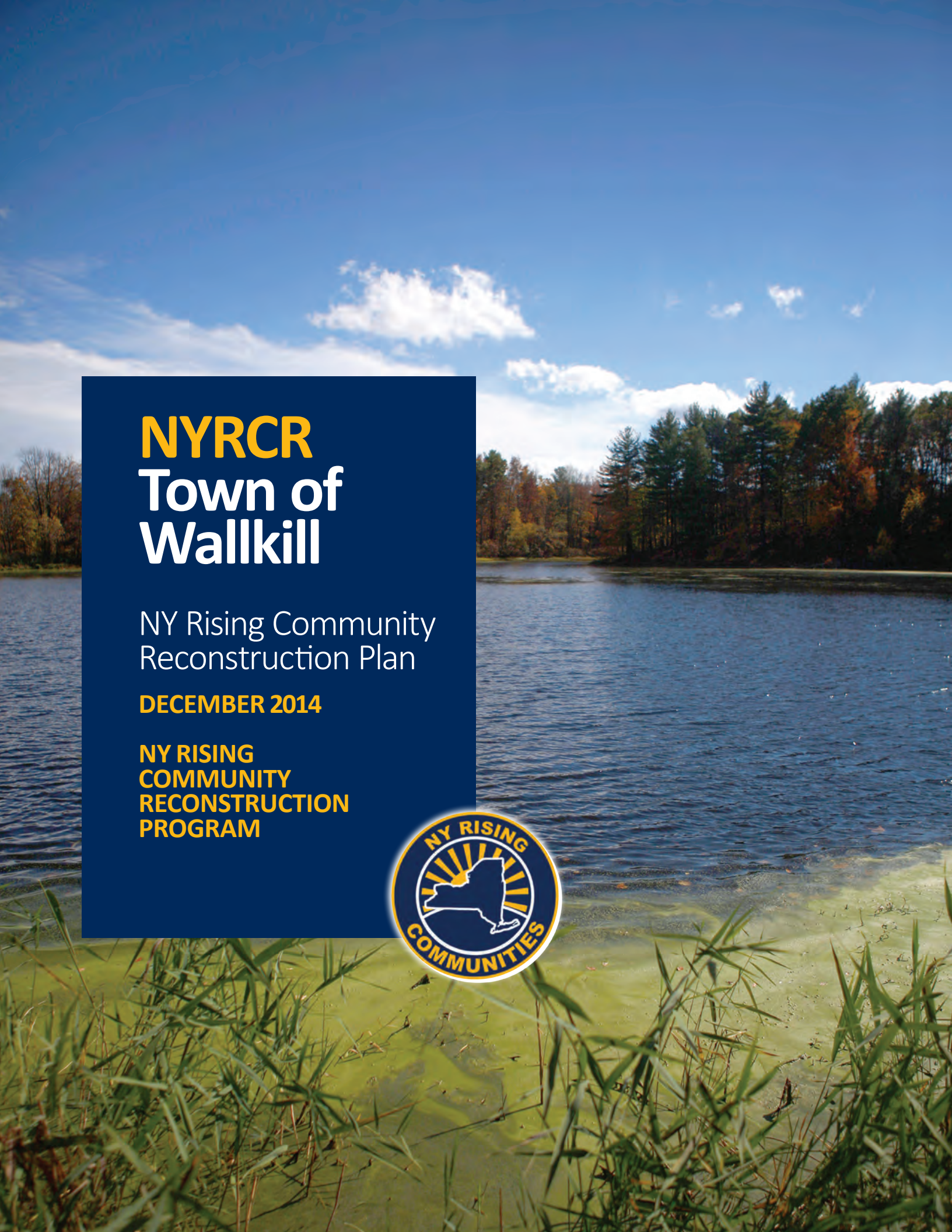

NYRCR Town of Wallkill

NY Rising Community Reconstruction Plan

DECEMBER 2014

NY RISING COMMUNITY RECONSTRUCTION PROGRAM

Town of Wallkill
NYRCR Planning Committee

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This document was developed by the Town of Wallkill NY Rising Community Reconstruction (NYRCR) Planning Committee as part of the NYRCR Program within the Governor's Office of Storm Recovery. The NYRCR Program is supported by New York State (NYS) Homes and Community Renewal, the NYS Department of State, and the NYS Department of Transportation. This document was prepared by the consulting firm Tetra Tech, 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 $700 million planning and implementation program 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.

Launched in the summer of 2013 and completed in March 2014, Round I of the NYRCR planning process included 50 NYRCR Planning Areas, comprising 102 storm-impacted localities. In January 2014, Governor Cuomo announced a second round of the planning process, serving an additional 22 storm-impacted localities. Four of these localities were absorbed into existing Round I NYRCR Planning Areas, bringing the number of localities participating in Round I up to 106; the other 18 localities formed 16 new Round II NYRCR Planning Areas. Between Rounds I and II, there are 66 NYRCR Planning Areas, comprising 124 localities. The program serves 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.

In Rounds I and II, the State allotted between $3 million and $25 million to each participating locality for the implementation of eligible projects identified in the NYRCR Plan. The funding for these projects is provided through the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant—Disaster Recovery (CDBG-DR) program.[1]

Each NYRCR Planning Area is represented 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 650 New Yorkers have represented their communities by serving on Planning Committees. Nearly 650 Planning Committee Meetings have been held, during which Planning Committee members

1 Five of the Round I Planning Areas—Niagara, Herkimer, Oneida, Madison, and Montgomery Counties—are not funded through the CDBG-DR Program.

worked with the State's team to develop community reconstruction plans, which identify opportunities to make their communities more resilient. All meetings were open to the public. An additional 250+ Public Engagement Events attracted thousands of community members, who provided feedback on the planning process and resulting 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 program's website (www.stormrecovery.ny.gov/nyrcr), providing several ways for community members and the public to submit feedback on the program and materials in progress.

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

The NYRCR Program does not end with this NYRCR Plan. Governor Cuomo has allotted over $700 million for planning as well as implementing eligible projects identified in NYRCR Plans. NYRCR Planning Areas are also eligible for additional funds through the NY Rising to the Top Competition, which evaluates applications from Round II NYRCR Planning Committees across three categories—Regional Approach, Inclusion of Vulnerable Populations, and Use of Green Infrastructure. The winner of each category will be allotted a share of the competition's $3.5 million to fund additional eligible projects.

In April 2014, Governor Cuomo announced that projects identified in NYRCR Plans would receive priority consideration through the State's Consolidated Funding Application (CFA) process and charged the Regional Economic Development Councils (REDCs), which play an advisory role in the CFA process, to support NYRCR projects. In December 2014, Governor Cuomo announced that 24 NYRCR projects received nearly $12 million in CFA funding. This announcement is an example of the Governor honoring his commitment to leverage the work of the NYRCR Planning Committees to incorporate resilience into other State programs and to find additional sources of funding for NYRCR projects. The NYRCR Program is also working with both private and public institutions to identify existing funding sources and to create 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 REDC State Agency Review Teams (SARTs), composed of representatives from dozens of State agencies and authorities, for feedback on projects proposed by NYRCR Planning Committees. 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 the Town of Wallkill NYRCR Planning Committee, which is passionately committed to realizing a brighter, more resilient future for its community.

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.

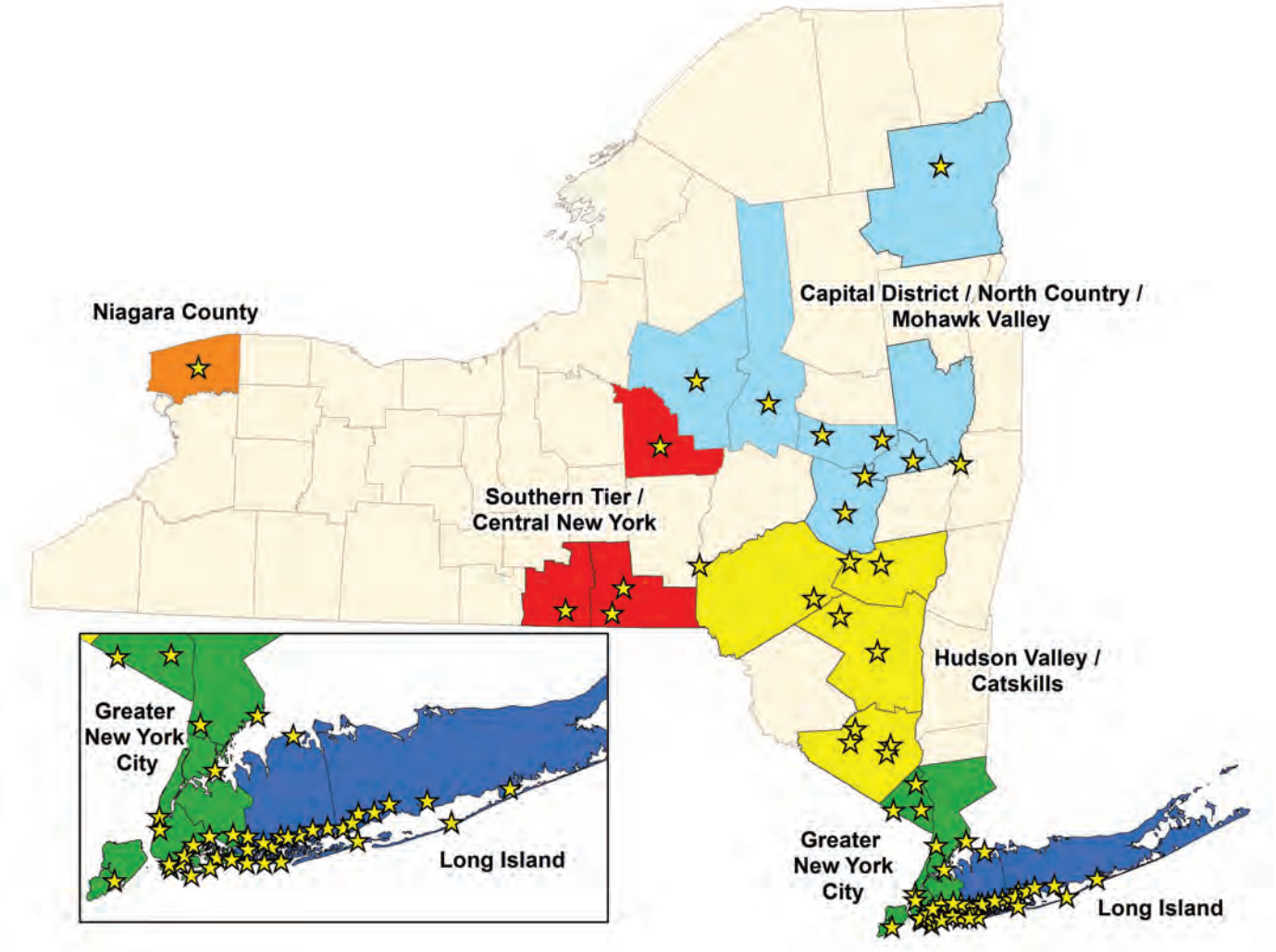
The projects and actions set forth in this NYRCR Plan are divided into three categories. The order in which the projects and actions are listed in this NYRCR Plan does not necessarily indicate the Planning Committee's prioritization of these projects and actions. **Proposed Projects** are projects proposed for funding through an NYRCR Planning Area's allotment 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 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.

As part of Round II of the NYRCR Program, the Town of Wallkill NYRCR Planning Area has been allotted up to $3.0 million in CDBG-DR funds for the implementation of eligible projects identified in this plan. While developing projects for inclusion in NYRCR Plans, Planning Committees took into account cost estimates, cost-benefit analyses, the effectiveness of each project in reducing risk to populations and critical assets, feasibility, and community support. Planning Committees also considered the potential likelihood that a project or action would be eligible for CDBG-DR funding. Projects and actions implemented with this source of Federal funding must satisfy a Federally-designated eligible activity category, fulfill a national objective (i.e., 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 GOSR 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 Planning Area's CDBG-DR allotment 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. 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. Projects will be implemented on a staggered timeline, and the NYRCR Program will choose an appropriate State or local partner to implement each project. GOSR will actively seek to match projects with additional funding sources, when possible.

