and vulnerability. These analyses were not based on engineering analysis and should be supplemented by further evaluation as projects become more defined and specific. An overview of the mitigated risk scoring process and its results was presented to the NYRCR Planning Committee and NYS Department of State (DOS) Planner upon completion, which facilitated both comprehension and approval of the assessed risk reduction associated with each project. The results of the mitigated risk scores estimated for the Proposed or Featured projects are provided within the applicable project profiles.

In general, the projects identified for implementation aim to improve the resiliency of assets within the Housing Recovery Support Function (RSF) in the Village of Bayville. Housing was identified by the NYRCR Planning Committee as an important community asset, and many housing areas were identified as both highly exposed to flood risks and exhibiting significant vulnerabilities in the wake of flood events. Both the pump station(s) and mobile water pump projects would reduce the vulnerability of the housing areas that they would serve, as they would enable those assets to return to normal function more quickly after a storm event. The Pine Lane Barrier Construction and North Shore Dune Replenishment projects would reduce the exposure of many housing assets by providing flood protection features along critical shorelines. The dune replenishment project also would serve to improve many Natural and Cultural assets, e.g., Sound Beach and the Oyster Bay National Wildlife Refuge.

Proposed and Featured Project Profiles

The NYRCR Planning Committee and the Community have identified six Proposed Projects and four Featured Projects. Profiles for each of the 10 projects are as follows:

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Proposed Project: Pump Stations

Project Description

Roads, homes and businesses in the Village's east end flooded during Hurricane Irene and Superstorm Sandy. Flood waters were unable to drain from the lowest lying areas of the Village's east end once the tide receded, forcing residents to navigate parts of Bayville Avenue using kayaks and row boats. Residents assisted each other with the pumping out of residual water using privately owned equipment.

This project proposes constructing a Pump Station(s) to increase resiliency by mitigating the flooding of roads, homes, and businesses in the Village's east end by controlling stormwater flow during and post extreme weather events. The Pump Station(s) would pump water from area(s) of low elevation in the east end, where flood water commonly pools following extreme weather events, to an existing County outfall. The greatest need for a Pump Station(s) appears to be in the neighborhoods located on the east and west sides of Ludlam Ave, and north and south of Bayville Avenue (see Figure 9). An engineering study would be required first to determine the optimal number/location/size of the pump station(s). The Pump Station(s) operation would likely require a source of emergency power. Connections to existing stormwater outfalls are assumed. The use of prefabricated vaults may provide the most cost effective option.

Estimated Project Costs

Cost of Pump Station(s): \$1.5 to \$2.5 million dollars, each

Additional Cost Considerations: The cost of the engineering study that would be required to determine the optimal number/location/size of/for the pump station(s) would be determined by the contract executed by the Village and/or County and the firm selected to conduct the study. It can be assumed that the project would also involve cost(s) associated with the delivery and installation of the prefabricated vaults, and the establishing a source of emergency power.



Project Benefits

Risk Reduction and Resiliency Benefits: The use of pump station(s) for stormwater management would reduce the risk to public health and safety, while reducing the risk of degrading the health of surrounding natural resources. These risk reductions translate to resiliency benefits for the Village of Bayville as storm water management would help prevent the flooding of roads and homes and would assist with maintaining the health, ecological and economic benefits of surrounding natural resources.

Economic Benefits: Mitigation of roadway flooding would reduce flood damage to surrounding homes and businesses, thereby lowering reconstruction and rehabilitation costs. The base of the local and regional economies are supported by recreational opportunities, e.g., boating, bird watching, swimming, and outdoor dining, that are sustained by the high quality coastal waters surrounding the Village.

Health and Social Benefits: Mitigation of roadway flooding would improve public health and safety by ensuring the accessibility of local roads to allow ingress/egress and delivery of emergency services within the community and to the community, including socially vulnerable residents living in private and/or group homes, e.g. Jones Manor Senior Housing.

Environmental Benefits: Use of pump station(s) to manage stormwater would benefit the water quality in the surrounding coastal waters of Long Island Sound, Mill Creek and Oyster Bay. High quality coastal waters are necessary for the health of the surrounding natural resources, e.g. Mill Creek Preserve, that assist with water filtration and wave attenuation, provide habitat(s) to flora and fauna and support economically important recreational opportunities, e.g., boating, bird watching, swimming, and outdoor dining.

Cost Benefit Analysis

Sustainability of Benefits: Constructing a Pump Station(s) would increase resiliency and reduce the risk of flooding for the foreseeable future. The use of pump station(s) for stormwater management supports the Long Island Sound Coastal management program goal of achieving sustainable use of the Sound's natural resources by providing high quality coastal waters.

Negative Externalities: Pump Station(s) operation could temporarily impact noise and air quality.

Opportunity Costs: No opportunity costs were identified.

Useful Life of the Project: The useful life of a pump station is typically between 30 years to 50 years.

Risk Reduction Analysis

For the risk reduction analysis, it was assumed that pump station(s) would be able to address minor flooding events, but would be most effective in assisting the community to recover from flooding. The community improvement translates to a reduction in vulnerability as the pump station(s) would assist with the removal of standing water following extreme weather and storm events. Having onsite emergency power would allow for operations to be maintained in the event of power loss to the Village, resulting in quicker recovery and reducing impact on service and the function of assets. Vulnerability was assumed to be reduced to each of the four asset areas that would be serviced by a proposed pump. Neighborhoods as well as individual assets within the asset area would show a reduction in their vulnerability. As a result, in the

areas where the pump station(s) would be located, the mitigated risk score was reduced from high to moderate. Assuming all four pump stations were constructed, a risk reduction to approximately 958 homes, 19 businesses, 5 community services, including the Nassau County Police Booth and the Village's water pump station, and 15 vacant parcels could result.

General Time Frame for Implementation: Approximately 7 months for engineering study and the purchase and installation of a prefab pump and vault.

Regulatory Requirements Related to Project: This will also involve the United States Army Corps of Engineers (USACE) and Coastal Zone Management (CZM) consistency concurrence (NYS DOS). A New York State Department of Environmental Conservation (NYS DEC) Tidal Wetlands permit as required by 6NYCRR Part 661 would be needed if the proposed project would result in an increase in the volume of stormwater discharged to surface waters or physical modification or construction of an outfall to surface waters is required. A NYS DEC dewatering (Long Island Water Well) permit would be required for construction if the dewatering system used during construction included a well with a 45 gallon per minute or higher pumping capacity.

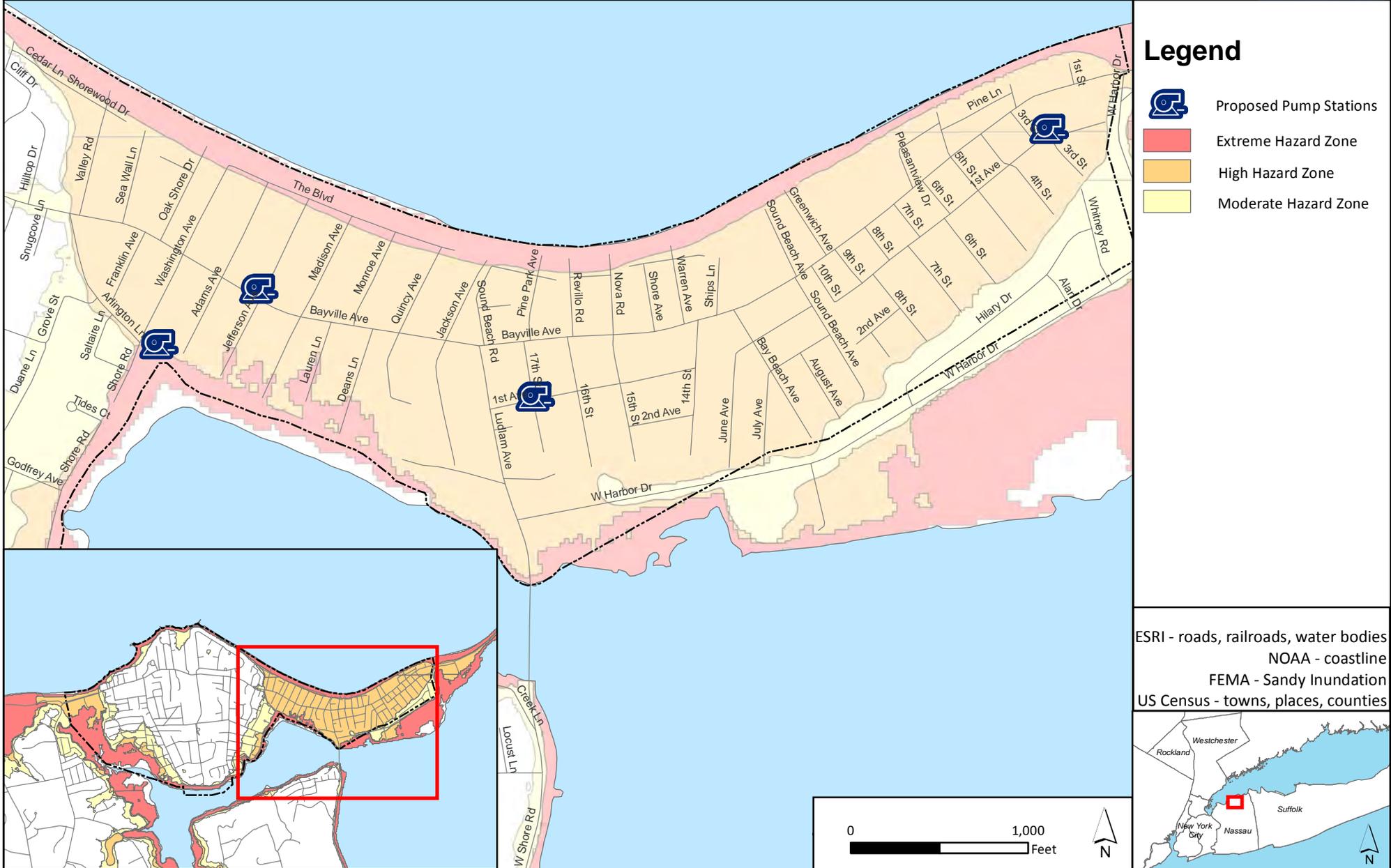
Increasing the quantity and/or volume of untreated stormwater discharged to surface waters around Bayville, especially inside Mill Neck Creek and Oyster Bay Harbor, would have to meet the requirements set forth in the NYS DEC State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges.

Jurisdiction: Home Owners Association (HOA), Village of Bayville, Nassau County

Nassau County Village of Bayville Proposed Projects

Figure 9 - Pump Stations (1 through 4)

March 2014

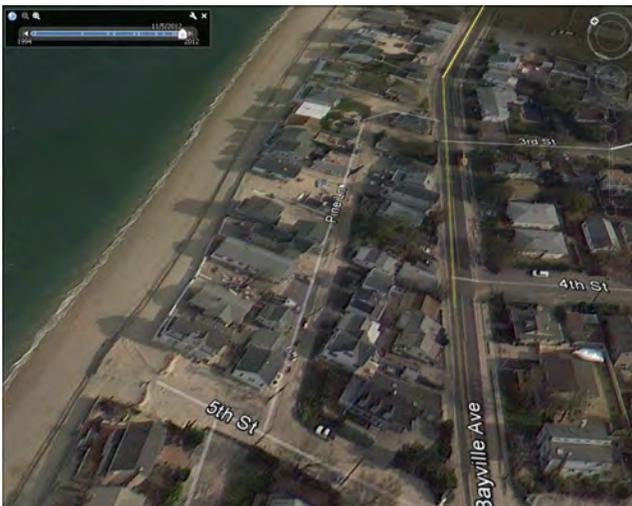


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Proposed Project: Pine Lane Barrier Construction

Project Description

Many of the Village's Home Owner Associates (HOAs), have added sand and/or created a dune(s), e.g., Pine Lane, to provide storm surge protection as part of the maintenance for their corresponding areas of beach access. Superstorm Sandy's storm surge breached the center of the Pine Lane sand dune and flowed south along the paved surface of 5th Avenue toward Oyster Bay, flooding Bayville Avenue and 1st Ave in the process. The inserted Google Earth aerial image, dated 11/05/2012, shows the breach in the dune as well as the sand that the storm surge deposited along 5th Ave, Pine Lane and Bayville Avenue. In November 2013, the Pine Lane HOA erected a barrier consisting of a cinder block wall with a supported below ground base to provide protection from nor'easters during the winter of 2013-2014.



*Pine Lane sand dune breach
(Google Earth Aerial Imagery, 05 November 2012)*

The proposed project is to construct a barrier on Pine Lane, landward of the high tide, to prevent tidal surge from flooding streets, homes and businesses in this area of the Village's east end, i.e. Pine Lane, the eastern most portion of Bayville Avenue and the Numbered Streets neighborhood (see Figure 10). An engineering study would be required first to determine the

optimal location, dimensions and materials for the barrier construction.

The United States Army Corps of Engineers (USACE) regulatory limit extends to the high tide line. The New York State Department of Environmental Conservation (NYS DEC) regulatory area is 300 feet landward of a shore's high tide line. The proposed barrier would, ideally, be located outside of the USACE and NYS DEC regulatory areas. If locating the barrier outside of the USACE and NYS DEC regulatory areas would require construction on private property then an easement(s) would have to be obtained in order for the barrier to be constructed.

Estimated Project Costs

Cost of Barrier: Approximately \$420,000; includes sheet pile bulkhead, the purchase and hauling of sand, the installation of stairs, fencing and planting, as the barrier would likely require structural support that can be covered with natural materials to provide the intended protection and maintain the character of the area. An example of this type of barrier is the existing dune that was constructed by the Village at Sound Beach.



*Beach access from Pine Lane
(Nanette Vignola-Henry, CDM Smith, 28 August 2013)*

Additional Cost Considerations: The cost of the engineering study that would determine the optimal location, dimensions and materials for the barrier

construction would be determined by the Village and the firm selected to conduct the study.

Project Benefits

Risk Reduction and Resiliency Benefits: The use of a constructed barrier on Pine Lane to prevent tidal surge from flooding roads, homes and businesses in the area of Pine Lane, the eastern most portion of Bayville Avenue and the Numbered Streets neighborhood in the Village's east end would reduce the risk to public health and safety. Prevention of tidal surge would increase resiliency by ensuring the accessibility of roads and allowing ingress/egress and delivery emergency services.

Economic Benefits: Prevention of tidal surge flooding in the Village's east end in the area of Pine Lane would provide the economic benefits of reduced flood damage to surrounding homes and businesses and lower reconstruction and rehabilitation costs. The base of the local and regional economies are supported by recreational opportunities, e.g., boating, bird watching, swimming, and outdoor dining, that are sustained by the high quality coastal waters, e.g. Oyster Bay, surrounding the Village.

Health and Social Benefits: Prevention of tidal surge flooding of roads, homes and businesses in the area of Pine Lane, the eastern most portion of Bayville Avenue and the Numbered Streets neighborhood in the Village's east end would improve public health and safety by ensuring the accessibility of local roads to allow ingress/egress and delivery of emergency services within the community and to the community, including socially vulnerable residents living in private homes.

Environmental Benefits: Prevention of tidal surge from Long Island Sound flooding the Pine Lane area of the Village's east end and flowing overland depositing accumulated debris and pollutants into the waters of Oyster Bay would benefit the water quality in Oyster Bay. High quality coastal waters are necessary for the health of the surrounding natural resources, e.g. Mill

Creek Preserve, and assets, e.g. Flowers Oyster Farm, that assist with water filtration and wave attenuation, provide habitat(s) to flora and fauna and support economically important recreational opportunities, e.g., boating, bird watching, swimming, outdoor dining, and businesses.

Cost Benefit Analysis

Sustainability of Benefits: Constructing a barrier on Pine Lane would increase resiliency and reduce the risk of Long Island Sound tidal surge from flooding the Pine Lane Area for the foreseeable future.

Negative Externalities: Short-term impacts to noise and air quality could occur during the construction of the barrier. The height of the barrier could alter the view from Pine Lane residences looking north toward Long Island Sound and the width of the barrier could decrease the width of the beachfront available for use by the Pine Lane residents.

Opportunity Costs: No Opportunity Costs were identified.

Useful Life of the Project: A barrier is expected to have a useful life of between 10 to 20 years.

Risk Reduction Analysis

For the risk reduction analysis, it was assumed that the proposed barrier would reduce the exposure score by providing adequate shore defense in the area of Pine Lane. The "Shore Defense" landscape attribute was adjusted for Neighborhoods 6A and 6B (east end of Village, near Pine Lane) reflecting a reduction in risk in these neighborhoods with the barrier in place.

General Time Frame for Implementation: Approximately 6 months.

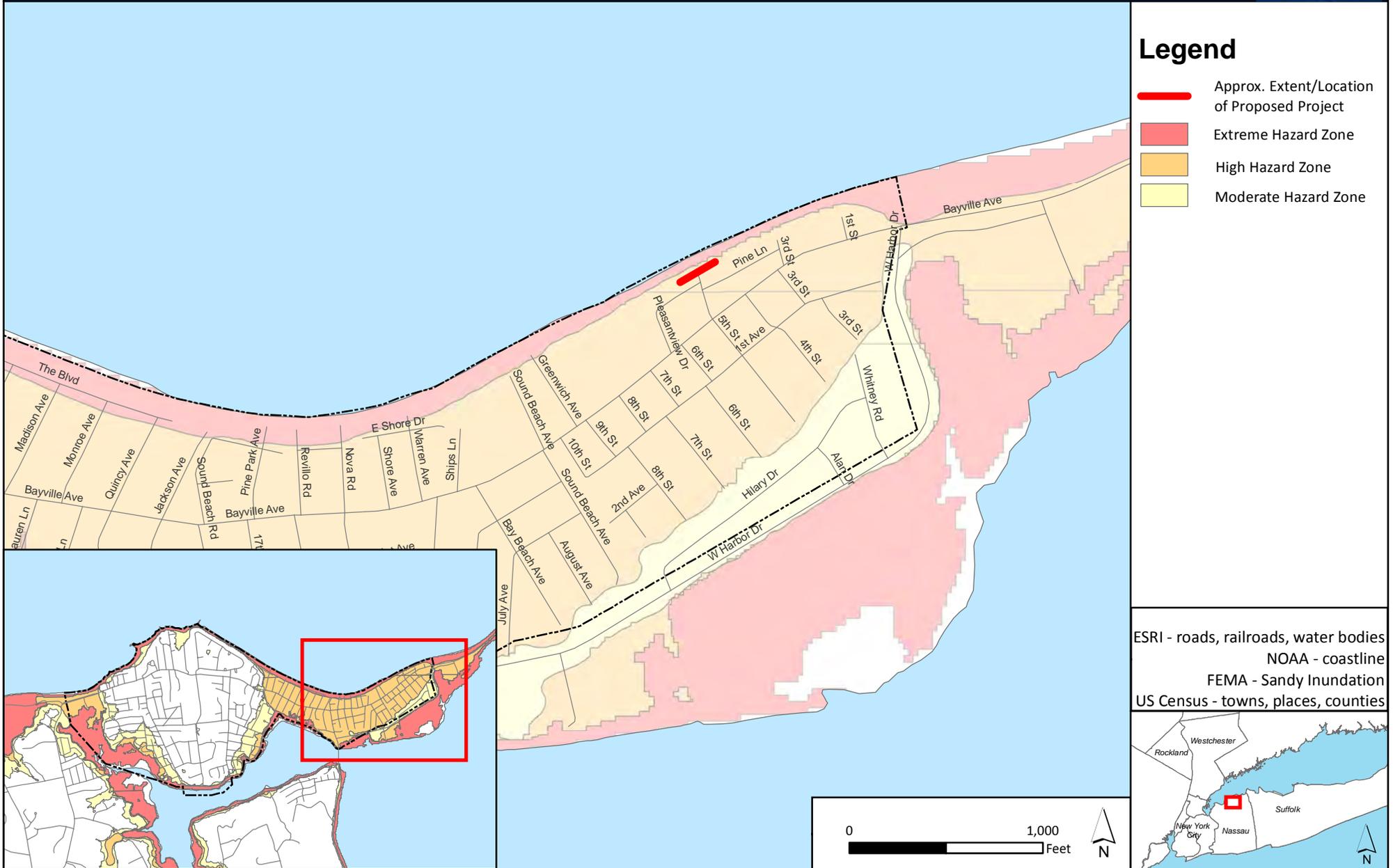
Regulatory Requirements Related to Project: This may involve NYS DEC, the USACE and CZM consistency concurrence (NYS DOS).

Jurisdiction: Home Owners Association (HOA), Village of Bayville

Nassau County Village of Bayville Proposed Projects

Figure 10 - Pine Lane Barrier Construction

March 2014



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Proposed Project: North Shore Dune Replenishment

Project Description

Storm surge from Hurricane Irene and Superstorm Sandy caused the waters of Long Island Sound to flood the roads, homes and businesses along the north shore of the Village's east end, from the Presidents Streets area to the Pine Lane area. The wave action from these storms also eroded the Centre Island Causeway, which is the only overland ingress/egress route for Centre Island residents. Due to the Village's history of storm damage and known flood water pattern, several types of disparate structural flood protective measures exist along the Sound-side of the Village's east end. These include a constructed dune at Sound Beach, sand piles and/or dunes put in place by the Village's Home Owner Associations (HOAs), e.g. Pine Lane, to provide storm surge protection as part of the maintenance for their corresponding areas of beach access. Limited flood/erosion protective measures are currently in place for the Centre Island Causeway.



*Beach access at the end of Quincy Street
(Matthew Condiotti, CDM Smith, 15 October 2013)*

The proposed project would replenish, stabilize and construct dunes to create a more cohesive structural protective measure along the north shore of the Village's east end, adjacent to Long Island Sound, from the vicinity of the intersection of Valley Rd/Bayville

Ave going east to Centre Island Sound Beach/Centre Island Road, to prevent tidal surge from flooding streets, homes and businesses and eroding the Centre Island Causeway (see Figure 11). An engineering study would be required first to determine the optimal location, dimensions, and materials for the dune replenishment.



*Village of Bayville Sound Beach constructed dune and beach access
(Nanette Vignola-Henry, CDM Smith, 28 August 2013)*

Estimated Project Costs

Cost of North Shore Dune Replenishment: \$3,000,000 to \$4,000,000; includes the purchase and hauling of sand and the construction associated with dune replenishment.

Additional Cost Considerations: Inclusion of internal structural supports, e.g., sheet pile bulkhead, and the installation of stairs for access and vegetative plantings would be additional costs. The engineering study would determine the optimal location, dimensions and materials required.

Project Benefits

Risk Reduction and Resiliency Benefits: The construction of a more cohesive structural protective measure along the north shore of the Village's east end, adjacent to Long Island Sound, from the vicinity of the intersection of Valley Rd/Bayville Avenue, going east

to Centre Island Sound Beach/Centre Island Road, to prevent tidal surge from flooding streets, homes and businesses would reduce the risk to public health and safety. Prevention of tidal surge would increase resiliency by ensuring the accessibility of roads and allowing ingress/egress and delivery emergency services. The proposed project would also reduce risk to Centre Island residents by preventing erosion to the Centre Island Causeway, which is the only overland ingress/egress route for Centre Island.

Economic Benefits: Prevention of tidal surge flooding along the north shore of the Village's east end and the Centre Island Causeway would provide the economic benefits of reduced flood and/or erosion damage to surrounding homes and businesses and the Centre Island Causeway, thereby lowering reconstruction and rehabilitation costs. The base of the local and regional economies are supported by recreational opportunities, e.g., boating, bird watching, swimming, and outdoor dining, that are sustained by the high quality coastal waters, e.g. Long Island Sound, surrounding the Village.

Health and Social Benefits: Prevention of tidal surge flooding along the north shore of the Village's east end and the Centre Island Causeway would improve public health and safety by ensuring the accessibility of local roads to allow ingress/egress and delivery of emergency services within the community and to the community, including socially vulnerable residents living in private homes.

Environmental Benefits: Prevention of tidal surge flooding along the north shore of the Village's east end and the Centre Island Causeway would benefit the water quality in Long Island Sound. High quality coastal waters are necessary as they provide habitat(s) to flora and fauna and support economically important recreational opportunities, e.g., boating, bird watching, swimming, outdoor dining, and businesses.

Cost Benefit Analysis

Sustainability of Benefits: Dune replenishment would provide flood mitigation and erosion control for the foreseeable future.

Negative Externalities: Short-term impacts to noise and air quality could occur during the replenishment phase of the proposed project. The height of the replenished dune could alter the view from north shore residences looking north toward Long Island Sound and the width of the dune could decrease the width of the north shore beachfront available for recreational activities, e.g., sun bathing.

Opportunity Costs: No Opportunity Costs were identified.

Useful Life of the Project: Dune replenishment would have a useful life of approximately 10 to 20 years.