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.

NY Rising Communities



Find out more at: StormRecovery.ny.gov/Community-Reconstruction-Program

Note: Map displays the 66 NYRCR Planning Areas from Rounds I and II. (Five of the Round I Planning Areas—Niagara, Herkimer, Oneida, Madison, and Montgomery Counties—are not funded through the CDBG-DR Program.)

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Executive Summary

Overview

The Town of Wallkill (Town) presents visitors with a unique opportunity to experience everything from farmlands to fashion. The Town, nestled in the Lower Hudson Valley, encompasses 62.2 square miles in Orange County. Recently, the Town has experienced a relatively major transformation from a primarily agricultural, rural community to a thriving retail economic center. In fact, the Town's population has more than doubled in less than 50 years. As the Town continues to attract new businesses and residents, municipal services, including local utilities and emergency responders, are under constant strain to meet new demands.

In 2011, Hurricane Irene and Tropical Storm Lee demonstrated just how vulnerable the Town could be. Between 4 and 11.5 inches of rain fell during Hurricane Irene, causing catastrophic flooding in the areas along the Wallkill River. In fact, Orange County was one of the seven hardest hit counties in New York State. The Town experienced significant road washouts and direct flooding damage, as well as secondary damage from fallen trees and downed power lines. During Hurricane Irene, 11 of the 86 National Flood Insurance Program (NFIP) policyholders in the Town of Wallkill filed claims for over $197,000 in damages due to the storm.

Less than two weeks later, the Town of Wallkill faced the challenge of Tropical Storm Lee, which brought rainfall of 4.6 to 8.3 inches, high winds, and more floodwaters. Tropical Storm Lee took an already tenuous situation and made it exponentially worse.

Only a little over a year later, the Town of Wallkill was threatened again, this time by Superstorm Sandy. Superstorm Sandy tested the Town not just through floodwaters, but through the force of its winds. Gusts of up to 61 mph downed trees and caused sustained power outages that threatened the safety of motorists and residents Town-wide. The Federal Emergency Management Agency (FEMA) indicated that the Town incurred $120,000 in costs because of Superstorm Sandy.

The Community, however, used the storms and resulting damages as a chance to showcase its spirit. Local residents demonstrated resolve that would have mirrored the original settlers of the Town, primarily farmers who frequently suffered from the vagaries of Mother Nature.

New York Governor Andrew M. Cuomo's NY Rising Community Reconstruction (NYRCR) Program presented the Town with an opportunity to leverage this resolve into long-term resiliency strategies.

The Town of Wallkill formed a community-based NYRCR Planning Committee that identified flood mitigation and community resiliency activities under the purview of the NYRCR Program. The Town of Wallkill NYRCR Plan identifies the most critical needs and impacts from recent major storm events. In addition, it seeks to not only foster increased resiliency and safety at a local level but also, to encourage community and economic development.

Critical Issues

The Town of Wallkill NYRCR planning process recognized several critical issues surrounding the Town's ability to successfully recover from natural disasters and to enhance its overall resiliency. The Town of Wallkill NYRCR Planning Committee (Committee) utilized a wide variety of resources to accomplish its goal. Sources included existing plans, technical analyses, public input, interagency guidance, and Committee discussion.

As with any worthwhile challenge, these issues have multiple facets and are interconnected, requiring complex and innovative solutions.

There's No Place Like Home

The Town of Wallkill has experienced many significant changes in the past few decades, as it has transitioned into a regional shopping area and employment hub. At the same time, the new residential developments and housing complexes have emerged to serve the demand of new, large local employers. As with any major change, this evolution has had many unintended effects, including the loss of a sense of community or home among residents.

This lack of a sense of place affects both long-term residents, who feel that the historic character of the Town has been lost, and newer residents, who have not yet been able to develop strong ties to the community.

In fact, one resident went so far as to state, "Lots of people who live in the Town of Wallkill don't even know that they live in the Town of Wallkill."

Although the Town of Wallkill NYRCR Plan focuses primarily on structural and infrastructural integrity as a way to enhance resiliency, the Town recognizes it cannot be truly resilient until it comes together as a community. To that end, the Committee identified many projects with a secondary goal of strengthening a sense of community and developing a Town of Wallkill identity.

Critical Infrastructure Cannot Experience Critical Failure

The Town's recent population growth has not only strained the Town's sense of identity, but the Town's housing and public services' resources, as well. Some of these residents commute daily to New York City, relying on the Town of Wallkill transportation corridors and public transit to get to workplaces. Many more commute locally, either to jobs along the Town's regional medical corridor or to other major local employers. The Town can also see up to 250,000 visitors on busy shopping days. This creates more demand on public services.

Although the Town typically manages these demands during non-disaster times, the increased dependency on an uninterrupted transportation and public services network creates a concern for the Town of Wallkill.

While the direct damages of flooding are serious enough, a subsequent or secondary hazard of transportation or utility interruption could bring the Town to a standstill. Such a standstill can inhibit residents and emergency personnel from getting to where they need to be.

The Committee sought out ways to create redundancy and support additional efforts to bolster public services, especially during severe storm and flood events.

Protecting the Community

The Committee identified its most significant concern in the *Town of Wallkill/City of Middletown Natural Hazards Mitigation Plan* (2014). Specifically, this issue concerns the Town's ability to respond to the direct damages and impacts caused by flooding.

As in many communities, the natural resources and waterways of the Town present both opportunity and danger for residents. These waterways have strengthened the Town's economy, but have also increased risk to residents' safety, residential homes, and other community assets. Development projects and a lack of understanding about flooding (i.e., specifically about exacerbating factors, such as the effect of residential debris) have amplified this vulnerability.

The Town of Wallkill NYRCR Plan seeks to improve the Town's existing mechanisms for flood control, and create more resilient infrastructure through a sustainable approach and a mindset aimed at long-term success.

A Community-Driven Process

Both the Committee and the community met NYRCR planning and organizational challenges with the same indomitable spirit that saw them through the 2011 flooding and subsequent storms. The Committee carried out a multi-pronged engagement process to incorporate quantitative and qualitative data from as many sources as possible.

Most importantly, from inception through the publishing of the Town of Wallkill NYRCR Plan, the planning process deliberately included public participation.

The Committee organized and conducted extensive, multi-media public outreach and events to offer residents every opportunity to ensure that their concerns and ideas were addressed. Residents could choose to participate through attendance at bi-weekly Committee Meetings, online and hard-copy surveys, door-to-door visits, radio/social media channels, and Public Engagement Events.

Four Public Engagement Events were held at the Town Hall to attract as wide an audience as possible. The Committee wanted to ensure that all its residents knew about the opportunities presented through the NYRCR Program, and that nobody was limited from participating by a lack of access to either transportation or technology, or because of a functional or access need.

Vision Statement

Overarching this effort was the following vision adopted by the Committee early in the planning process:

For the preservation of our future, the Town of Wallkill stands united to build a more resilient community of tomorrow. The Town of Wallkill aspires to strengthen our infrastructure, not only to manage future storms, but also to ensure the future growth, development, and sustainability of our community. Together with our neighbors of all ages and abilities, both within the Town of Wallkill and in the surrounding areas, we can establish a safer, more economically viable community and protect the spirit of the Town for generations to come.

A Blueprint for Success

The Committee chose to take an expansive approach to promote long-term resiliency and success at multiple levels, including flood damage reduction, improved emergency services, and promotion of community initiatives. The NYRCR Plan creates a blueprint that effectively targets the Town's greatest at-risk assets and recommends solutions to bolster critical facilities and essential services.

The Committee and the public used a multi-generational body of knowledge and experience, augmented by both personal experiences and technical analysis, to determine the Town's primary needs, risks, and critical issues. This catalyzed the development of resiliency and recovery activities.

After identifying and analyzing economic, healthcare, social services, housing, infrastructure, and natural and cultural resources to determine prospective flood vulnerability and overall impact to the Town, the Committee developed preliminary strategies to reduce risk and to meet the most critical community needs. These needs focus on community health and safety, resiliency, quality of life, economic growth, and environmental stewardship. The strategies are

the foundation for projects and actions proposed in the Town of Wallkill NYRCR Plan for Community Development Block Grant – Disaster Recovery (CDBG-DR) funding.

The Committee chose not to limit itself only to transportation and infrastructure projects, which can have a limited useful life. Instead, the planning process explored projects in variety of categories: transportation and infrastructure; planning and regulatory processes; natural resource protection; and education and outreach.

Projects were categorized into three project types. This methodology was designed to identify and consider the full range of potential actions and outcomes, while providing a clear direction toward project implementation.

Proposed Projects are projects proposed for funding through an NYRCR Plan Area's allotment 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.

From Strategies to Implementable Projects

The Committee identified five strategies in its NYRCR Plan, around which potential projects and resiliency actions center. These strategies highlight the Community's overall reconstruction and resiliency needs, while offering opportunities to address them.

The following strategies resulted in projects and actions that collectively remediate, mitigate, rebuild, and promote a resilient Town of Wallkill.

Strategies

Strategy 1: Ensure an efficient, safe, and resilient transportation system.

Strategy 2: Improve stormwater management and drainage systems throughout the Town to decrease risk for homes, businesses, and residents.

Strategy 3: Improve on existing emergency preparedness, response, and communications, including public outreach and education.

Strategy 4: Preserve, protect, and enhance the Town's natural, recreational, and cultural resources, and strengthen the local sense of place and community.

Strategy 5: Promote sustainability and resilience through local planning mechanisms and regulation/ code enforcement.

Projects

The following projects were selected for the Proposed Project category, due to the multitude of benefits to the community and project contribution towards increased resiliency.

Ballard Road at East Galleria Drive Flood Mitigation

This project seeks to replace an undersized culvert to improve flood-level flow capacity, increase floodwater conveyance, and access the available floodplain downstream.

The roadway and shoulder sustained costly flood damages during Hurricane Irene and Superstorm Sandy, resulting in temporary road closure and sustained lane closure. Additionally, the intersection is a high traffic area for both regional and local motorists who access the Middletown train station or shopping centers, as well as industrial traffic.

Interoperable Communications Program

This project seeks to develop and implement an interoperable communications program to support effective and strategic emergency management activities. Interoperable communications refers to the ability of emergency responders to communicate and share voice and data information. These communications will ultimately lead to more efficient disaster response and recovery.

Natural Gas or Solar Backup Power for Critical Facilities and Infrastructure

The focus of this project is the installation of permanent natural gas or solar back-up power sources for critical facilities and infrastructure in the Town, including: traffic signals near Route 211 and Route 17 intersection; Wallkill Senior Housing, 88 Senior Way; and Senior Horizons, 141 Bert Crawford Road.

Power sources would be obtained for specific facilities that service functional needs and vulnerable populations. This project would reduce the need to rely on emergency services and responders to meet basic health and safety needs during large-scale power outages. This project would also include an evaluation of existing shelter and other critical facility needs for redundant power generation. Use of solar or green energy would be considered, where feasible.

Silver Lake Dam Modifications and Emergency Operations Agreement

This project aims to mitigate future flood damages at repetitively damaged roadways in the area, including the Silver Lake-Scotchtown Road and "Twin Bridges," along Bert Crawford Road near the inlet for Silver Lake; at the intersection of Fitzgerald Drive and Neely Street; and at State Route 211 East near Wallkill Plaza. Phase 1 of the project would improve the Silver Lake outlet structure to enable timely water surface reduction in Silver Lake to increase flood storage capacity and reduce localized flooding. Phase 2 of the project calls for coordination with the owners of the Silver Lake Dam to secure access for Town officials, and the authority to lower the water level prior to a storm event.

Sump Pump Backflow Prevention and Cross-Connection Control

This project would include an education and outreach program. The intent is to minimize the occurrences of improper sump pump connections to the municipal sanitary sewer system and to increase the number of residences who are equipped with backflow preventers that meet current standards. This project aims to reduce unnecessary and inappropriate load on the municipal sanitary system during flood events, and to prevent basement sewage backflow with voluntary backflow installation and improper connection repair programs.

Water and Sewer Treatment Plant Flood Damage Mitigation Measures

This project would implement strategic flood-proofing and operational mitigation activities to reduce further service interruptions and costly damage repairs. The project proposes upgrades to the Kosuga, Braeside, Crystal Run, and Rykowski Well Roads; the Braeside and Kosuga Water Treatment Plants; the Braeside Sewer Treatment Plant; and the Northern Woods and Woodland Acres Sewer Pump Stations.

Winding Brook Floodplain Improvements

This project would mitigate future flood damages throughout the Winding Brook floodplain in the Scotchtown neighborhoods. The project would focus on the Ben Lomond Drive culvert, as its current state threatens several buried Town utilities. The current culvert would be replaced with an upgraded structure. The project would also reactivate two capped ends of the water main pipe under Ben Lomond Drive, which was broken during Tropical Storm Lee due to roadway collapse around the Ben Lomond culvert.

TOWN OF WALLKILL NYRCR PLAN PROJECTS BY STRATEGY

Town of Wallkill NYRCR Projects	Proposed Project	Featured Project	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5
Ballard Road at East Galleria Drive Flood Mitigation	X		X	X			
Natural Gas or Solar Back-up Power for Critical Facilities and Infrastructure	X		X		X		
Interoperable Communications Program	X				X		
Silver Lake Dam Modifications and Emergency Operations Agreement	X			X		X	
Water and Sewer Treatment Plant Flood Damage Mitigation Measures	X				X		
Winding Brook Floodplain Improvements	X		X	X			
Channel Daylighting and Riparian Improvements		X		X			
Circleville Hamlet Preparedness and Public Space Improvements		X				X	
Marketing and Outreach Campaign about Life in the Town of Wallkill		X				X	
Masonic Creek Watershed Stormwater Storage: Fredrick's Farm Stormwater Storage and Public Park		X		X			
Sump Pump Backflow Prevention and Cross-Connection Control		X			X		
Vulnerable Populations and Community Emergency Alert, Education, and Support		X			X		

Section 1

Community Overview

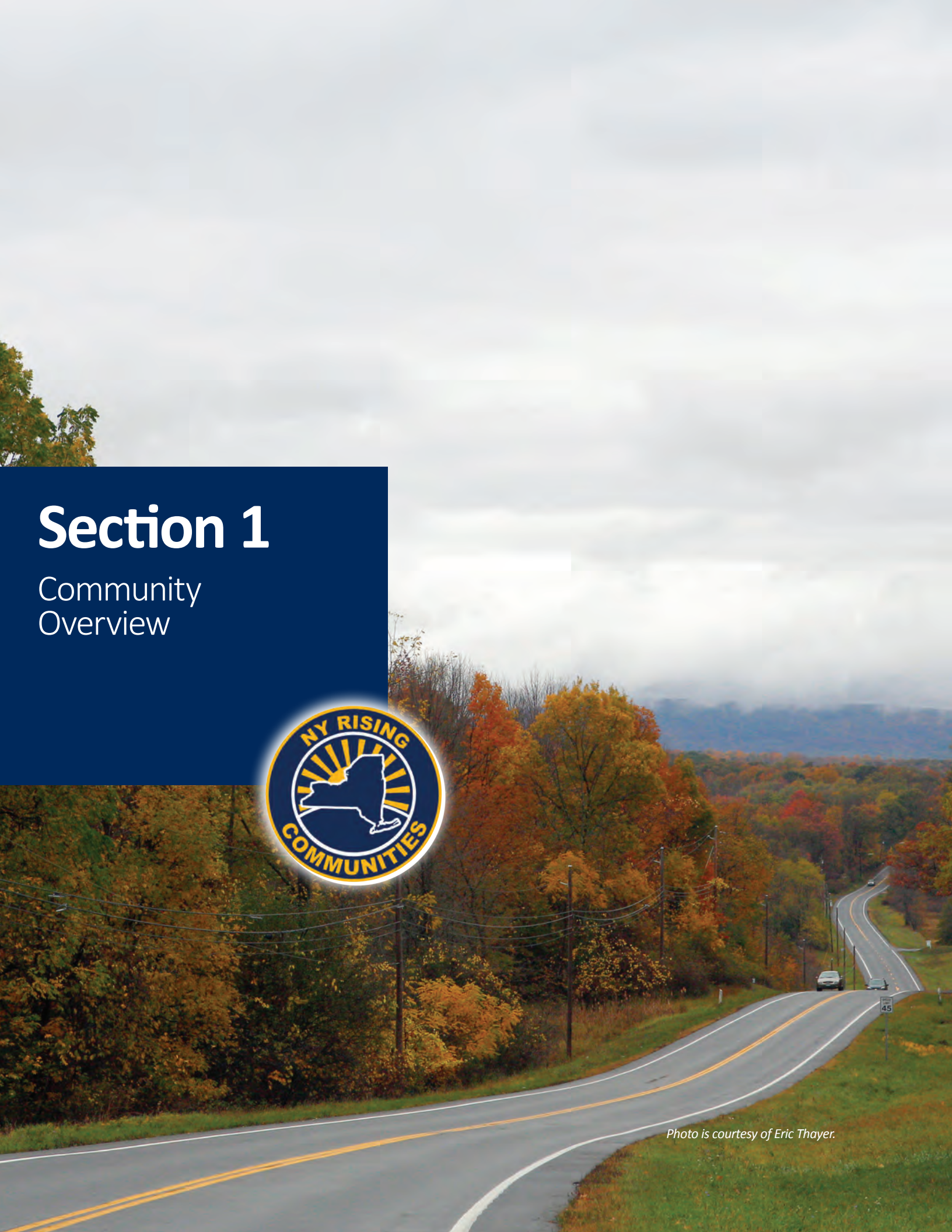


Photo is courtesy of Eric Thayer.

Section 1: Community Overview

Introduction

On a typical day, steady streams of traffic flow in and out of the Town of Wallkill (Town). Morning commuters drive along the regional medical corridor; mid-day local and regional shoppers navigate to grocery and retail shopping centers; and tractor trailers haul midnight deliveries to industrial and manufacturing facilities.

However, late summer 2011 was not typical for many communities across New York, including the Town of Wallkill. As angry clouds marched across the ominous Hudson Valley skies, many motorists around the region headed for home. Local shoppers scampered to snatch what remained of the once-ample supplies of bottled water, bread, and batteries. Meanwhile, crews from the Town's Department of Public Works and Highways prepared for what promised to be landscape-changing events.

Hurricane Irene and Tropical Storm Lee unleashed successive torrents of record rainfall into waterways and storm drains in late August and early September 2011, respectively. In mere hours, narrow drainage ditches were engulfed in white-water. Arterial roadways disappeared under volumes of surging water, destroying culverts and catch basins, eroding road shoulders, and causing asphalt surfaces to collapse. As power outages spread across the region, local electrical infrastructure was inundated by multiple power surges that damaged critical equipment, as electricity rapidly fluctuated on and off.

A year later, even while recovery efforts from these beastly 2011 storms were still underway, the fury of Superstorm Sandy served as a painful reminder that devastating storms demand long-term solutions for community resiliency.

To address the significant and lasting impacts from flood events, including Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy, and to establish long-term community health and resiliency, the Town undertook the important task of developing a NY Rising Community Reconstruction (NYRCR) Plan. Under the guidance and funding of the NYRCR Program, the Town of Wallkill NYRCR Plan aims to address the most critical needs and impacts from these storm events, while identifying strategies and priorities for future resiliency, increased quality of life, community vibrancy, and economic revitalization.

Throughout the planning process, the Town of Wallkill NYRCR Planning Committee (Committee) met bi-weekly with Tetra Tech, Inc. (Consultant Team), staff from the New York State Department of State (NYS DOS), and the regional NYRCR Program lead. These meetings provided the venue to manage the overall process, assign tasks, determine the direction of the Town of Wallkill NYRCR Plan, and ultimately, to select proposed projects for funding.

Geographic Scope of the Town of Wallkill NYRCR Plan

The Committee defined the Town of Wallkill NYRCR Plan Area (NYRCR Plan Area) as the 62.2 square miles within the Town's boundaries. This area includes the Town's commercial corridors, various residential neighborhoods and hamlets, protected farmlands and conservation lands, and other land uses. Many locations within the NYRCR Plan Area experienced severe economic damage from Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy, and area residents in all corners of Town sustained lasting impacts from the storms' flooding.

Situated in the western part of Orange County, NY, the Town of Wallkill is considered (in the NYRCR Program) to be part of the Lower Hudson Valley Region. Figure 1.1 provides an overview of the NYRCR Plan Area as designated by the Committee, along with neighboring municipalities in Orange and Sullivan Counties.

The Town of Wallkill: A Snapshot

The following sections provide a brief snapshot of the Town of Wallkill, including an overview of its geographic features, community demographics, land use conditions, infrastructure resources, and public amenities. This overview is not meant to be exhaustive of all community details, but provides a foundation for the discussions on critical issues, asset vulnerability, needs and opportunities, as well as reconstruction strategies, programs, and projects that appear later in this Town of Wallkill NYRCR Plan.

Historic Transformations

Nestled in the Lower Hudson River Valley, the Town of Wallkill encompasses 62.2 square miles in Orange County, along the northern county line. The Town shares part of its northwestern boundary with Sullivan County. Surrounding the Town are the Orange County Towns of Wawayanda and Goshen to the south, Crawford and Montgomery to the north, and Mount Hope to the west.

The agricultural sector has been an historic staple in Wallkill's economy, relying on natural water resources and transportation modes to move goods to market. Photo of barn and trees is courtesy of Eric Thayer.

Several major transportation corridors in Wallkill have changed the physical landscape of the Town, while enabling local residential and commercial growth and commuting connectivity to New York City. Photo major highway intersection is courtesy of Eric Thayer.

The Wallkill River forms part of the Town's easterly boundary, with the Town of Hamptonburgh beyond. The Town of Wallkill surrounds the City of Middletown almost completely; however, Middletown is an independent jurisdiction and is concurrently engaged in the NYRCR Program with its own Planning Committee.

Before its establishment as the Town of Wallkill in 1772, early European settlements developed along the Wallkill River. These developments were mostly small agricultural homesteads. By the late 19th century, dams operated along the Wallkill River near the Town of Wallkill, as well as near the neighboring Towns of Montgomery and Walden. The Wallkill River provided vast water resources that benefitted agricultural pursuits and created water power for other industries.

The Wallkill Valley Railroad was completed in 1872, traversing the Wallkill Valley for 33 miles, from the Towns of Montgomery and Wallkill to Kingston; there, it linked to the Erie Railway. This system of railways connected the Orange County settlements to the major urban centers and economies of New York City.

Rail and roadway transportation corridors have transformed the Town of Wallkill's and surrounding communities' land uses over the last few centuries.