Risk Reduction Analysis

For the risk reduction analysis, it was assumed that the North Shore Dune Replenishment project would reduce the exposure score by providing dunes to prevent tidal surge from flooding streets, homes and businesses along the north shore of the Village's east end. Applying the Landscape attributes for the "Dunes" for any asset or asset area adjacent to the proposed extent of the dunes results in a reduction (positive) in the risk score. Providing shore defense measures can reduce the potential for neighborhood flooding and loss of availability to services.

As a result, risk could be reduced for approximately 958 homes, 19 businesses, four community service parcels, including the Nassau County Police Booth, and the Village's only Firehouse/Ambulance, and 13 vacant parcels.

General Time Frame for Implementation: Approximately 18 months and can be done in phases.

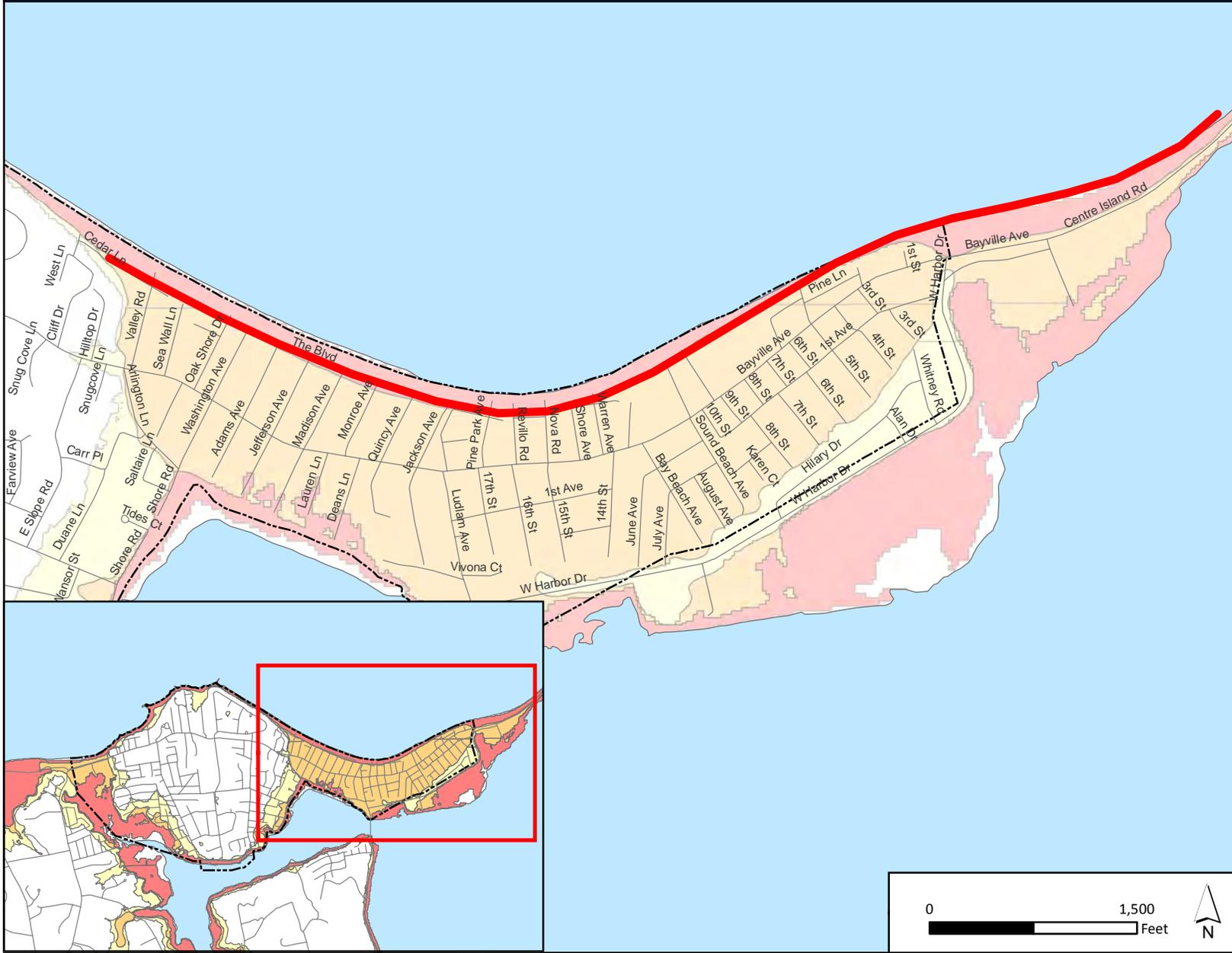
Related Requirements Related to Project: This may involve NYS DEC, the USACE and CZM consistency concurrence (NYS DOS)

Jurisdiction: Home Owners Association (HOA), Village of Bayville, Village of Centre Island, Town of Oyster Bay

Nassau County Village of Bayville Proposed Projects

Figure 11 - North Shore Dune Replenishment

March 2014



Legend

- Approx. Extent/Location of Proposed Project
- Extreme Hazard Zone
- High Hazard Zone
- Moderate Hazard Zone

ESRI - roads, railroads, water bodies
 NOAA - coastline
 FEMA - Sandy Inundation
 US Census - towns, places, counties



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Proposed Project: Egress Study

Project Description

Village access is constrained in that there are only two points of overland ingress and egress: Bayville Road and West Shore Road/ Bayville Bridge. Both routes are under the jurisdiction of Nassau County and are located in the FEMA-designated 100-year floodplain. These two routes are often impassable due to flooding during extreme weather events, including Superstorm Sandy. The Storm's flood waters inundated the Bridge's electrical equipment that opens and closes the bridge for the respective passage of boat and vehicular traffic. The bridge was unavailable for use by vehicular traffic from October 29, 2012 until April 2013. West Shore Road, which leads to the Bayville Bridge and is adjacent to Oyster Bay, was severely eroded and had to remain closed for repair until mid-June 2013. This damage left the Village with only one available vehicular access/egress route for seven months following Superstorm Sandy, which diminished public safety and disrupted the local economy.

The proposed project would conduct a study to identify measures to maintain accessibility of the Village's two overland ingress/egress routes, Bayville Road/ Bayville Avenue and West Shore Road/ Bayville Bridge, during and following extreme weather events, being sure to consider/include socially vulnerable populations.



Storm Surge at Ransom/Stehli Beach photo (Danielle Finkelstein, Newsday, 29 October 2012)

The study would be done in collaboration with the County, as these are County roads. Additionally the County Office of Emergency Management (OEM) has reached out to USACE to advance a study to specifically identify evacuation routes along the North Shore of the County.

Estimated Project Costs

Cost of Egress Study: \$100,000; includes the identification of potential roadway improvements to maintain accessibility of the two primary egress routes for the Village, conducting a GIS-based demographic analysis to locate socially vulnerable populations within Bayville in consultation with Village stakeholders to ensure this segment of the population is protected. Work would be coordinated with Nassau County.

Project Benefits

Risk Reduction and Resiliency Benefits: Maintaining accessibility of the Village's two overland ingress/egress routes, during and following extreme weather events, reduces the risk of the Village, and Centre Island, from becoming geographically isolated from necessary services, e.g., ambulance, DPW debris removal crews, etc. Maintaining accessibility of these two overland ingress/egress routes also increases resiliency of the Village and Centre Island by ensuring the delivery of necessary services.

Economic Benefits: Maintaining accessibility of the Village's two overland ingress/egress routes, during and following extreme weather events, would eliminate economic disruption due to prolonged geographic isolation by ensuring connectivity to the surrounding municipalities and allow the continued flow of goods and services that are necessary to the Village's economy.

Health and Social Benefits: Maintaining accessibility of the Village's two overland ingress/egress routes would improve public safety by ensuring the possibility of ingress/egress and delivery of emergency services to the community, including socially vulnerable

residents living in private and/or group homes, e.g. Jones Manor Senior Housing.

Environmental Benefits: Maintaining accessibility of the Village’s two overland ingress/egress routes during and following extreme weather events would benefit the environment by ensuring the delivery of services necessary to keep storm drains and roadways free of storm-related debris, e.g., removal of tree branches by Department of Public Works.

Cost Benefit Analysis

Sustainability of Benefits: Identifying effective egress route(s) would allow for evacuation preparation and execution for future extreme weather events and storms.

Negative Externalities: No negative externalities were identified.

Opportunity Costs: No Opportunity Costs were identified.

Useful Life of the Project: An egress study would provide recommendations that would be useful for the foreseeable future.

Risk Reduction Analysis

The egress study has the potential to reduce risk for each of the assets identified by the Committee, since upon implementation the study’s recommendations would benefit the entire Village by providing reliable ingress/egress routes. As a result, the egress study has the potential to reduce risk for approximately 1,436 homes, 43 businesses, 5 community service parcels, including the Nassau County Police Booth, the Village’s water pump and the Village’s only Fire-house/Ambulance, and 26 vacant parcels, and two Wild, Conservation Lands and Public Park parcels, i.e., Mill Creek Preserve and Ransom/Stehli Beach.

General Time Frame for Implementation: Approximately 6 months.

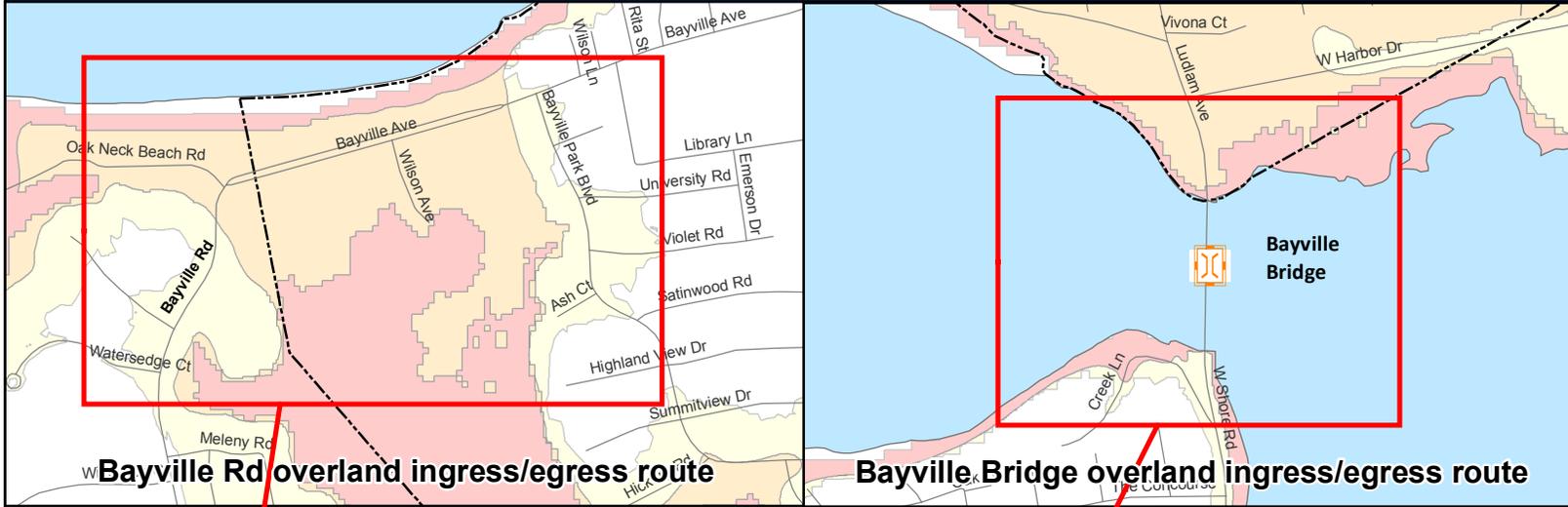
Regulatory Requirements Relayed to Project: This is a study and no permits are required. Coordination should include NYS DEC, the USACE and NYS DOS.