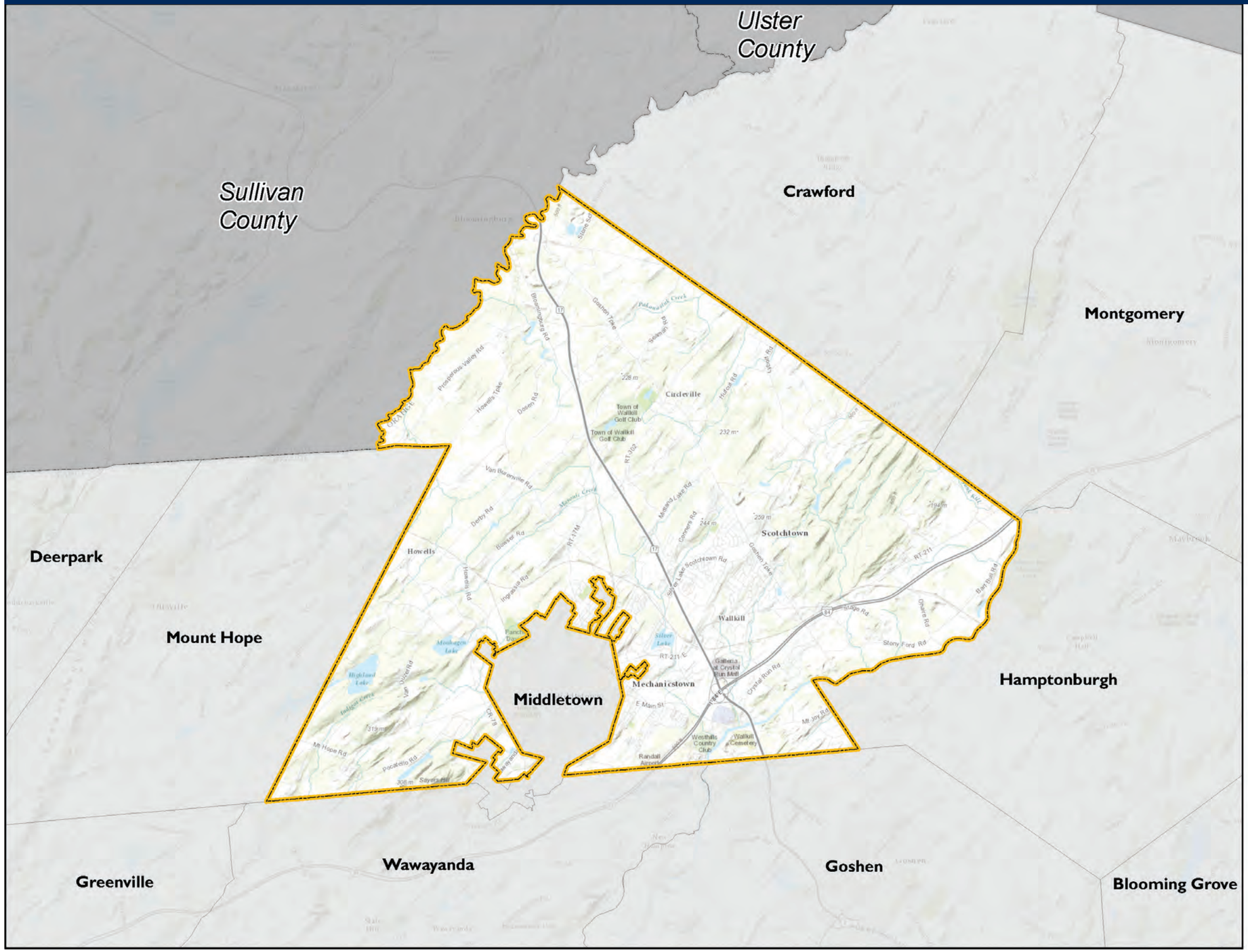
This spurred the livestock and dairy industries in the region, and solidified population and commerce centers in the Town of Wallkill and other locations along the rail corridor (*Historical Society of Shawangunk and Gardiner,* 2009).

The Wallkill Valley Railroad phased out with the increased availability and convenience of the automobile, but daily service continued on the Erie Railroad, which had a terminus in the City of Middletown and another stop at Howell's Depot in Wallkill. The Midland Railroad, later known as the New York and the Ontario and Western, came through the Town near the end of the nineteenth century, establishing stops in the Town of Wallkill at Fair Oaks, Crawford Junction, Purdy's Station, and Lockwood. Settlement and activity clusters generally formed around these railway station commercial nodes, as well as around the organized churches in Town. These factors spurred populations that developed the Hamlets of Circleville, Howells, Scotchtown, and Mechanicstown.

The Town of Wallkill gradually developed into a rural residential community by the mid-twentieth century, with agricultural uses concentrated along the southeast, northeast, and northwest perimeters of the Town. Residential development still focused around the historic hamlets and near the major population center,

NYRCR: Town of Wallkill, Orange County

FIGURE 1.1 – OVERVIEW MAP

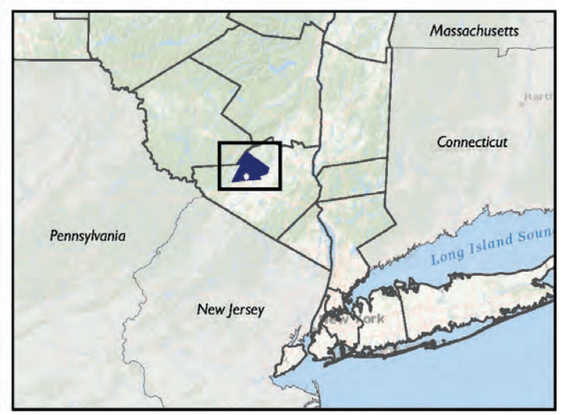


Legend

- Town of Wallkill Planning Area
- Municipal Boundary

Data Sources:
NYS - Railroads, Waterbodies, Boundaries
ESRI - Topo

2 1 0 2 Miles



Pictured above, the Town of Wallkill NYRCR Plan Area is a combination of "town and country," complemented by open space, environmental and recreational resources, and historic properties. Photos of town and country roads, above, are courtesy of Eric Thayer.

the City of Middletown. The most significant event in the Town's 20th century history was the opening of State Route 17 and Interstate Highway 84, and the local interchanges for both roadways in the Town limits.

These transportation investments not only changed the physical landscape of the Town, but also attracted new development and substantial residential growth, as the new highways put Wallkill within commuting distance of New York City. Investment in regional and interstate transportation infrastructure continues to be a formative influence on the Town's character and development, even to present day.

Landscape

Elevations throughout the Town of Wallkill range from 360 to 1040 feet above sea level, and the resulting ridges and valleys contribute to the many scenic landscapes and vistas that are characteristic of the area. The highest elevations are in the southwest sections of Town, near the neighborhoods of Pocatello and Howell's Depot. Meanwhile, the Mechanicstown area, just east of the City of Middletown and along the Wallkill River, occupies the lowest terrain in the Town.

Surface water in Wallkill drains to two major drainage basins—the Shawangunk Kill and Wallkill River Basins. Together, these represent two of the major water resources in the Town of Wallkill, the Shawangunk and Wallkill Rivers, respectively.

Lesser streams in the Town include:

- Masonic Creek, which flows from Pilgrim's Corner in western Wallkill and collects tributaries near State Route 302 and near Bisch Road in the central part of town, before flowing into Silver Lake and on to the Wallkill River;
- Winding Brook, which flows from north to south through the Scotchtown neighborhood, south of Silver Lake Scotchtown Road, along Blumel and Ballard Roads, and joining the Wallkill River south of the Crystal Run Corporate Park;
- Monhagen Creek, which flows through the City of Middletown; Bullhack Creek, which runs near the Hamlet of Circleville and joins the Wallkill River near Phillipsburgh; and
- Mannayunk Kill, which runs through the eastern part of Town and empties into the Wallkill River in the Town of Montgomery.

Other water features include the Dwaarkill River, the Highland and Pocatello Lakes, and roughly 1,800 acres of wetlands. Much of the Town lies within the Wallkill Watershed, including substantial amounts of protected lands that contribute not only to unique ecosystems, but also to a robust aquifer that provides the Town's residents with a source of drinking water.

Land Use

Current land use in the Town of Wallkill reflects both its long tradition of rural settlement patterns and its more modern history of retail-based economic growth. This difficult balance is evidence among major commercial development and measures to preserve the natural environment. Development patterns throughout the Town have followed the availability of public infrastructure, services, and amenities—first, with the railroad and later, with the central water and sewer lines. With these reliable patterns leading growth, significant amounts of undeveloped land, including established agricultural lands and environmentally sensitive areas, remain undisturbed.

The Future Land Use Plan in the *Town of Wallkill 2005 Comprehensive Plan* (2005) continues to direct growth to areas where efficient infrastructure exists and seeks to minimize adverse impacts on environmental resources. The Town uses traditional zoning definitions for its current Land Use Plan, but also divides the land area into distinct "Land Use Character" areas. These Areas delineate general land and development concepts with similar natural, cultural, or development features that highlight overall land use patterns. While specific zoning boundaries exist within the Town Code, land use character areas depict broader land use, development, and conservation strategies that align with the vision and goals developed as part of this Town of Wallkill NYRCR planning process. The current zoning and the character areas proposed in the *Town of Wallkill 2005 Comprehensive Plan* (2005) are depicted in Figure 1.2.

The Town contains a wealth of natural beauty and historic resources, some of which are recognized at the Orange County and national levels. The panorama visible from the Scotchtown Turnpike near the Hamlet of Circleville is one of 11 "recognized views" in Orange County. Route 302 and the Goshen Turnpike are noted as "scenic corridors" in the *Town of Wallkill 2005 Comprehensive Plan* (2005).

There are two historic buildings in the Town listed on the National Register of Historic Places: the John Tears Inn at 1224 Goshen Turnpike, and the William Bull, III House, also known as the "Brick Castle," located on Bart Bull Road.

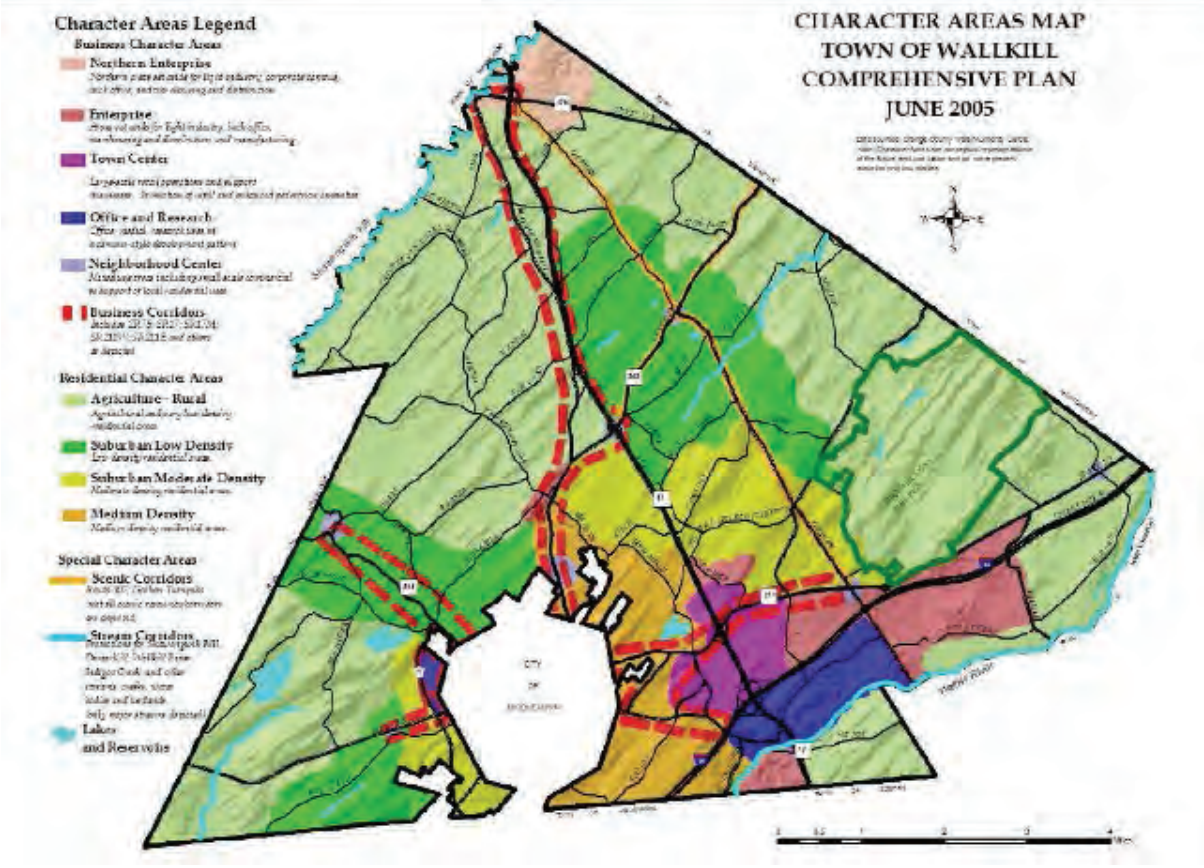
Public recreational facilities in the Town include 11 parks, ball fields, fishing, open spaces, paddle boating, a golf course, playgrounds, picnic pavilions, and swimming facilities.