Jurisdiction: Not Applicable

Nassau County Village of Bayville Proposed Project

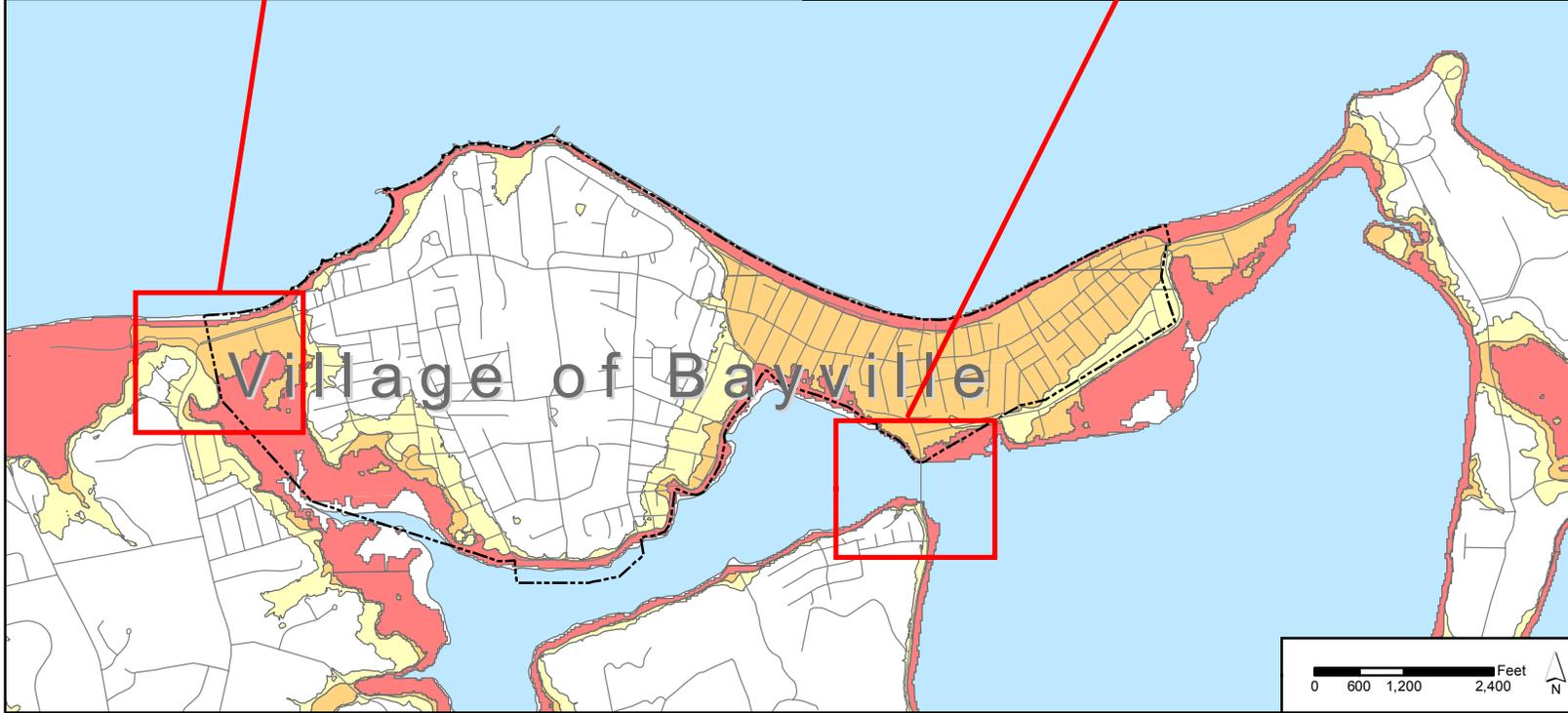
Figure 12 - Egress Study

March 2014



Legend

-  Bayville Bridge
-  Extreme Hazard Zone
-  High Hazard Zone
-  Moderate Hazard Zone



ESRI - roads, railroads, water bodies
 NOAA - coastline
 FEMA - Sandy Inundation
 US Census - towns, places, counties



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Proposed Project: Citizens Auxiliary Group

Project Description

Village access is constrained in that there are only two points of overland ingress and egress: Bayville Road and West Shore Road/ Bayville Bridge. Both routes are under the jurisdiction of Nassau County and are located in the FEMA-designated 100-year floodplain. The closure of these two routes due to flooding during and following Superstorm Sandy limited debris removal assistance from local and County service crews. Therefore, residents assisted each other with debris removal and the pumping of residual flood water in low lying areas, such as the Village's east end.

The proposed project would organize/formalize a group of residents, a Citizens Auxiliary Group (CAG), which would be trained to assist the Village with disaster preparedness, response and recovery.



CERT Training event image (Nassau County)

Proposed activities for this group include confirming survivorship of neighbors following extreme storm events. This could be combined into Nassau County's existing Community Emergency Response Team (CERT) program, which would identify a CERT member in the Village that would be responsible for conducting this task following extreme storm events. Residents could also designate Block Captains that would

gather/convey information, e.g. neighbors known to have evacuated, traveling for vacation, etc., for their block to the Village CERT member(s). CERT members currently receive six weeks of formal training and are dispatched through Nassau County Office of Emergency Management to areas within a Division of the County when they are needed.

Members of this group could also receive training through the Governor's Citizens Preparedness Corps Training Program. The program aims to increase public safety by training approximately 100,000 New Yorkers in 2014 through the use of 2-hour training sessions. Attendees are educated on disaster preparedness, response and recovery. One participant per family is provided with a Citizens Preparedness Corps Response starter kit, which includes items such as a first aid kit and a flashlight.

Information gathered by individual CAG members would be coordinated with the Village and the County.

Estimated Project Costs

Cost of Citizens Auxiliary Group Formation: \$150,000; includes any costs associated with initial training and the purchase of relevant necessary equipment.

Additional Cost Considerations: continued training of existing and/or new members and any fees that may be required to obtain oversight services from a formally trained group such as the Village Fire Department.

Project Benefits

Risk Reduction and Resiliency Benefits: CAG support of the first responders would focus emergency response efforts and reduce the risk to the community, e.g., socially vulnerable residents that live in private and/or group homes, that may need immediate assistance following extreme weather events. The CAG would increase resiliency as the survivorship information they collect could be used by DPW/utility service crews when cutting power to a residence is necessary due to downed electrical lines.

Economic Benefits: Focused emergency response and recovery efforts would reduce the cost(s) associated with these services. The CAG could also make recovery crews aware of areas and/or structures, e.g., catch basins, in need of debris removal; thereby reducing damage and repair costs to the areas and/or structures.

Health and Social Benefits: The CAG would increase public health and safety by supporting first responders and providing immediate assistance to the community through a coordinated, collaborative and organized effort. This project would benefit the region by augmenting and expanding the range of Nassau County's existing CERT program.

Environmental Benefits: The CAG could also make recovery crews aware of structures, e.g., catch basins, in need of debris removal; thereby reducing the chance the structure would overflow into the surrounding waters of Long Island Sound, Mill Creek and Oyster Bay.

Cost Benefit Analysis

Sustainability of Benefits: Continued resident interest and availability to participate in the CAG could result in long lasting community assistance for future extreme weather events and storms. Negative Externalities: No negative externalities were identified.

Opportunity Costs: No opportunity costs were identified.

Useful Life of the Project: Continued resident availability and interest from FEMA, Nassau County and residents to support and/or participate in the CAG could extend the useful life of the CAG indefinitely.

Risk Reduction Analysis

The CAG has the potential to reduce risk for each of the assets identified by the Committee, since the CAG would be involved in assisting the entire Village with storm preparation, as well as response and recovery. As a result, the CAG has the potential to reduce risk for approximately 1,436 homes, 43 businesses, 5 community service parcels, including the Nassau County Police Booth, the Village's water pump and the Village's only Firehouse/Ambulance, and 26 vacant parcels, and two Wild, Conservation Lands and Public Park parcels, i.e., Mill Creek Preserve and Ransom/Stehli Beach.

General Time Frame for Implementation: Approximately 6 months

Regulatory Requirements Relayed to Project: The Village of Bayville is a participant in Nassau County's CERT Program. Expanding duties for volunteers would require Nassau County Office of Emergency Management approval.

Jurisdiction: Village of Bayville, Nassau County

Proposed Project: Public Education and Outreach

Project Description

Develop and distribute, in collaboration with the County, Public Education materials that contain flood preparation and evacuation information specific to school age children, businesses and socially vulnerable populations in the Village of Bayville to inform residents about the importance of storm preparation and evacuation planning as well as the dangers associated with not evacuating prior to extreme weather events. The materials developed would include information about the logistics and benefits of evacuating and assembling an emergency “Go-Kit”, e.g., medicine, portable radio, etc., the importance of shutting off the utilities at residences and businesses, and leaving front door notes so that neighbors and utility crews are aware that this has been done, evacuating before high tide occurs, contacting family and friends that live outside of any evacuation zones for alternative sheltering, and following the direction of law enforcement and emergency management officials. The materials would be distributed bi-annually and the content would be updated annually.

The activities proposed for this project include disseminating information through presentation at schools and meetings held at places such as Village Hall. The County’s Office of Emergency Management (OEM) staff is available to provide presentation materials or the presentations themselves.

Estimated Project Costs

Public Education and Outreach Cost: \$75,000; includes development of an outreach in consultation with Village stakeholders to disseminate flood preparation information and evacuation plans to the Bayville population with a focus on outreach to vulnerable populations, production, mailing and posting of materials, website design, and a marketing element to ensure use of the website and alert various Village

constituencies to the existence/availability of the information within the first year of project implementation.

Additional Cost Considerations: Website maintenance and keeping the information in the materials current beyond the first year of project implementation.

Project Benefits

Risk Reduction and Resiliency Benefits: Providing extreme weather event preparation and evacuation information specific to the coastal Bayville empowers the community and reduces risk to public health and safety during and following extreme weather events. Residents who have developed a ‘plan’ prior to receiving the notice to evacuate are more likely to leave and move out of harm’s way.

Economic Benefits: The Village’s Public Education project would provide extreme weather event preparation and evacuation information specific to a coastal community, update Village’s existing on-line storm preparation information (http://bayvilleny.gov/flood_information) and empower residents in the event of an extreme weather event. This would reduce the costs associated with emergency service calls from people that did not evacuate prior to an extreme weather event because they were not properly informed and/or prepared.

Health and Social Benefits: This project would benefit the region by augmenting and expanding the range of the County’s existing storm preparedness public education information.

Environmental Benefits: Armed with preparation information specific to their community, a greater number of residents would be expected to evacuate. This would free up personnel to remove debris and keep stormwater structures open and prevent the back-up of stormwater into the surrounding water bodies, e.g., Oyster Bay.

Cost Benefit Analysis

Sustainability of Benefits: The ability to continue with the annual development and biannual distribution of extreme weather event and storm preparedness, response and recovery information specific to the residents of the Village of Bayville could sustain the benefits of the Public Education and Outreach project indefinitely.

Negative Externalities: No negative externalities were identified.

Opportunity Costs: No opportunity costs were identified.

Useful Life of the Project: The ability to continue with the annual development and biannual distribution of extreme weather event and storm preparedness, response and recovery information specific to the residents of the Village of Bayville could extend the useful life of the Public Education and Outreach program indefinitely.

Risk Reduction Analysis

The Public Education and Outreach project has the potential to reduce risk for each asset identified by the Committee. The entire Village would benefit from the storm preparation material/information distributed throughout the Village. As a result, the Public Education and Outreach project has the potential to reduce risk for approximately 1,436 homes, 43 businesses, 5 community service parcels, including the Nassau County Police Booth.

General Time Frame for Implementation: Approximately 6 months

Regulatory Requirements Related to Project: Not Applicable

Jurisdiction: Not Applicable

Featured Projects

Featured Project: Code Modifications

Project Description

The flooding of roads and buildings in the 100-year floodplain and power failures decreased public health and safety by downing trees that were planted near overhead utility lines, and contributing to the flow of untreated stormwater into adjacent water bodies, e.g., Long Island Sound. The flooding also increased costs associated with emergency response and recovery services and increased the overall recovery time of the Village. This project would modify the Village's Codes to address stormwater management requirements to reduce the impact/severity of flooding and to incorporate resiliency measures, which can minimize the secondary impacts of extreme weather events and storms. The Codes could be modified to include the following:

- ▶ Use of green infrastructure, e.g. rain gardens, cisterns, bioswales, for stormwater management
- ▶ Limit tree planting adjacent to overhead utilities,
- ▶ Require property owners in flood zone to comply with strict building code requirements and grade changes,
- ▶ Raise all buildings, roads in the floodplain, i.e. Bayville Ave at the President's Street(s) area,
- ▶ Elevate utility connections,
- ▶ Include generators as part of construction projects, and
- ▶ Re-establish the position of Village Code Enforcement Officer.

The scope of this project can also include a study to evaluate potential changes in zoning that may add resiliency to future re-development.

Estimated Project Costs

Cost: \$150,000; thorough investigation of code changes that would improve resiliency by the Village Board of Trustees and funding to obtain the services of a consultant that would assist the Village with preparing the code modifications.

Additional Cost Considerations: review and update the code as needed to remain relevant

Project Benefits:

Risk Reduction and Resiliency Benefits Code Modifications would decrease flood risk and the risk of safety hazards created by downed utility lines, submerged electrical lines and/or flooded roads.

Economic Benefits: The proposed project is in alignment with the regional economic development plan's goal to maintain and expand the County's infrastructure.

Health and Social Benefits: Code Modifications would provide health and social benefits through the re-establishment of the Code Enforcement Officer. This person would ensure that the Village's buildings and infrastructure are renovated and constructed in accordance with current codes set forth by the Village.

Environmental Benefits: The stormwater management measures associated with this project would benefit the water quality in the surrounding waters of Long Island Sound, Mill Creek and Oyster Bay.

Cost Benefit Analysis

Sustainability of Benefits: The ability to review and update the Village Code as needed to remain relevant could sustain the benefits of Code Modifications indefinitely.

Negative Externalities: No negative externalities were identified.

Opportunity Costs: Code Modification may limit development activity on certain parcels so that the Village may forgo potential property or other tax revenues.

Useful Life of the Project: The ability to review and update the Village Code as needed to remain relevant could extend the useful life of the project indefinitely.

Risk Reduction Analysis

The Code Modifications project has the potential to reduce risk for each of the assets identified by the Committee, since the Code modifications would be developed to benefit the entire Village. As a result, the Code Modifications project has the potential to reduce risk for approximately 1,436 homes, 43 businesses, 5 community service parcels, including the Nassau County Police Booth, the Village water pump and the Village’s only Firehouse/Ambulance, 26 vacant parcels, and two Wild, Conservation Lands and Public Park parcels.

General Time Frame for Implementation: Approximately one year

Regulatory Requirements Related to Project: The Village of Bayville would need to make an official action to change their building code. Conducting the study that would present the list of resiliency code modifications could proceed without an official Village action.

Jurisdiction: Village of Bayville

Featured Project: Mobile Water Pump(s) Study

Project Description

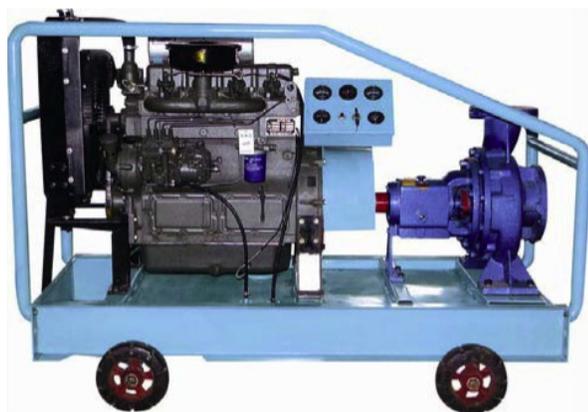
Roads, homes and businesses in the Village's east end flooded during Hurricane Irene and Superstorm Sandy. Flood waters were unable to drain from the lowest lying areas of the east end once the tide receded, forcing residents to navigate parts of Bayville Avenue using kayaks and row boats. Residents assisted each other with the pumping out of residual water using privately owned equipment.

This project proposes an engineering study to determine the optimal number(s) and size(s) of the mobile pump(s) to increase resiliency by assisting with pump out operations following extreme weather events. The mobile pumps (truck mounted or trailered) could be used by Village Department of Public Works personnel in lieu of or in addition to permanent pump station(s) to dewater Village roads and properties, e.g., Bridge Marina, following extreme weather events and storms.

Estimated Project Costs

Mobile Pump Costs: \$150,000 to \$200,000 each; includes approximately 1,000 feet of hose per pump and truck transport costs.

Additional Cost Considerations: The cost of the engineering study that would be required to determine the optimal number/location/size of/for the pump



station(s) would be determined by the contract executed by the Village and/or County and the firm selected to conduct the study.

Project Benefits

Risk Reduction and Resiliency Benefits: The use of mobile pumps to remove residual flood waters would reduce public health and safety risks created by residual flood waters that often contain debris and/or sewage. Use of mobile pumps would increase resiliency by removing residual water and expediting the reopening of local roads and businesses.

Economic Benefits: The use of mobile pumps to remove residual flood waters would reduce flood damage to surrounding homes and businesses, thereby lowering reconstruction and rehabilitation costs. The expedited reopening of local roads and businesses would eliminate the economic disruption that result from prolonged inaccessibility of roads.

Health and Social Benefits: Use of mobile pumps to pump out or assist with pumping out residual flood waters from Village roads and properties would improve public health and safety by expediting the reopening of local roads and allowing the delivery of necessary emergency services within the community, including socially vulnerable residents living in private and/or group homes, e.g. Jones Manor Senior Housing.

Environmental Benefits: Use of mobile pumps to remove residual flood waters would benefit the water quality in the surrounding coastal waters of Long Island Sound, Mill Creek and Oyster Bay provided the residual water is discharged to the existing County outfall at a higher elevation versus directly into an adjacent coastal waterbody. High quality coastal waters are necessary for the health of the surrounding natural resources, e.g. Mill Creek Preserve, that assist with water filtration and wave attenuation, provide habitat(s) to flora and fauna and support economically important recreational opportunities, e.g., boating, bird watching, swimming, and outdoor dining.

Cost Benefit Analysis

Sustainability of Benefits: Use of mobile pump(s) would increase resiliency following extreme weather events and storms for the foreseeable future. The use of mobile pump(s) to remove residual flood waters, provided the residual water is discharged to the existing County outfall at a higher elevation versus directly into an adjacent coastal waterbody, supports the Long Island Sound Coastal management program goal of achieving sustainable use of the Sound's natural resources by providing high quality coastal waters.

Negative Externalities: Mobile Pump(s) operation could temporarily impact noise and air quality.

Opportunity Costs: No opportunity costs were identified.

Useful Life of the Project: Mobile water pumps are expected to have a useful life of between 15 years to 20 years.

The use of mobile pump(s) for stormwater management is a critical step toward a more resilient Bayville, which would increase health and safety of its residents, ensure continued health of its natural resources, contribute to a quicker economic recovery and allow the Village to deliver health and social services during and following extreme weather events and storms.

Risk Reduction Analysis

For the risk reduction analysis it was assumed that these mobile pumps would improve vulnerability by improving drainage conditions and removing flood waters following storm conditions; thereby allowing quicker recovery and lower impact on service and function of assets. Vulnerability reduction would apply equally to all businesses and neighborhood in the asset areas benefited by the mobile pump(s) As a result, the risk was reduced for approximately 963 homes, 30 businesses, 3 community services, including the Nassau County Police Booth and the Village's only Firehouse/Ambulance and 19 vacant parcels, three recreation and entertainment venues and one Wild, Conservation Lands and Public Parks parcel, i.e., Ransom/Stehli Beach.

General Time Frame for Implementation: Approximately one year for the study portion of the proposed project

Regulatory Requirements Related to Project: This will involve NYS DEC and may also involve the USACE and CZM consistency concurrence (NYS DOS)

Increasing the quantity and/or volume of untreated stormwater discharged to surface waters around Bayville, especially inside Mill Neck Creek or Oyster Bay Harbor would have to meet the requirements set forth in the NYS DEC State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges.

Jurisdiction: Village of Bayville, Nassau County

Featured Project: Bayville Bridge Equipment Protection

Project Description

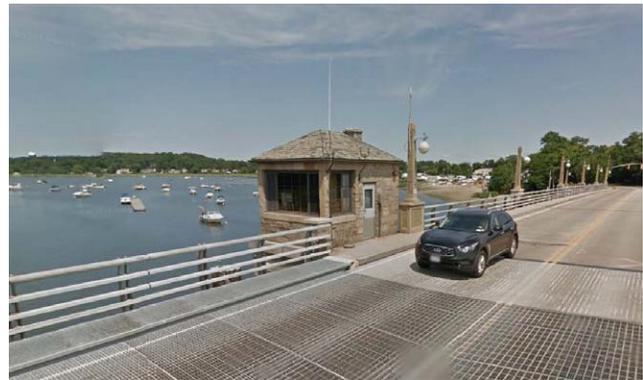
Village access is constrained in that there are only two points of overland ingress and egress: Bayville Road and West Shore Road/ Bayville Bridge. Both routes are under the jurisdiction of Nassau County and are located in the FEMA-designated 100-year floodplain. These two routes are often impassable due to flooding during extreme weather events and storms, including Superstorm Sandy. The Storm's flood waters inundated the Bridge's electrical equipment that opens and closes the bridge for the respective passage of boat and vehicular traffic. The bridge was unavailable for use by vehicular traffic beginning October 29, 2012 until April 2013.

Flood proofing the equipment is necessary for the Bayville Bridge to remain operable during and following extreme weather events and storms, and would increase public safety and improve resiliency. Nassau County has applied for funding of this project through the Federal Highway Administration (FHWA).

Estimated Project Costs

Costs of equipment protection: \$450,000; refers to the funding being applied for through the FHWA. Additional costs for this project are not being sought through the NYRCR Program. This project is included as a Featured Project because it is important to the resiliency of the Village.

Additional Cost Considerations: None



Bayville Bridge (Alice Brown, Sasaki Associates, 15 October 2013),

Project Benefits

Risk Reduction and Resiliency Benefits: Maintaining operability of the bridge to ensure that its roadway is available for ingress/egress following extreme weather events reduces the risk that the Village would become geographically isolated from receiving necessary services, e.g., ambulance, Department of Public Works debris removal crews, etc.

Economic Benefits: Maintaining operability of the bridge to ensure that its roadway is available for ingress/egress following extreme weather events would avoid the economic disruption that results from prolonged geographic isolation of the Village.

Health and Social Benefits: This project has a regional benefit as it would assist the United States Coast Guard with maintaining navigational safety in the waters of Oyster Bay during and following extreme weather events. The Village ingress/egress route that contains the bridge is also used by Centre Island residents.

Environmental Benefits: Maintaining operability of the bridge to ensure the ability of debris removal crews to travel to/from the Village would prevent the accumulation of debris within stormwater structures and waterways, thereby helping to protect the water quality of the adjacent waterways, e.g., Oyster Bay.

Cost Benefit Analysis

Sustainability of Benefits: The continued operability of the Bayville Bridge during and following extreme weather events and storms would allow the Village and the County to deliver health and social services during and following extreme weather events and contribute to economic stability of the Village and the region by avoiding the economic disruption that results from prolonged geographic isolation of the Village.

Negative Externalities: No negative externalities were identified.

Opportunity Costs: No opportunity costs were identified.

Useful Life of the Project: The useful life of electrical equipment is typically 25+ years.

Risk Reduction Analysis

Protection of the equipment associated with the Bayville Bridge could result in improvements to roadways that would significantly reduce the time they are out of service as a result of a flood, and/or improve site conditions that reduce the Exposure scores. These changes are assumed to significantly reduce the overall risk scores for the Bridge, but their effectiveness cannot be estimated (change in risk score) because the equipment protection details are in development by the County.

General Time Frame for Implementation: Approximately 18 month

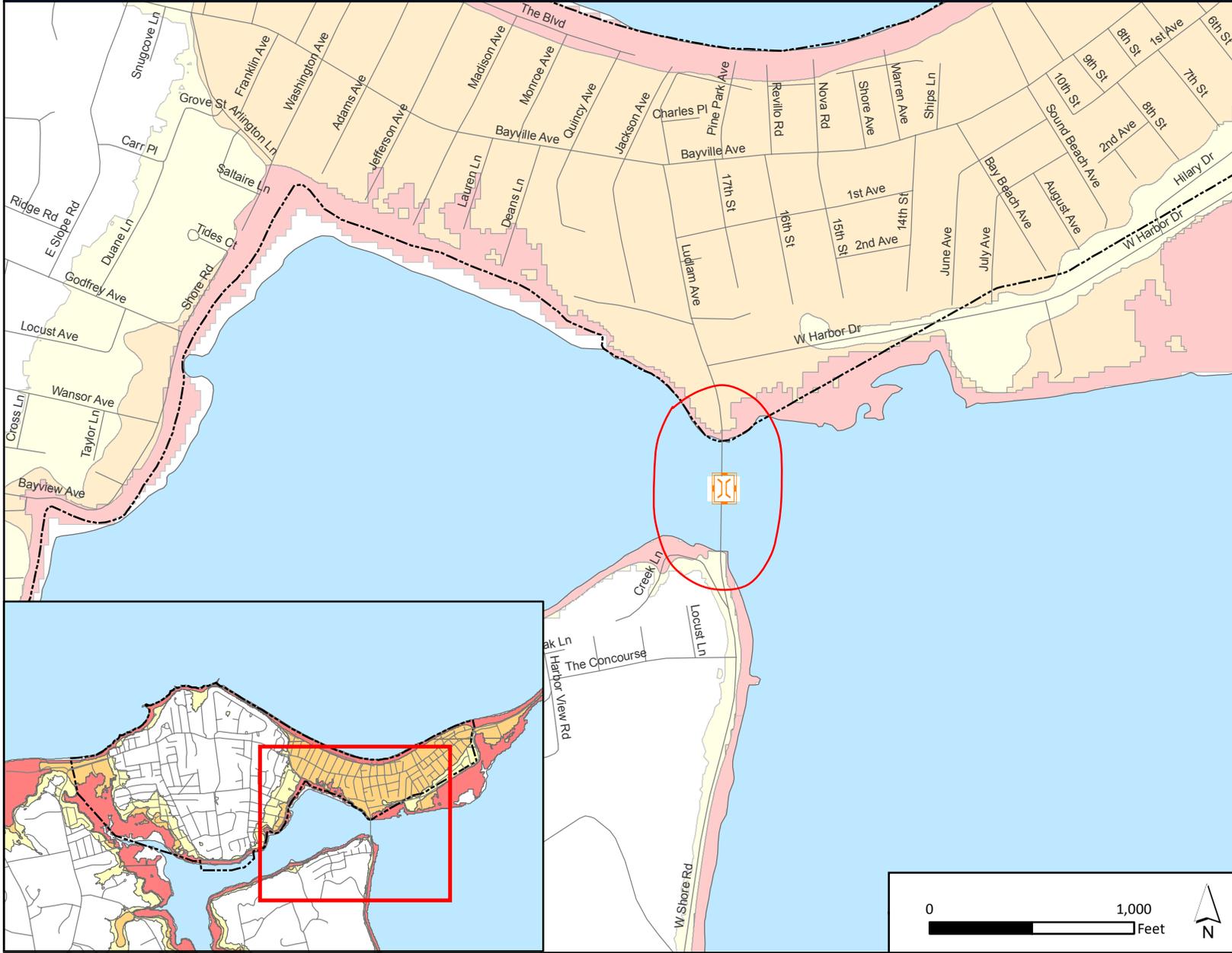
Regulatory Requirements Related to Project: This may involve NYS DEC, the USACE and CZM consistency concurrence (NYS DOS)