The streams, water bodies, wetlands, and groundwater resources in the Town are the source of pride, health, and income for many Wallkill residents. Many of these resources are protected by local codes and ordinances, including conservation easements, and by public awareness campaigns designed to educate residents on water resource protection and pollution prevention. The largest protected area of land is the Moonbeams Preserve, which is 150 acres of fields, forest, and wetlands that border the Shawangunk Kill, a major tributary to the Wallkill River.

There are also three wellhead protection zones located within the Town limits, and four along the southeastern border on the Hamptonburg Town line. Additional municipal water supply lands just west of the City of Middletown are classified as permanently protected open space for the long-term protection of the groundwater aquifer.

These natural resource and conservation areas are important to the Town's future livability, sustainability, and resilience, and factor into this Town of Wallkill NYRCR Plan.

FIGURE 1.2 – CHARACTER AREAS MAP
TOWN OF WALLKILL – COMPREHENSIVE PLAN, 2005



Source: Town of Wallkill Comprehensive Plan, 2005.

The People of Wallkill

The population in the Town of Wallkill has more than doubled since 1970 (U.S. Census, 2010). The Town's current density of roughly 441 persons per square mile is relatively high, compared to neighboring municipalities and to Orange County as a whole. However, the Town's population density could be better understood at the block-level or neighborhood scale, since much of the Town's development has occurred in close proximity to key activity centers and transportation nodes; this has resulted in large portions of land, mainly along the outskirts, remaining largely rural and undeveloped.

As shown in Figures 1.3 and 1.4, the population in the Town of Wallkill is 27,426 (U.S. Census, 2010). The U.S. Census indicated an 11.2% increase between 2000 and 2010 in the Town's population, only slightly higher than the growth rate of Orange County for that same period.

The Town's most significant period of growth occurred between 1970 and 1980, after development of State Route 17 and Interstate 84, which put the Town within easy driving distance of New York City and New Jersey.

Population projections, along with historic population growth trends and a review of building permits issued over the past several years, indicate that the Town of Wallkill is likely to continue its pattern of steady growth at a pace slightly ahead of Orange County. Furthermore, the Town of Wallkill is among the most racially and ethnically diverse municipalities in Orange County.

This growth and diversity will have important implications for the expected future demand for affordable senior housing, as well as sufficient public transportation emergency services.

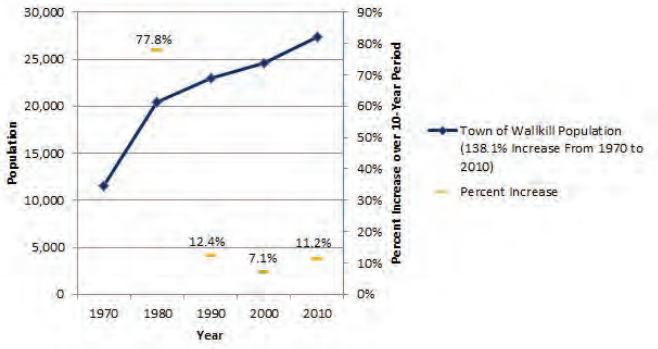
Education and Income

According to the U.S. Census 2008-2012 American Community Survey, 87.4% of Town residents have a minimum education of a high school diploma or equivalency, compared to an Orange County average of 86.9% and a State average of 84.9%. As shown in Table 1.1, 25.2% of Town residents have earned a Bachelor's degree or higher, which is lower than both the Orange County average of 28.7%, and the State average of 32.8%.

Meanwhile, the Town of Wallkill's unemployment rate for those 16 years of age and older was 10%, compared to 7.9% in Orange County, and 8.7% statewide. Arguably, there is a direct correlation between the level of education and an individual's ability to gain employment and earn higher wages.

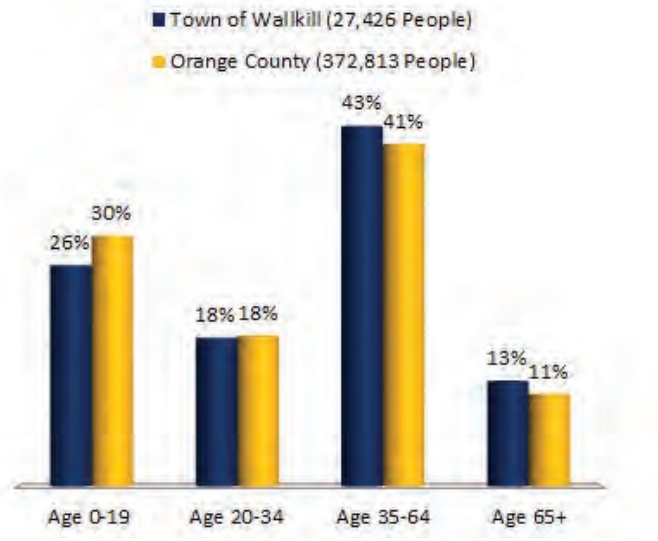
However, even while the Town's unemployment numbers were higher than the County and state averages, only 6.6% of Wallkill residents earned incomes below the poverty level, as opposed to 11.7% in the County and 14.9% in the State, as shown in Table 1.2 on following page. These statistics indicate that jobs in the Town of Wallkill are generally higher quality, living-wage jobs, although they may be inaccessible to residents with lower levels of education.

FIGURE 1.3 – POPULATION OF TOWN OF WALLKILL 1970 TO 2010



Source: U.S. Census Bureau, 2010 Decennial Census

FIGURE 1.4 – POPULATION DISTRIBUTION BY AGE TOWN OF WALLKILL AND ORANGE COUNTY, 2010



Source: U.S. Census Bureau, 2010 Decennial Census

According to the U.S. Census 2008-2012 American Community Survey, the median household income in the Town of Wallkill was approximately $68,505, compared to $70,712 for all of Orange County. Statewide, the median household income was $57,683. Of the Town's surrounding municipalities and all other Orange County municipalities, the Town of Wallkill ranked the fifth lowest in median income in 2012.

For many in Orange County, including median wage-earning Wallkill residents, senior citizens, younger adults and families, and people with more modest incomes, housing is increasingly unaffordable.

TABLE 1.1 – INCOMES AND EDUCATIONAL ATTAINMENTS NEW YORK STATE, ORANGE COUNTY, AND WALLKILL 2008 TO 2012

Geographic Area	Median Income		Income Over $150,000		Educational Attainment for Population Age 25 and Over		
	Family	Households	% of Families	% of Households	Total Population Age 25 and Over	School Grad or Equivalent	% Bachelor's Degree or Higher
New York State	$69,968	$57,683	16.2%	12.8%	13,101,982	27.3%	32.8%
Orange County	$85,640	$70,712	17.9%	14.3%	235,119	29.0%	28.7%
Town of Wallkill	$81,189	$68,505	14.2%	10.9%	18,538	31.3%	25.2%

Source: Education Data: U.S. Census Bureau, 2008-2012 American Community Survey, 5-year estimates, Table DP02
Income Data: U.S. Census Bureau, 2008-2012 American Community Survey, 5-year estimates, Table DP03

TABLE 1.2 – HOUSEHOLDS, FAMILIES, AND INCOME NEW YORK STATE, ORANGE COUNTY, AND WALLKILL 2010

Geographic Area	Owner-Occupied Homes	Total Households	Median Household Income	Percent of Total Population Below the Poverty Level (in last 12 months)
New York State	7,230,896	$57,683	11.4%	14.9%
Orange County	125,180	$70,712	8.0%	11.7%
Town of Wallkill	9,894	$68,505	4.1%	6.6%

Source: U.S. Census Bureau, 2008-2012 American Community Survey, 5-year estimates, Table DP03

Housing

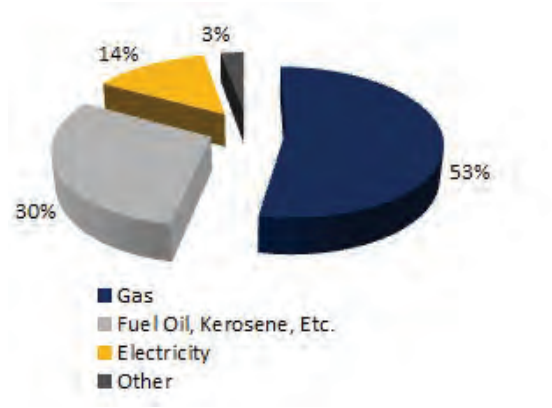
According to the U.S. Census 2008-2012 American Community Survey, there are roughly 10,000 housing units in the Town of Wallkill, 9,700 of which were occupied at the time of the survey. The vacancy rate is 6%, compared to 8.1% in Orange County and 9.7% in New York State.

Approximately two thirds of all housing units in the Town (67%) are single-unit structures, with the remainder as multi-unit structures (30%) and mobile homes (3%). A majority of the multi-unit structures are clustered within a few miles of the high commercial and retail activity centers, which are generally centered at the intersection of State Route 17 and Interstate 84. Residents in such areas are more likely to walk to local destinations for goods and services, and even to their places of employment.

Table 1.3 shows that the majority of housing units in the Town of Wallkill are also owner-occupied (65%), relatively new (29% of the housing units were built after 1990), and purchased on credit (76% of the owner-occupied units had a mortgage). The median home value in the Town is $297,000, which aligns closely with Orange County ($299,500) and State ($301,000) values.

As depicted in Figure 1.5, the majority of homes in the Town of Wallkill are heated by natural gas (53%) or by fuel oil, kerosene, etc. (29.9%). While residents using natural gas or fuel oil for heating are vulnerable to fuel shortages that may be caused by supply chain disruptions, such as road closures, the 14.2% using electric heat have a much higher risk of being without heat after a storm, due to power outages. This factored into discussions on building community resiliency against future storms, since the Town's experience with power loss in the wake of past storms acutely impacted Town residents. This power loss was due to electricity outages and fuel shortages from interrupted barge shipments up the Hudson River.

FIGURE 1.5 – HOME HEATING SOURCES TOWN OF WALLKILL



Source: American Community Survey, 2012

This view is looking south from Leewood Drive, with a large apartment complex fronting Tower Drive. Photo is courtesy of Tetra Tech, Inc.

TABLE 1.3 – HOMES AND HOME VALUES NEW YORK STATE, ORANGE COUNTY, AND TOWN OF WALLKILL 2010			
Geographic Area	**Owner-Occupied Homes**	**Renter-Occupied Homes**	**Median Value Homes**
New York State	53.3%	46.7%	$301,000
Orange County	68.9%	31.1%	$299,500
Town of Wallkill	65%	35%	$297,000

Source: U.S. Census Bureau, 2008-2012 American Community Survey, 5-year estimates
Note: Of the 9,700 occupied housing units in the Town of Wallkill, 6,400 are owner-occupied, and the remaining 3,400 are renter-occupied.