Jurisdiction: Nassau County

Nassau County Village of Bayville Featured Project

Figure 13 - Bayville Bridge Equipment Protection

March 2014



Legend

-  Bayville Bridge
-  Approx. Extent/Location of Proposed Project
-  Extreme Hazard Zone
-  High Hazard Zone
-  Moderate Hazard Zone

ESRI - roads, railroads, water bodies
 NOAA - coastline
 FEMA - Sandy Inundation
 US Census - towns, places, counties



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Featured Project: Comprehensive Drainage System Improvements

Project Description

The Village's two ingress/egress routes, Bayville Road and West Shore Road/ Bayville Bridge, are located in the FEMA-designated 100-year floodplain. These two routes are rendered impassable during extreme weather events, leaving the community isolated from necessary services.

Many of the local streets in the Village's west and east ends are also in the 100-year floodplain and routinely flood during and following extreme weather events. The areas of lowest elevation(s) in the west and east end of the Village remain flooded after the tide recedes and/or the storm passes and local roads are rendered impassable.

The Village homeowners associations (HOA) are aware of the areas that commonly experience flooding during and following extreme weather events in their neighborhoods. The 1st Avenue HOA installed a drainage system along 1st Avenue to mitigate repetitive flooding. Residents have reported that the existing system is undersized and/or is not properly connected to the existing County storm drains along Bayville Ave.



County Executive Ed Mangano at damaged West Shore Road photo (Nassau County.gov)

The flooding of the Village's two ingress/egress routes and local roads conditions create public health and safety hazards by halting the distribution of emergency services, supplies and communication within the Village.

As part of the proposed project, the Village would evaluate the needs of the individual HOA's and would connect any existing privately installed drainage systems to the County's existing system of storm drains along Bayville Ave and Ludlam Ave. The Village monitors and maintains these drains as its own Municipal Separate Storm Sewer System (MS4). The Village recognizes that drainage improvements would augment stormwater management and would therefore benefit from being addressed as a system. The County has recognized that the region is in need of drainage improvements. Any improvements to the Village's drainage system would therefore be coordinated with the County.

The Village's drainage system would be improved using the following methods:

- ▶ Implement code modifications to require use of green infrastructure, e.g., cisterns and rain gardens
- ▶ Re-establish stormwater outfall at Tides Motel and Ransom/Stehli Beach
- ▶ Re-evaluate the drainage at Vivona Ct. to obtain maximum benefit from use of the existing sump
- ▶ Evaluate the stormwater and/or best management practices on Bayville Ave, from Mountain Ave to Ludlam Ave, to drain the Presidents Streets
- ▶ Investigate and correct issues with existing drainage infrastructure along 1st Avenue

Estimated Project Costs

Drainage System Improvement Costs: \$1,500,000 to \$2,500,000.

Additional Cost Considerations: development of a long term plan for management and maintenance of the system.

Project Benefits

Risk Reduction and Resiliency Benefits: Improving the Village's drainage system decreases the risk of flooding of the Village's two ingress/egress routes and local roads during and following extreme weather events, which subsequently reduces the risk of the Village becoming geographically isolated from necessary services, e.g., ambulance, Department of Public Works debris removal crews, etc. Reduced risk of flooding to neighborhoods and businesses during storm events would be anticipated as a result of implementing a Village-wide approach to stormwater management. The reduced risks translate to resiliency benefits as recovery would be quicker and less costly due to improved road access, less flood damage and an expedited ability to provide necessary services.

Economic Benefits: Improving the Village's drainage system would provide the economic benefits of reduced flood damage to surrounding homes and businesses and lower reconstruction and rehabilitation costs.

Health and Social Benefits: Improving the Village's drainage system would ensure the delivery of necessary services within and to the Village during and following extreme weather events.

Environmental Benefits: Improving the Village's drainage system would benefit the water quality in the surrounding waters of Long Island Sound, Mill Creek and Oyster Bay and the use of local roads in the Village's east end as well as its ingress/egress routes being used by Centre Island residents.

Cost Benefit Analysis

Sustainability of Benefits: The development and implementation of a long term plan for management and maintenance of the Village's drainage system would sustain the benefits of improving the Village's drainage system indefinitely. Comprehensive drainage improvements to address stormwater management throughout the Village supports the Long Island

Sound Coastal management program goal of achieving sustainable use of the Sound's natural resources by providing high quality coastal waters.

Negative Externalities: Traffic flow, noise and air quality could be impacted during re-establishment of the stormwater outfall at the Tides Motel and Ransom/Stehli Beach and/or during the correction of issues with the existing drainage infrastructure along 1st Avenue.

Opportunity Costs: No opportunity costs were identified.

Useful Life of the Project: The useful life of the comprehensive drainage improvements would be more than 20 years.

The implementation of measures to allow the Village to improve drainage as a system is a critical step toward a more resilient Bayville, which would increase the health and safety of its residents, ensure continued health of its natural resources, contribute to its economy and development, and allow the Village to deliver health and social services during and following extreme weather events.

Risk Reduction Analysis

The Comprehensive Drainage System Improvements project has the potential to reduce risk for each of the assets identified by the Committee, since the project would benefit the entire Village upon complete implementation. Comprehensive drainage system improvements have the potential to reduce risk for approximately 1,436 homes, 43 businesses, 5 community service parcels, including the Nassau County Police Booth, the Village's water pump and the Village's only Firehouse/Ambulance, 26 vacant parcels, and two Wild, Conservation Lands and Public Park parcels, i.e. Mill Creek Preserve and Ransom/Stehli Beach.

General Time Frame for Implementation: Approximately one year

Regulatory Requirements Related to Project: This may involve the USACE and CZM consistency concurrence (NYS DOS)

A New York State Department of Environmental Conservation (NYS DEC) Tidal Wetlands permit as required by 6NYCRR Part 661 would be needed if the proposed project would result in an increase in the volume of stormwater discharged to surface waters or if physical modification or construction of an outfall to surface waters is required. A Dewatering (Long Island Water Well Withdrawal) permit would be required for construction if the dewatering system used during construction has a pumping capacity 45 gallons per minute or higher. The completed drainage system could require a modification to the local MS4 reporting requirements.

Jurisdiction: Village of Bayville, Town of Oyster Bay, and Nassau County

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2014 NY RISING COMMUNITY RECONSTRUCTION PLAN VILLAGE OF BAYVILLE

Section V Additional Materials





A. Additional Resiliency Recommendations

The following table contains the listing of Additional Resiliency Recommendations as identified by the Bayville Planning Committee and the Village residents during the planning process. Community input on the list of Additional Resiliency Recommendations was obtained during the three Public Engagement Events held throughout the NYRCR planning process.

Table 5: Additional Resiliency Recommendations

Strategy	Project Name	Short Description	Estimated Cost (\$)	Regional (Y/N)
Protect residents, assets and natural environment from extreme weather events; Maintain water quality	United States Army Corps of Engineers North Shore of Long Island -- Bayville Storm Damage Protection and Beach Erosion Control Reconnaissance Study	On-going study that is to evaluate a set of storm protection measures, e.g. bulkhead reinforced dunes, for the Village of Bayville's coastline along Long Island Sound, Mill Creek and Oyster Bay as well as elevation of home in flood prone areas.	\$32M to \$43M (USACE 1995 estimate)	N
Protect residents, assets and natural environment from extreme weather events	Bayville Bridge to Shore Road Barrier Construction	Construct a barrier at the shoreline extending between the Bayville Bridge and Shore Road to prevent tidal surge (Mill Creek) from flooding streets, homes and businesses (area is included within the USACE Study described above).	Subset of the USACE cost above	N
Enhance economic stability	Bayville Promotion and Advertisement Campaign	Develop local news spots and advertising to promote Bayville and support economic development by attracting business and tourism.	\$175,000	Y
Protect residents, assets and natural environment from extreme weather events	Centre Island Causeway Protection	Construct a flood protective measure to mitigate tidal surge erosion and flooding of the Centre Island Causeway/Centre Island Road, which is the only overland entrance/egress route for Centre Island residents.	\$1,000,000+	Y
Protect residents, assets and natural environment from extreme weather events	FEMA National Flood Insurance Program (NFIP) Community Rating System (CRS)	A Study that would review and then recommend to local government opportunities for additional CRS credits for resilience actions that will reduce flood insurance premiums for property owners.	\$100,000	N

Table 5: Additional Resiliency Recommendations

Strategy	Project Name	Short Description	Estimated Cost (\$)	Regional (Y/N)
Protect residents, assets and natural environment from extreme weather events	Overhead Utility Protection or Burying Underground	Develop short, medium, and long term measures to protect overhead utilities, e.g. prohibit tree planting under existing power lines, relocate power lines underground, etc., to protect overhead utilities from damage and subsequent operational failure during extreme weather events.	NA - project under the authority of the utility (ex. PSE&G)	N
Maintain accessibility to emergency services	Relocate Critical Emergency Services Outside of Flood Zone	Relocate Village fire department/ ambulance outside of the flood zone or facilitate temporary relocation during extreme weather events to ensure availability of emergency services during and immediately following such events.	\$1,175,000	N
Maintain water quality; Enhance economic stability	Sanitary Sewer Installation	Engineering study and execution of a plan to transition the Village from the use of septic systems to a municipal sanitary sewer system; may be available by connecting to an existing interceptor that provides connection to the City of Glen Cove's Wastewater Treatment Plant.	\$30,000,000+	Y
Protect residents, assets and natural environment from extreme weather events	Storm Preparedness Policy	Develop a plan that formally documents the steps/actions taken by the Village following County issuance of emergency orders. The plan would include steps/actions to be taken during extreme weather events.	\$50,000	Y
Maintain accessibility to emergency service	Utility Connection Elevations	Elevate utility connections at vital service locations, i.e., fire department/ ambulance and police station, to ensure continued operation of emergency services during and following extreme weather events.	\$250,000	N
Protect residents, assets and natural environment from extreme weather events	West Harbor Drive Sand Bar Construction	Construct a sand bar across the Oyster Bay inlet, in the area of West Harbor Dr/14th St/June Ave, to prevent tidal surge from flooding streets and homes.	\$2,000,000	N

B. Master Table of Projects

The following table contains a list of the Proposed, Featured and Additional Resiliency projects identified by the NYRCR Planning Committee and the Community. Short descriptions of these projects are included in the table as well as estimated cost, if the project has a regional contribution and potential start and end date.

Table 6 Master Project Table

Strategy	Project Name	Short Description	Project Category	Estimated Cost (\$)	Regional (Y/N)
Maintain accessibility to emergency services; Maintain water quality	Pump Stations 1 through 4	Construct a Pump Station(s) to increase resiliency mitigating the flooding of roads, homes, businesses in the Village's east end by controlling stormwater flow. The optimal location, size of pump etc., will be determined by an engineering study although the greatest need for a Pump Station(s) appears to be in the Village's east end.	Proposed	\$1.5M to \$2.5M each	N
Protect residents, assets and natural environment from extreme weather events	Pine Lane Barrier Construction	Construct a barrier on Pine Lane, adjacent to Long Island Sound, to prevent tidal surge from flooding streets, homes and businesses in this area of the Village's east end.	Proposed	\$420,000	N
Protect residents, assets and natural environment from extreme weather events	North Shore Dune Replenishment	Replenish, stabilize and construct dunes along the north shore of the Village's east end, adjacent to Long Island Sound, from the vicinity of intersection of Valley Rd/Bayville Ave east to Centre Island Sound Beach/ Centre Island Road to prevent tidal surge from flooding streets, homes and businesses.	Proposed	\$3M to \$4M	Y
Protect residents, assets and natural environment from extreme weather events: Maintain accessibility to emergency service	Egress Study	Conduct a study in collaboration with Nassau County to identify measures to maintain accessibility of the Village's two entrance/egress routes during and following extreme weather events, being sure to consider/include socially vulnerable populations.	Proposed	\$100,000	Y
Protect residents, assets and natural environment from extreme weather events	Citizens Auxiliary Group	Organize/formalize a group of residents that would be trained to serve to perform activities that would augment the County's existing Community Emergency Response Team (CERT program). Proposed activities for this group include confirming survivorship of neighbors following extreme storm events.	Proposed	\$150,000	Y
Protect residents, assets and natural environment from extreme weather events	Public Education	Develop and distribute Public Education materials that contain flood preparation and evacuation information specific to students, business and socially vulnerable populations in the Village of Bayville. The materials would be distributed bi-annually and the content would be updated annually.	Proposed	\$75,000	Y
Protect residents, assets and natural environment from extreme weather events; Enhance economic stability	Code Modifications	Identify improvements to the Village's municipal Codes that would include stormwater management requirements and incorporate increased resiliency measures and reduce flood damage to businesses and residences.	Featured	\$50,000	N
Maintain accessibility to emergency services; Maintain water quality	Mobile Water Pump(s)	An engineering study to determine the optimal number(s) and size(s) of mobile pump(s) needed to restore accessibility to the Village road network and critical services after extreme storm events.	Featured	\$700,000	N
Maintain accessibility to emergency services	Bayville Bridge Equipment Protection	Flood proof the mechanical and electrical equipment of Bayville Bridge, which is a draw bridge; Nassau County has applied for this project to be funded through the Federal Highway Administration (FHWA).	Featured	\$450,000	Y
Maintain accessibility to emergency services; Maintain water quality	Comprehensive Drainage System Improvements	An engineering study to assess the Village's existing stormwater drainage system and identify areas of improved in coordination with the County.	Featured	\$2,000,000	Y
Protect residents, assets and natural environment from extreme weather events; Maintain water quality	United States Army Corps of Engineers North Shore of Long Island -- Bayville Storm Damage Protection and Beach Erosion Control Reconnaissance Study	On-going study that is to evaluate a set of storm protection measures, e.g. bulkhead reinforced dunes, for the Village of Bayville's coastline along Long Island Sound, Mill Creek and Oyster Bay as well as elevation of home in flood prone areas.	Additional Resiliency Recommendation	\$32M to \$43M (USACE estimate in 1995)	N
Protect residents, assets and natural environment from extreme weather events	Bayville Bridge to Shore Road Barrier Construction	Construct a barrier at the shoreline extending between the Bayville Bridge and Shore Road to prevent tidal surge (Mill Creek) from flooding streets, homes and businesses (area is included within the USACE Study described above).	Additional Resiliency Recommendation	Subset of the USACE cost above	N
Enhance economic stability	Bayville Promotion and Advertisement Campaign	Develop local news spots and advertising to promote Bayville and support economic development by attracting business and tourism.	Additional Resiliency Recommendation	\$175,000	Y
Protect residents, assets and natural environment from extreme weather events	Centre Island Causeway Protection	Construct a flood protective measure to mitigate tidal surge erosion and flooding of the Centre Island Causeway/ Centre Island Road, which is the only overland entrance/egress route for Centre Island residents.	Additional Resiliency Recommendation	\$1,000,000+	Y
Protect residents, assets and natural environment from extreme weather events	FEMA National Flood Insurance Program (NFIP) Community Rating System (CRS)	A Study that would review and then recommend to local government would review requirements for and identify opportunities for the Village to obtain additional CRS credits for resilience actions that will reduce flood insurance premiums for property owners	Additional Resiliency Recommendation	\$100,000	N
Protect residents, assets and natural environment from extreme weather events	Overhead Utility Protection or Burying Underground	Develop short, medium, and long term measures to protect overhead utilities, e.g. prohibit tree planting under existing power lines, relocate powerlines underground, etc., to protect overhead utilities from damage and subsequent operational failure during extreme weather events	Additional Resiliency Recommendation	NA - project under the authority of the utility (ex. PSE&G)	N

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Table 6 Master Project Table

Strategy	Project Name	Short Description	Project Category	Estimated Cost (\$)	Regional (Y/N)
Maintain accessibility to emergency services	Relocate Critical Emergency Services Outside of Flood Zone	Relocate Village fire department/ambulance outside of the flood zone or facilitate temporary relocation during extreme weather events to ensure availability of emergency services during and immediately following such events.	Additional Resiliency Recommendation	\$1,175,000	N
Maintain water quality; Enhance economic stability	Sanitary Sewer Installation	Engineering study and execution of a plan to transition the Village from the use of septic systems to a municipal sanitary sewer system; may be available by connecting to an existing interceptor that provides connection to the City of Glen Cove's Wastewater Treatment Plant.	Additional Resiliency Recommendation	\$30,000,000+	Y
Protect residents, assets and natural environment from extreme weather events	Storm Preparedness Policy	Develop a plan that formally documents the steps/actions taken by the Village following County issuance of emergency orders. The plan would include steps/actions to be taken during extreme weather events.	Additional Resiliency Recommendation	\$50,000	Y
Maintain accessibility to emergency service	Utility Connection Elevations	Elevate utility connections at vital service locations, i.e., fire department/ambulance and police station, to ensure continued operation of emergency services during and following extreme weather events.	Additional Resiliency Recommendation	\$250,000	N
Protect residents, assets and natural environment from extreme weather events	West Harbor Drive Sand Bar Construction	Construct a sand bar across the Oyster Bay inlet, in the area of West Harbor Dr/14th St/June Ave, to prevent tidal surge from flooding streets and homes.	Additional Resiliency Recommendation	\$2,000,000	N

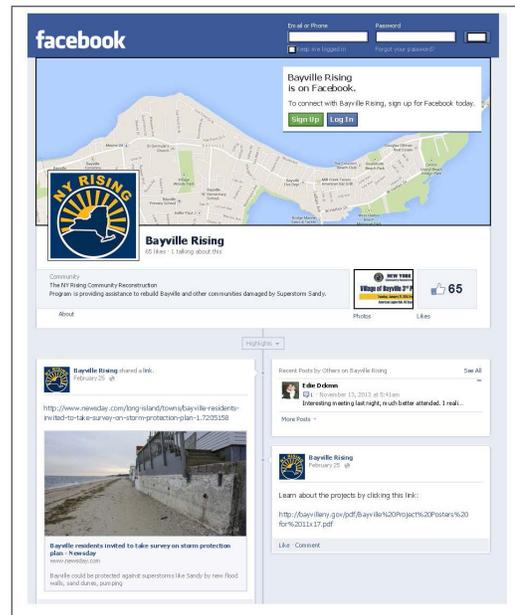
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C. Public Engagement Process

The Public Engagement and stakeholder involvement has helped to shape and define the Bayville NYRCR Plan (the Plan). The Bayville Planning Committee was comprised of local business owners, civic leaders and storm-impacted residents. Thirteen Planning Committee meetings were held throughout the development of the Plan beginning in late September 2013 and running through March 2014. All Committee Meetings were open to the public.

In addition three Public Engagement Events were held at which the NYRCR Program and Bayville Plan content were discussed. The Public Engagement meetings included opportunities for the general public to comment and suggest issues or solutions for inclusion in the Plan.

Public engagement is a critical component to the success and transparency of the planning process and, as such, key opportunities for public involvement were provided throughout the development of the Plan. Specific public engagement events were developed in collaboration with the Planning Committee, the DOS Planners and the NY Rising County Regional Lead. To encourage public involvement, the Bayville Planning Committee utilized social media (ex. Facebook and Twitter), direct e-mailing via the Village’s ‘eBlast’ system, postings to the Village’s webpage and poster advertisements located within the Village storefronts and public venues. In addition, Planning



Committee meetings, Public Engagement Events and the availability of the Bayville Conceptual Plan were placed on the Governor’s Office of Storm Recovery NYRCR webpage. Using the ‘Get Involved’ button, comments and questions could be submitted to help inform the process.

The Plan for each Public Engagement Meeting was built on the information gather at the previous engagement meeting. Techniques to gather public input varied according to Public Engagement meeting content and were specifically designed to meet the needs of the Plan and the NYRCR Program at that specific step in the process.

The Planning Committee maintained a Committee Facebook page as a communication link with one another. Upcoming Public Engagement dates and information were made available along with links to the State’s program webpage. Links to meeting announcements and the State NYRCR Program were also provided on other Village Facebook page. The Village’s webpage was used to announce upcoming Public Engagement Events as well as providing links to the State’s program webpage. Flyers were posted in local businesses and Village buildings to inform residents who do not normally use Facebook or



Locust Valley CSD Student Robotic Club (CDM Smith)

Village of Bayville Public Meeting
 Tuesday, November 12, 2013 from 7 - 9 PM
 at Bayville Intermediate School, 50 Mountain Avenue

Bayville's future is up to you!

The NY Rising Community Reconstruction Program, developed under Governor Cuomo's leadership, is providing your community with assistance to rebuild Bayville better than before. As part of this process, we are reaching out to you at four community meetings to get your input on how Bayville can become stronger and better prepared for future storms.

Come to the second community meeting to provide feedback on the Conceptual Plan. The Conceptual Plan includes the Community Vision, Geographic Scope, Assets and Needs/Opportunities that were presented and commented on at the October 15 Public Meeting. Your participation will help to shape a Final Plan for a more resilient community in Bayville.

NEW YORK RISING
 Community Reconstruction Program
stormrecovery.ny.gov



connect to the Village by e-mail or internet of upcoming events.

Adding elements such as these to the public engagement strategy contributed to a more informed public and a Plan that reflects the needs of Village residents. Public input received at each Public Engagement Event is reflected in the Bayville Plan, ensuring that the public's voice remains a permanent part of the record of this planning process.

The three Public Engagement Events had individual goals and specific focus that was important to inform the Plan. The first Public Engagement Event focused on informing the community of the NY Rising Program and gathering resident's 'stories' of their storm experience. Residents helped to identify specific areas of repeated flooding and assets located within those risk areas. By the time of the second Public Engagement Event a Conceptual Plan had been completed, describing community flood conditions and potential management actions. The community was asked for their comments on the Conceptual Plan. Engagement activities were specifically designed to cull resident's opinions and level of support for the information contained in the Conceptual Plan. During the third Public Engagement Meeting community members were asked to review the specific projects, studies and programs developed to address the needs of the community. Community input was collected at the event itself held on January 28, 2014 as well as via an online survey.

Residents' comments and input gathered at the three Public Engagement Events were integrated into the Final Plan. For example, areas of 'Need' were noted by residents on plans provided at the first Public Engagement Event; Flowers Oyster Farm was added as a 'high' value asset based on input received at the second Public Engagement Event; the project identified as 'Comprehensive Drainage Study' was moved from the list of 'Additional Resiliency Recommendations' to the 'Featured Projects' list because of the level of community support at the third Public Engagement Event.



Public Engagement Event (Sasaki)

It is important to note that service organizations such as Project Hope, Catholic Charities, and Family Service League were in attendance at one or more of the Public Engagement Events. News organizations including Newsday and the Oyster Bay Guardian also attended these events. The Federal Emergency Management Agency (FEMA) was on hand to respond to individual resident needs.

In addition, the regulatory community was engaged at critical steps in the process. Meetings were scheduled with and input sought from regulatory agencies including the US Army Corps of Engineers (USACE), NYS Department of Environmental Conservation (NYS DEC) and the NYS Department of State (NYS DOS). The USACE and NYSDEC attended a NYRCR

Planning Committee in November 2013 to specifically discuss the status of the USACE Bayville storm damage protection and beach erosion control reconnaissance study that had been recently re-initiated. Coordination between the USACE and the NYRCR Program is through the NYS DOS planner and the State Planner. Information on regional projects and initiatives supported by Nassau County was obtained at several meetings with key County staff. A representative of NYS DEC also attended three of the Planning Committee meetings to provide input as to the NYS DEC's regulatory requirements for projects that the Committee had identified for inclusion in the Final Plan.