Of all Town households, 65% have moved into the Town since 2000. This large percentage of new residents has weakened community spirit and bonds, since many newer residents hold stronger ties to their previous "hometowns." While the youth and young adult populations are growing in the Town, only 39% of all Town of Wallkill households have one or more people under the age of 18 and 25% of all households have one or more people 65 years and over.

The median monthly housing costs for mortgaged owners was $2,010, non-mortgaged owners $783, and renters $1,131. Forty-three percent of owners with mortgages, 18% of owners without mortgages, and 47% of renters in the Town of Wallkill spent 30% or more of household income on housing. According to the U.S. Department of Housing and Urban Development (HUD), families who pay more than 30% of their income for housing are considered cost-burdened and may have difficulty affording necessities, such as food, clothing, transportation, and medical care.

Shown here are typical single-family residences found in the Scotchtown neighborhood of Wallkill. Photo is courtesy of Eric Thayer.

Infrastructure

Aging, failing, and insufficient road and electricity infrastructure were identified as critical issues by Wallkill residents, business leaders, and key community stakeholders during Public Engagement Events, surveys, and interviews conducted during the course of the planning process.

Transportation Infrastructure

The Town of Wallkill maintains 166.2 miles of Town-owned paved and gravel roads. These corridors provide primary access into and out of the residential neighborhoods in Town. Repeated flooding of these roads has created significant evacuation and safety issues in the past.

In addition to local municipal roads, a number of private, county, state, and interstate roads transverse the Town of Wallkill. Maintenance responsibilities for these roads belong to other agencies, jurisdictions, or abutting property owners.

These major thoroughfares largely enable the Town to operate a regional employment center, medical corridor, and retail destination, and to accommodate the traffic generated by such uses. However, traffic lights at critical intersections along these routes are frequently affected by severe storm-related power outages, which cripple these transportation systems and the ability of Town officials to operate emergency services.

Furthermore, population growth and the development of the "Miracle Mile" regional shopping destination have led to regular congestion on State Route 211 (the main arterial through Town), reducing efficient traffic flow patterns.

The Town is served by various modes of public transit, including a Metro-North commuter rail station on North Galleria Drive south of State Route 211, and a Park-and-Ride commuter lot in the Hamlet of Circleville. The Town is also home to Randall Airport that serves roughly 70,000 passengers per year; it is located southeast of the City of Middletown, between Interstate 84 and Schutt Road.

A reconstruction and reconfiguration of the State Route 17 Exit 122 Interchange and associated improvements on Town and county roadways, including East Main Street (County Route 67) and Crystal Run Road, would change the design and functionality of the Town's most heavily trafficked routes. This project addresses a number of pre-existing operational and safety problems, and positions new roads to enhance economic development within the Town's designated commercial areas (*Mid-Hudson Regional Economic Development Council Strategic Plan*, 2011).

Utility Infrastructure

Most of the well-established Town of Wallkill neighborhoods are served by basic municipal utility systems, including sewer and water. As described previously, the Town benefits from having its own primary source of drinking water from various local water resources, including rivers, streams, ponds, reservoirs, springs, and wells. The Town of Wallkill Consolidated Water District #1's water source is supplied entirely by groundwater, has roughly 4,300 connections, and services nearly 15,000 people.

While less prevalent than the Town's drinking water utility, the Town's municipal sewer systems serve the majority of residential areas. However, select residential parcels in the north part of Town and the majority of rural and agricultural parcels are not connected to the municipal system. Parcels not connected to the municipal system rely on individual septic systems. The Town's sewage plant, located along the Wallkill River, has a capacity of 4 million gallons per day; the existing system of pipes and connection lines have a capacity of 900,000 gallons.

The Town is served by these and other essential local services, including a local police department and fire department. The local facilities and service providers in the Town are summarized in Table 1.4.

TABLE 1.4 – SERVICE PROVIDERS

Service Category	Name
Water and Sewer Districts	Water District #1 Wallkill Heights Woodland Acres Lorelei Water District
Communication	Mediacom Communications Corp.
Energy Service	Orange and Rockland Utilities, Inc. (O&R - a wholly owned subsidiary of Consolidated Edison, Inc.)

Economic Drivers

The Town of Wallkill is defined by its retail shopping, as well as professional and medical corridors that attract people from around New York State to work, shop, and receive medical care.

In recent decades, the Town's positive economic growth has been fueled by two main factors—its growing population of working age residents and its location at the crossroads of major transportation routes.

Pictured above is a wayfinding sign introducing the Town of Wallkill's Medical Corridor, which is home to numerous healthcare-related facilities and offices. Photo is courtesy of Eric Thayer.

Transportation, in particular, has helped the Town develop into a regional, retail shopping destination and employment hub. In many cases, these are conveniently located between traditional residential areas and more intensive retail complexes, service centers, or transportation routes. Examples include areas along Interstate 84 and Crystal Run Road, where existing commercial structures serve a local, community, and regional market area.

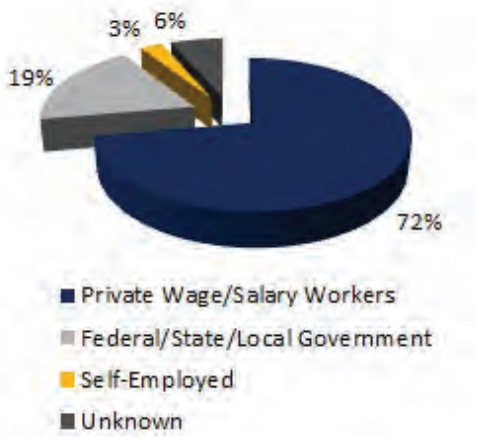
Robust and Diverse Workforce

The Town of Wallkill's vast open spaces, and scenic, cultural, and agricultural resources contribute to making the Town an attractive place to call home.

The *Town of Wallkill Comprehensive Plan*, 2005, illustrated a positive trend in employment figures, showing a decrease in unemployment since 1990, and an increase in the working age population between 1990 (17,216 persons 16 years or older) and 2000 (18,847 persons 16 years or older). The trend continued throughout the following decade, with a 15.3% increase in the working age population between 2000 (18,847) and 2010 (21,732).

As shown in Figure 1.6, from 2010 to 2012, 72% of the civilian workers in the Town of Wallkill were employed by private companies or corporations; 19% were federal, state, or local government workers; and 3% were self-employed.

FIGURE 1.6 – EMPLOYMENT SECTORS TOWN OF WALLKILL, 2010-2012



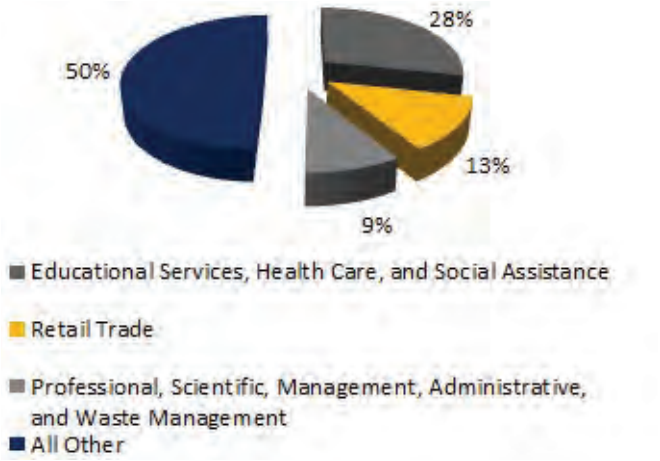
Source: American Community Survey, 2012

During that same period among all sectors, the majority of Wallkill residents worked in one of three industries: 28.8% in educational services, healthcare, and social assistance; 13.1% in retail trade; and 9.4% in professional, scientific, management, administrative, and waste management services.

The fourth largest industry share was the arts, entertainment, recreation, accommodation, and food services industries, reflecting the needs common to

a bustling employment center and retail destination. Employment by industry is depicted in Figure 1.7.

FIGURE 1.7 – EMPLOYMENT INDUSTRIES TOWN OF WALLKILL, 2010-2012



Source: American Community Survey 2012

Additionally, the Town's proximity to other population and economic activity centers and abundance of regional and interstate transportation options contribute to both a strong commuter base and ease in migration of workers into the various employment centers in Wallkill.

Regional Attractions

Arguably, the Town of Wallkill's proximity to interstate road access has been the major catalyst for economic growth. The large-scale retailers, service centers, and restaurants in the town center have clustered strategically near the intersections of these interstate arterials. Shoppers have benefited from convenient access to auto-oriented retailers on the Route 211 East and East Main Street commercial corridors.

The Town's primary regional shopping attraction is the Galleria at Crystal Run at the intersection of Interstate 84 and State Route 17. The Galleria is only one of the five shopping centers within two miles of this roadway interchange. The Crystal Run Mall, Wallkill Plaza, Orange Plaza Mall, and Dunnings Farms Shopping Center are all easily accessible to Interstate 84 and State Route 17, and to a Metro North Train Station located between two of the largest plazas.

The 383-bed Orange Regional Medical Center became the focal point of the corridor known as the "Medical Mile" on Crystal Run Road in the Town of Wallkill. Pictured here is the Medical Pavilion. Photo is courtesy of Eric Thayer.

Healthcare's Impact

Another vibrant aspect of the Town of Wallkill's economy is the emerging healthcare and medical services sectors that have brought a wide range of income-earning jobs to the Town. As shown in Figure 1.7, 28.8% of the Town's workers are employed in educational services, healthcare, and social assistance. In 2011, the Orange Regional Medical Center (ORMC) opened the first new, freestanding hospital built in New York State in the last 20 years, becoming the largest medical center between Westchester and Albany.

The presence of the new medical center will continue to support the Town's economy, by providing jobs and promoting a diverse range of development and business opportunities in the medical fields.

Furthermore, with the opening of the new OMRC in the Town, the former hospital site in the neighboring City of Middletown is being repurposed as a medical teaching facility. This will positively contribute to the development across both municipalities as a regional medical industry hub.

Current Challenges

This high-activity commercial clustering provides important economic benefits, as well as challenges for the Town. Large commercial attractions have altered shopping patterns away from historic and hamlet centers, thus challenging efforts to reinvigorate those traditional downtowns and weakening older suburban shopping centers. Additionally, the density of large-scale and high-use retail and commercial activity in the Town center introduces challenges regarding safe truck and out-of-town shopper safety, especially during heavy shopping holiday seasons.

These issues highlight the need to maintain economic diversity by continuing to invest in the traditional neighborhood centers, including the Town's two mixed-use Hamlets of Circleville and Scotchtown, as well as the need to focus on transportation solutions as part of resilience strategies for the Town of Wallkill.

Photo of historic sign and trees is courtesy of Eric Thayer.

While the Town of Wallkill has experienced steady economic growth, overall economic health should also be gauged by how effectively the Town's economy supports its workforce with good-paying jobs, so residents can afford the essentials of life, such as housing.

Nearly half of renters and more than one-third of homeowners in the Town pay such a large percentage of their income for housing that they are dubbed as "burdened." This means that the essential costs of life may be difficult to afford, and their ability to recover from disasters is likely to be more challenging and take longer than someone who is not cost-burdened.

The effects of decreasing affordability are felt throughout Orange County, where 44% of all households are "housing-cost stressed," according to a 2014 County Community Health Assessment report. This limits economic growth by dissuading the younger generation of workers and first-time homeowners to settle in the region.

Future Development Potential

A significant amount of future development potential remains within the Town, particularly in the industrial and research/office park areas, and numerous infill opportunities close to the center of Town. The Town's 2005 Comprehensive Plan identifies areas where development, infill, and redevelopment should be encouraged, focusing on the need to protect and enhance established commercial business areas in the center of Town (e.g., the Galleria Mall and at the Interstate 84 interchange). Additional economic growth areas exist along State Route 17 and in the northern section of town (State Route 17K). Development of these areas depends on future infrastructure investment that connects these corridors to municipal infrastructure.

The amount of redevelopment and infill opportunities in the Town's established commercial districts, combined with potential developable land in the northern section of the Town, highlights the importance of future investment in Town infrastructure, such as water and electricity. This would help to secure existing capacity and accommodate future growth.

Anticipated infill growth also highlights the need to focus on proactive approaches to stormwater management, both for the protection of groundwater resources, and to reduce the future flood risk that could develop with increased volumes of overland stormwater sheet flow.

Description of Storm Damage

Many sources provided historical information regarding previous occurrences and losses associated with severe storm and flooding events throughout the State of New York, Orange County, and the Town of Wallkill. Loss and impact information for these past events often vary. Therefore, monetary figures that follow are based only on the available information referenced for this document; information sources are cited, where applicable, and appear in the endnotes portion of this document (see Section 5: Additional Materials).

Hurricane Irene

Hurricane Irene tracked up the East Coast of the United States from August 21 - 27, 2011, and hit New York State on August 28, bringing heavy rains to the Catskill Mountains and through the Schoharie and Mohawk Valleys.

HURRICANE IRENE

August 25 to September 5, 2011
EM-3328 / DR-4020

Orange County, New York Designated eligible for Public Assistance and Individual Assistance

According to the National Climatic Data Center, in the weeks before Hurricane Irene, areas from New Jersey to Vermont (including much of eastern New York State) had soil moisture ranking in the 80th and 90th percentiles, as compared to long-term averages over the same period in previous years. These saturated ground conditions left those areas less capable of absorbing the impending heavy rainfall, setting the stage for quick runoff and uprooted trees from the winds and rain to come.

The heavy rains and strong winds associated with Hurricane Irene devastated parts of New York State, beginning on the evening of August 28, 2011. During the height of the storm, over 40,000 people were without power; for some, the blackout lasted an entire week. On August 31, 2011, President Obama issued a major disaster declaration (DR-4020) for New York State and the counties impacted by Irene, including Orange County, where Wallkill is situated.

In Orange County, between 4 and 11.5 inches of rain fell during Hurricane Irene, causing catastrophic flooding in the areas along the Wallkill River. Orange County was one of the seven hardest hit in New York State, and received $29.1 million in direct aid programs.

In the Town of Wallkill, torrential rains and high winds from Irene caused widespread flooding and power outages. Several of the Town's water and sewer pump stations sustained damage.

The Town of Wallkill's Braeside Water Treatment Plant was inundated with over three feet of water, which damaged pumps, motors, controllers, and transformers. Two large fiberglass chemical tanks were submerged for the first 13 of their total 18 foot height. This caused an increased amount of hydrostatic pressure, which caused both tanks to crack. The interior walls of the office in the Braeside Water Treatment Plant, as well as the entire interior of the generator building, were lined with plywood wallboard, which were soaked and swelled by floodwaters. Town officials were concerned about the growth of mold in these areas, as mold would create a health hazard to the employees and add to disaster-related costs. The Town removed the plywood to mitigate the spread of mold.

Pictured here is a flooded portion of East Main Street in the Town of Wallkill during Hurricane Irene. Photo is courtesy of The Town of Wallkill.

The Kosuga Water Treatment Plant's control and generator buildings were flooded with over three feet of water, destroying a transformer. Many of the pump stations lost power, forcing the Town to hire a contractor for numerous pump stations to provide and operate temporary power, including Belmont Avenue Pump Station, Northern Woods Sewer Pump Station, and Woodland Acres Water Pump Station. Without power, the pumps at these stations would no longer operate, threatening an overflow of sewage material into the surrounding residential areas.

Road Damage

Numerous roads in the Town sustained damage as well, including washouts and flooding. The storm damaged the embankment to the creek at Ben Lomond Road, as the Winding Brook toppled the banks of its drainage channels and overwhelmed culverts through the Scotchtown neighborhood. There was a broken pipe near Fitzgerald Drive and Neely Street. Van Burenville Road, near the Town line flooded, due to the Little Shawangunk Kill. Howell's Road flooded from the Masonic Creek, northwest of Middletown.

The inlet off Bert Crawford Road at Silver Lake washed out, causing the roadway to flood. Brook Road and Tamms Road were closed for days, due to flooding. Several culverts along King Road were washed out. The Dwaarkill River wore away the shoulder and guiderail along Hufcut Road, and washed out an inlet and outlet along Lybolt Road. Water flowing down from the hillside washed out the shoulder of Tice Lane. Many of these damages led to road closures throughout the Town, as seen in Figure 1.8.

Along with road washouts and flooding, numerous fallen trees caused damages to homes, power lines, and roadways. A couple of roadways in the Town (Lock Lomond and Patricia at Dominic) experienced sinkholes. According to the Federal Emergency Management Agency (FEMA) and the National Weather Service (NWS), the Town of Wallkill suffered over $220,000 in damages in total.

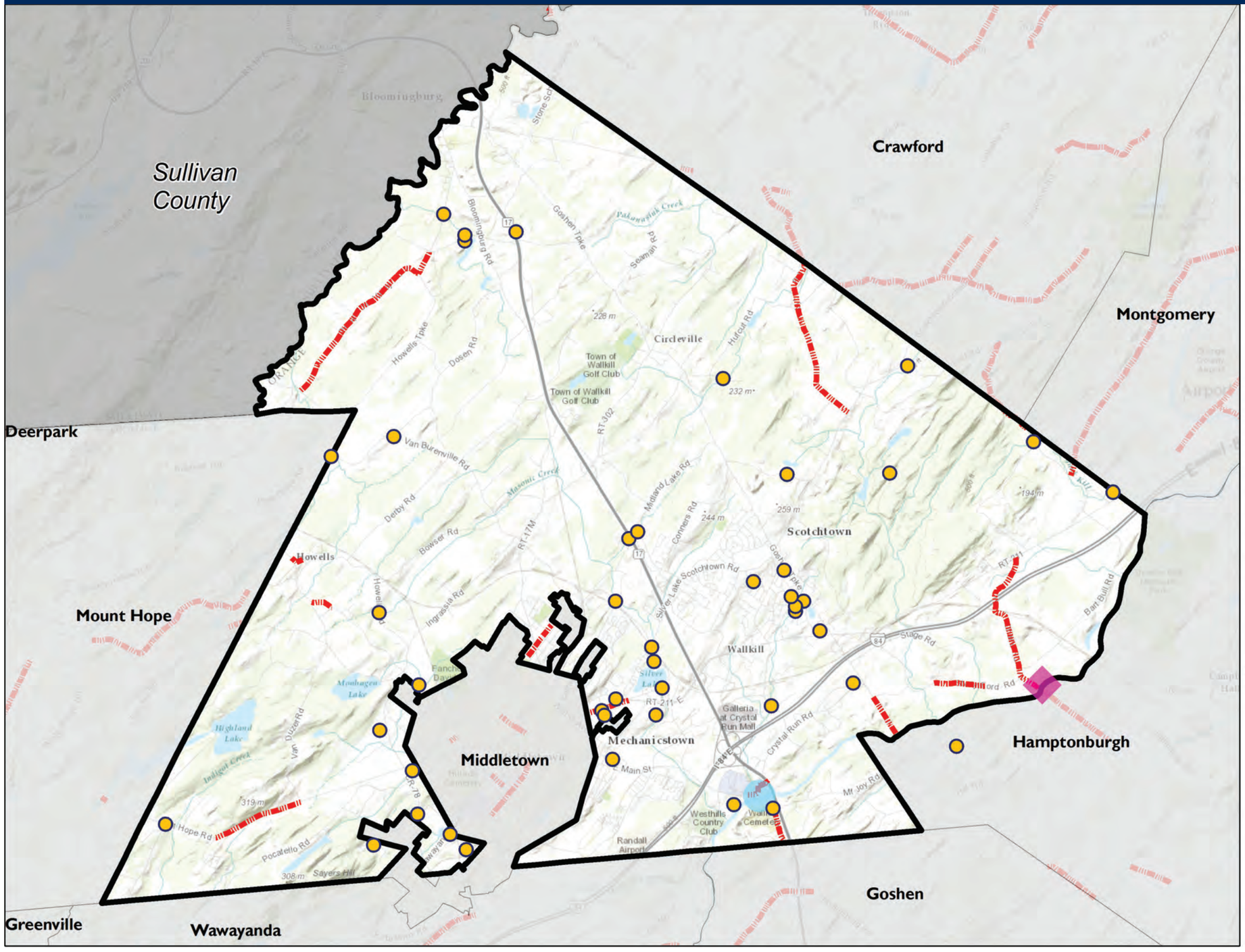
Pictured here is a sinkhole and roadway collapse on Crotty Road in the Town of Wallkill because of Hurricane Irene. This is indicative of the types of roadway damages incurred from Hurricane Irene. Photo is courtesy of the Town of Wallkill.

Town officials provided the Committee with a record of post-Irene property surveys, which chronicled structural damages incurred from the storm. The assessments were completed within the weeks following the storm, and as such, the flooding that followed Tropical Storm Lee (less than two weeks after Hurricane Irene) may have worsened some of the damages that were reported.

During Hurricane Irene, 11 of the 86 National Flood Insurance Program (NFIP) policyholders in the Town of Wallkill filed claims for over $197,000 in damages due to the storm.

NYRCR: Town of Wallkill, Orange County

FIGURE 1.8 – DAMAGES MAP

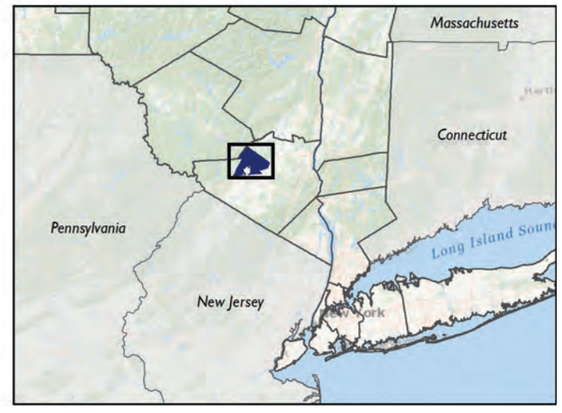


Legend

- Town of Wallkill Planning Area
- Municipal Boundary
- Irene Road Closures
- Flood and Damage Problem Areas
- Repetitive Loss
- Severe Repetitive Loss

Data Sources:
NYS - Railroads, Water bodies, Boundaries
ESRI - Topo
FEMA - NFIP
OCGIS - Road Closure

1 0.5 0 1 Miles



Tropical Storm Lee

REMNANTS OF TROPICAL STORM LEE

September 7 to 10, 2011
EM-3341 / DR-4031

Orange County, New York
Designated eligible for Public Assistance and Individual Assistance

Less than two weeks after Hurricane Irene unleashed fury on the Town of Wallkill, Tropical Storm Lee brought nearly one foot of rain and subsequent flooding across parts of central and southeastern New York State. An already struggling Town of Wallkill was again struck by high winds, heavy rains, and rushing floodwaters that carried dangerous debris. Rainfall totals beginning on September 7, 2011, reportedly ranged from 4.6 to 8.3 inches in Orange County, with accumulations of over 6 inches within 48 hours. On September 8, 2011, FEMA declared a second major disaster declaration (DR-4031) in as many weeks, again providing public assistance and individual assistance for recovery operations to communities in Orange County.