NY Rising Community - Bayville Projects Passport

January 28, 2014



Vision

The Village of Bayville is a unique community focused on building back better by protecting our assets and natural environment from extreme weather events and natural disasters. Our goals are to enhance economic stability, maintain and improve our water quality, preserve community character, and maintain access to emergency services.

Goals & Objectives

- Reduce threats from future storm and sea level rise to both the community and our natural resources
- Protect and improve groundwater and surface water quality
- Improve stormwater management
- Provide emergency communication systems
- Maintain access to emergency responders and services
- Encourage new and existing economic development

D. Community Asset Inventory

In order to evaluate risk of future storm damages, and thereby develop recommendations to minimize that risk, information was collected on a set of assets that best represent the Village of Bayville. Assets were classified according to categories determined by the National Disaster Recovery Framework Recovery Support Functions. When compiling the list of assets particular attention was directed to assets that support community functions, including economic, socio-cultural and environmental functions. A number of assets were grouped into individual asset areas that represented groups of assets with similar geographic location and asset class. These asset areas were used in place of their constituent individual assets in the risk scoring process. As an example, individual homes were not identified as assets, but neighborhoods with

similar residential character and flood risks were grouped together as a single asset. A number of assets that were considered individually, either due to their occupancy of a contiguous geographic location, because they represented a unique community function, or because they are defined by FEMA as Critical Facilities or otherwise support a particularly important function in the community. A handful of assets identified in the asset inventory were not evaluated in the risk scoring because they are not located within a designated flood risk area.

The table that follows correlates the geographic asset areas to their constituent assets from the asset inventory and highlights those assets that were considered individually. Individual assets are called out on the risk map in Section II.Aii.

Table 7: Asset Areas: Corresponding Individual Assets and Land Use

Corresponding Individual Asset(s) from Community Asset Inventory	Land Use Category	Number of Parcels
Neighborhood 1		
Mill Creek Preserve	Residential	144
	Vacant Land	2
	Wild, Conservation Lands, Public Parks	1
Neighborhood 2		
No individual asset identified	Residential	165
	Vacant Land	4
Neighborhood 3		
American Legion Jones Manor Senior Housing United Cerebral Palsy	Residential	128
	Community Services	2
	Commercial	1
	Vacant Land	1
Neighborhood 4		
No individual asset identified	Residential	45
Neighborhood 5A		
President Streets Neighborhood Post Office Nassau County Police Booth*	Residential	158
	Vacant Land	5
	Commercial	4

Table 7: Asset Areas: Corresponding Individual Assets and Land Use

Corresponding Individual Asset(s) from Community Asset Inventory	Land Use Category	Number of Parcels
Neighborhood 5B		
Taste of China	Residential	136
	Commercial	2
	Vacant Land	1
	Community Services	1
Neighborhood 6A		
Twin Harbors Restaurant Crescent Beach Club Wall's Wharf Sound Beach Pine Lane Homes	Residential	251
	Commercial	9
	Vacant Land	2
	Community Services	1
Neighborhood 6B		
Numbered Streets Neighborhood Nassau County AHRC*	Residential	400
	Vacant Land	5
Ludlam/Bayville Avenue Business Area		
Ludlam/Bayville Avenue Business Area Gas Station Bayville Seafood Mill Creek Tavern Fire Department/Ambulance*	Residential	13
	Commercial	4
	Vacant Land	2
	Community Services	1
West End Business Area		
Tides Motor Inn & La Cantina Bay Ransom/Stehli Beach The Stands The Breakers Shipwreck Tavern Souvlaki Place of Bayville Ralph's Pizza Anthony's Gourmet Café	Commercial	11
	Residential	5
	Vacant Land	4
	Recreation and Entertainment	3
	Wild, Conservation Lands, Public Parks	1
Mill Neck Creek Businesses		
Flowers Oyster Farm Bridge Marina	NA	-
Recreation Area		
West Harbor Beach Rod & Gun Club	NA	-

Table 8: Individual Assets

*Assets located within asset areas and listed individually on map
Nassau County Police Booth Nassau County AHRC Fire Department/Ambulance
Assets not located within asset areas
Road to Red Cross Shelter Village Marina Bayville Bridge Water Pump Station Athletic Facility Centre Island Causeway Centre Island Police Department
Assets not risk scored (not located within risk areas)
Water Tower Water Well Village Hall Primary School Intermediate School Merritt Lane Shopping Center Locust Valley High School St. Gertrude's Roman Catholic Church The Village Church Village Woods Park

Table 9 presents the “unmitigated” Risk Scores for the assets located within the extreme, high and moderate risk areas in the Village. See Section II.Aii, Assessment of Risk to Assets and Systems for discussion of assumptions used in assessing risk.

Table 9 Unmitigated Risk Scores

Risk Assessment Tool																
Asset Information						Landscape Attributes						Risk Assessment				
Asset	Risk Area	Asset Class	Socially Vulnerable Populations	Critical Facility	Community Value	Erosion Rate ≥1 foot per year or unknown	Waterline frequently at shore defense or upland vegetation	Shore defenses absent, not constructed to anticipated conditions, or deteriorating	Protective vegetation between asset and flood source absent	Dunes absent, below BFE, eroding, little vegetation; Bluff slope unstable, little vegetation	Asset on coastal barrier island or filled wetland	Landscape Attribute Score ("Yes" = +0.5)	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Road to Red Cross Shelter	High	Infrastructure_Systems	No	No, Locally Significant	High	No	Yes	No	Yes	Yes	Yes	2	3	3.00	2	18
West End Business Area	High	Economic	No	No	Medium	No	Yes	No	Yes	Yes	Yes	2	3	3.00	3	27
Neighborhood 1	High	Housing	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.50	3	23
Village Marina	Extreme	Economic	No	No	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.50	3	41
Neighborhood 2	High	Housing	No	No	High	No	Yes	Yes	No	Yes	No	1.5	3	2.50	3	23
Neighborhood 3	Moderate	Housing	No	No	High	No	No	Yes	Yes	Yes	No	1.5	3	2.00	3	18
Neighborhood 4	Moderate	Housing	No	No	High	No	Yes	Yes	Yes	Yes	No	2	3	2.50	3	23
Neighborhood 5A	High	Housing	No	No	High	No	No	Yes	Yes	Yes	No	1.5	3	2.50	4	30
Neighborhood 5B	High	Housing	No	No	High	No	No	Yes	Yes	Yes	No	1.5	3	2.50	4	30
Ludlam/Bayville Ave. Business Area	High	Economic	No	No	Medium	No	No	Yes	Yes	Yes	No	1.5	3	2.50	4	30
Fire Department/Ambulance	High	Health_and_Social_Services	No	Yes, FEMA	High	No	No	Yes	Yes	Yes	No	1.5	3	2.50	4	30
Nassau County Police Booth	High	Health_and_Social_Services	No	Yes, FEMA	Medium	No	No	Yes	Yes	Yes	No	1.5	3	2.50	4	30
Mill Neck Creek Business Area	Extreme	Economic	No	No	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.50	3	41
Bayville Bridge	Extreme	Infrastructure_Systems	No	No, Locally Significant	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.50	4	54
Nassau County AHRC	High	Housing	Yes	No, Locally Significant	Medium	No	No	Yes	Yes	Yes	No	1.5	3	2.50	4	30
Neighborhood 6A	High	Housing	No	No	High	No	No	Yes	Yes	Yes	No	1.5	3	2.50	4	30
Neighborhood 6B	High	Housing	No	No	High	No	No	Yes	Yes	Yes	No	1.5	3	2.50	4	30
Water Pump Station	High	Infrastructure_Systems	No	Yes, FEMA	High	No	No	Yes	Yes	Yes	Yes	2	3	3.00	3	27
Recreational Area	High	Natural_and_Cultural_Resources	No	No	low	No	No	Yes	Yes	Yes	Yes	2	3	3.00	3	27
Athletic Facility	High	Natural_and_Cultural_Resources	No	No	Low	No	No	Yes	No	Yes	Yes	1.5	3	2.50	3	23
Centre Island Causeway	High	Infrastructure_Systems	No	No	Medium	No	Yes	No	Yes	Yes	Yes	2	3	3.00	2	18
Centre Island Police Department	High	Health_and_Social_Services	No	Yes, FEMA	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3.50	2	21

- Notes:
1. Only assets or asset areas located in moderate, high, or extreme flood risk areas are listed. Assets or asset areas not in flood risk areas automatically receive a risk score of zero and are not included in the risk assessment.
 2. Assets and asset areas listed in order from west to east.

	Moderate risk score
	High risk score
	Severe risk score

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Photograph Credits

Cover Page

Village of Bayville Marina and Water Tower (Matthew Condiotti, 15 October 2013)

Dividers

Section I

West Shore Road (Bill Bleyer, Newsday, 31 October 2012)

Osprey nesting (Nanette Vignola-Henry, CDM Smith, 28 August 2013)

Wave splashing onto Ransom/Stehli Beach (Danielle Finkelstein, Newsday, 29 October 2012)

Village of Bayville Marina and Water Tower (Matthew Condiotti, CDM Smith, 15 October 2013)

Section II

Presidents Street drain (Nanette Vignola-Henry, CDM Smith, 28 August 2013)

Bayville Bridge (Alice Brown, Sasaki Associates, 15 October 2013)

Bayville Firehouse (Alice Brown, Sasaki Associates, 15 October 2013)

Pine Lane sand dune breach (Google Earth Aerial Imagery 05 November 2012)

Section III

Sound Beach constructed dune with vegetation (Nanette Vignola-Henry, CDM Smith, 28 August 2013)

First Street sand pile on beach (Nanette Vignola-Henry, CDM Smith, 28 August 2013)

“The Stands” metal railing (Matthew Condiotti, CDM Smith, 15 October 2013)

Sound Beach constructed dune with vegetation (Nanette Vignola-Henry, CDM Smith, 28 August 2013)

Section IV

Evacuation Sign (Alice Brown, Sasaki Associates, 15 October 2013)

View from West Harbor Road (Alice Brown, Sasaki Associates, 15 October 2013)

Beach Access, end of Quincy Street (Matthew Condiotti, CDM Smith, 15 October 2013)

Bayville Firehouse (Alice Brown, Sasaki Associates, 15 October 2013)

Section V

Locust Valley CSD Student Robotics Club, Public Engagement Event #3 (Nanette Vignola-Henry, CDM Smith, 28 January 2014)

Village of Bayville Public Engagement Event #3 (Hope Stege, Sasaki Associates, 28 January 2014)

Bayville overhead utility lines near trees (Alice Brown, Sasaki Associates, 15 October 2013)

Centre Island Causeway (Alice Brown, Sasaki Associates, 15 October 2013)

Bayville overhead utility lines near trees (Alice Brown, Sasaki Associates, 15 October 2013)

Centre Island Causeway (Alice Brown, Sasaki Associates, 15 October 2013)

F. Glossary

AHRC	Association for the Help of Retarded Children	LWRP	Local Waterfront Revitalization Program
BFE	Base Flood Elevation	MS4	Municipal Separate Storm Sewer
CBA	Cost Benefit Analysis	NCR	Natural and Cultural Resources
CDBG-DR	Community Development Block Grant – Disaster Recovery	NDRF	National Disaster Recovery Framework
CEHA	Coastal Erosion Hazard Area	NFIP	National Flood Insurance Program
CERT	Citizens Emergency Response Team	NOAA	National Oceanic and Atmospheric Administration
CPCB	Community Planning and Capacity Building	NYRCR	NY Rising Community Reconstruction Program
CRS	Community Rating System	NYS	New York State
CZM	Coastal Zone Management	NYS DEC	New York State Department of Environmental Conservation
ESRI	Environmental Systems Research Institute	NYS DOS	New York State Department of State
FEMA	Federal Emergency Management Agency	NYS DOT	New York State Department of Transportation
FHWA	Federal Highway Administration	OEM	Office of Emergency Management
FIRMs	Flood Insurance Rate Maps	RSFs	Recovery Support Functions
GIS	Geographic Information System	USACE	United States Army Corps of Engineers
GOSR	Governor’s Office of Storm Recovery	USEPA	United States Environmental Protection Agency
HOA	Home Owner’s Association	USFWS	United States Fish and Wildlife Service
HSS	Health and Social Services	USGS	United States Geological Survey
HUD	U.S. Department of Housing and Urban Development		