The heavy rain from Tropical Storm Lee caused massive, record-breaking flooding on small streams, creeks, and along the Wallkill River and its tributaries. While the Wallkill River Basin, in the central portion of Orange County, received its most significant flooding from of Hurricane Irene, Tropical Storm Lee intensified this flooding. The Wallkill River at Gardiner (Ulster County) was already above its flood stage when Tropical Storm Lee impacted the area. With the rains from Tropical Storm Lee, the Wallkill River rose nearly 5 feet above its flood stage of 13 feet. According to the U.S. Geological Survey, the Wallkill River crested at 17.7 feet on September 8, with a discharge of 27,500 cubic feet per second.

The high waters of the Wallkill River washed away many onion and squash crops in Orange County Over $318,000 in damages were reported in the Town of Wallkill following Tropical Storm Lee. In the Town of Wallkill, the West Side Plaza on Route 211 East was under four feet of water; forcing businesses that were still cleaning up from Hurricane Irene to begin all over again. Town officials declared a state of emergency in response to the storm.

This image of roadway damage on Gordon Road in the Town of Wallkill shows a typical scene in the aftermath of Tropical Storm Irene. Photo is courtesy of the Town of Wallkill.

Pictured here is a flooded portion of Leewood Drive in the Town of Wallkill during Tropical Storm Lee. Residents reported flooding in their basements. Photo is courtesy of the Town of Wallkill.

The torrential rains, quick-moving water, and flooding damaged or destroyed numerous roadways and culverts throughout the Town, forcing road closures once again in Scotchtown near Winding Brook and in numerous other locations. Some of the road closures included East Main Street in front of the hospital, and Mud Mills Road, which was inundated with nearly five feet of water. Flooding and road closures forced Wallkill Central School District to close. Numerous homeowners reported flooding in their basements and washed out driveways.

During Tropical Storm Lee, two of 86 NFIP policy holders in the Town of Wallkill filed claims for damages due to the storm. Both properties were located on East Main Street. The claimed losses totaled over $6,500 for both properties.

Superstorm Sandy

Superstorm Sandy made landfall on October 29, 2012, impacting the southeastern region of New York State with storm surge, high waves, and wind.

SUPERSTORM SANDY

October 27 to November 9, 2012 / DR-4085

Orange County, New York Designated eligible for Public Assistance and Individual Assistance

In New York State, Superstorm Sandy caused major impacts to the population, property, infrastructure, and environment. Millions of residents were impacted by flooded streets, water systems, and subways. Over two million homes lost power, thousands of housing units were damaged, and hundreds of homes were destroyed.

The amount of damage caused by Superstorm Sandy was of a level never before experienced in New York State, causing a temporary change in focus from day-to-day operations to response and recovery. On October 30, 2012, President Barak Obama issued a major disaster declaration (DR-4085) for New York State and the counties impacted by Superstorm Sandy, including Orange County, where the Town of Wallkill is situated.

According to the National Weather Service, peak wind gusts in Orange County ranged from 58 mph in Montgomery to 61 mph at Orange Lake. In the Town of Wallkill, wind speeds ranged from 7 to 43 mph, with wind gusts ranging from 24 to 61 mph. Primary damages in the Town included downed trees and power lines. During Superstorm Sandy, the Town of Wallkill Highway Department monitored all roads in the Town to ensure the safety of travelers, place safety cones and barricades at locations that were deemed unsafe and/or to close roads, where necessary. After Superstorm Sandy, the Department of Public Works removed tree debris from roadways and Town-owned properties. The wood debris was chipped in place and hauled to the Town's facility on Route 17M in Middletown. After the cleanup was completed, wood debris was moved to a biomass plant to be used for fuel and mulch. Based on FEMA project worksheets received, the Town had over $120,000 in costs incurred because of Superstorm Sandy.

Damages caused by the declared disasters remain throughout the Town. Pictured here is a section of filled culvert and roadway failure at Ben Lomond Drive. Photo is courtesy of Eric Thayer.

View of roadway flood waters on East Galleria Drive at Ballard Road after Superstorm Sandy. Photo is courtesy of the Town of Wallkill.

In the aftermath of Superstorm Sandy, the loss of electrical power to many traffic signals in the Town of Wallkill caused gridlock conditions, which reportedly hampered or prevented emergency vehicle movement within the Town.

The NFIP offers flood insurance to homeowners, renters, and business owners if their community participates in the Program. The Town of Wallkill does participate in NFIP and as of May 31, 2013, there were 86 policies in force in the Town. During Superstorm Sandy, two of the policyholders filed claims for damages due to the storm. The properties were located on Alberta Avenue and Karen Drive. The claimed losses totaled over $84,000 for the two properties.

Other Recent Hazard Event History

Table 1.5 summarizes information regarding recent hazard events that have occurred in or around the Town of Wallkill.

TABLE 1.5 – RECENT HAZARD EVENTS AFFECTING THE TOWN OF WALLKILL

Dates of Event	Event Type	FEMA Declaration Number	County-Designated Disaster	Local Damages and Losses
April 2 - 4, 2005	Severe Storms and Flooding	DR-1589 (IA and PA)	Yes	Two properties in the Town filed NFIP claims (Stony Ford Road and East Main Street) and had losses that totaled over $27,000. Both properties were damaged on April 2, 2005.
June and August 2006	Severe Storms and Flooding	DR-1650	Yes	One property in the Town filed a NFIP claim (Greenway Terrace) and had a loss of over $2,000 (date of loss was June 28, 2006).
October 28, 2006	Flash Flood	Not declared	N/A	Heavy rain produced flash flooding in Howells. The fire department responded to numerous flooded basements on Winterton Road, Ingrassia Road, and adjoining streets.
February 13 - 14, 2007 (Valentine's Day Storm)	Severe Winter Storm	Not declared	N/A	A mixture of heavy snow, sleet, and freezing rain fell across Orange County with totals ranging from six to eight inches.
April 15, 2007	Flood	Not declared	N/A	The Wallkill River crested at 14.9 feet (1.8 feet above flood stage). Rainfall totals ranged from 4.3 to 8 inches in Orange County. Four properties filed NFIP losses (East Main Street, North Western Avenue, Stony Ford Road, and Monica Court). Combined, the properties had over $29,000 in losses.
July 23, 2008	Severe Storms and Flooding	Not declared	N/A	Torrential rainfall and flash flooding; road closures throughout Orange County.
June 26, 2009	Lightning	Not declared	N/A	Supercell thunderstorms formed and tracked across the Lower Hudson Valley. These storms produced hail and flash flooding. Lightning struck a shed in the Hamlet of Circleville, causing a fire and approximately $5,000 in property damage. In Washington Heights, lightning struck a barn on Maples Road, causing a fire and approximately $30,000 in property damage.

TABLE 1.5 – RECENT HAZARD EVENTS AFFECTING THE TOWN OF WALLKILL (CONT'D)

Dates of Event	Event Type	FEMA Declaration Number	County-Designated Disaster	Local Damages and Losses
July 17, 2009	Thunderstorm Winds	Not declared	N/A	Gusty winds caused a roof to collapse at a construction site on Route 211 in the Hamlet of Michigan Corners.
February 2010	Severe Winter Storm	Not declared	N/A	Six to twelve inches of snow fell across the Lower Hudson Valley.
July 29, 2011	Thunderstorm Wind	Not Declared	N/A	There was a reported $2,000 in property damages in Scotchtown, due to high winds.
August 25 - September 5, 2011	Hurricane Irene	EM-3328 / DR-4020 (PA and IA)	Yes	See description above.
September 7 - 10, 2011	Remnants of Tropical Storm Lee	EM-3341 / DR-4031 (PA and IA)	Yes	See description above.
August 9, 2013	Heavy Rains	Not Declared	N/A	Three properties located on Patricia Road, Hulse Avenue, and Woodside Knolls Drive filed NFIP claims. Together, the properties had $16,000 in losses.
October 27 - November 9, 2012	Superstorm Sandy	DR-4085	Yes	See description above.

Sources: Orange County, 2013; NWS, 2011; USGS, 2011; Weather Underground, 2014; NCDC, 2013
N/A Not applicable
NCDC National Climactic Data Center
NOAA National Oceanic and Atmospheric Administration

Critical Issues

Several critical issues surfaced during the Town of Wallkill NYRCR Plan development, including:

- A lack of a "sense of place" among the Town's residents;
- Repetitive failures and inadequacy of critical infrastructure, including transportation and electricity systems; and
- Future risk of flooding experienced at community assets and homes.

Lacking a Sense of Place

The Town's recent growth into a regional shopping destination, employment hub, and as a commuters' bedroom community, has shaken the historic sense of place, especially among long-time Town residents. Municipal boundaries and postal ZIP codes in the Town are not coordinated, which confuses visitors and residents alike. Automated mapping systems often inaccurately associate addresses that fall within Town boundaries with a City of Middletown address.

"Lots of people who live in the Town of Wallkill don't even know that they live in the Town of Wallkill." Spoken by a Town resident

The lack of a distinct Town center, or even clear boundaries between various historical neighborhoods, hinders a sense of community. Because many residents have relocated to the Town from across the Lower Hudson Valley and New York City region, they often have stronger ties to their original towns than to the Town of Wallkill.

Critical Infrastructure

The Town's rapid population growth also strains housing resources and public systems by significantly increasing the number of transient visitors who rely on public services, as compared to full-time residents. While the Town of Wallkill is home to nearly 30,000 residents, the main commercial corridor may see as many as 250,000 visitors on the busiest shopping days of the year. Though infrequent, this dramatic increase in intensity of use puts specific requirements on the Town's critical infrastructure, and poses unique problems for local emergency responders. There are a growing number of Town residents who "out-migrate" to work, in many cases, commuting to New York City jobs that offer greater opportunities.

Power loss to traffic signals often causes gridlock conditions and traffic accidents, and complicates access for emergency responders. Photo of an intersection and traffic lights is courtesy of Eric Thayer.

The Town of Wallkill NYRCR Committee was mindful of striking the delicate balance between respecting and preserving the Town's agricultural roots and open spaces with the need for floodplain management and economic development. Photo of farm equipment and trees is courtesy of Tetra Tech, Inc.

Widespread loss of power related to major disaster events is a primary concern for the Town of Wallkill, in addition to issues directly caused by the flooding itself. A number of subsequent or secondary issues stem from power loss, including traffic and transportation management, and difficulty ensuring essential emergency services. These concerns amplify the severity of the initial storm impacts to the power grid. These issues surfaced during existing document reviews, technical analyses, public input, interagency coordination, and Committee guidance and discussion.

Significant amounts of development have occurred along the Town's major arterials, outpacing the necessary upgrades needed for the transportation infrastructure to handle the new demand. The resulting imbalance compromises the ability of the transportation system to effectively and efficiently move traffic during heavy use periods, such as during Black Friday and the holiday season. This type of congestion, which is common along State Routes 211 and 17, becomes a major public safety problem when a severe weather event compounds these issues by leading to power outages that shut down traffic signals throughout the Town.

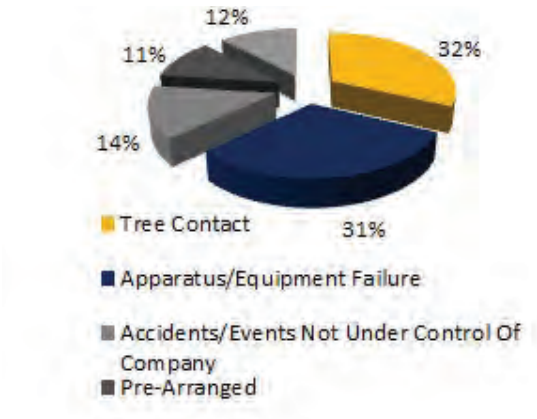
Power loss to traffic signals often causes gridlock conditions and traffic accidents, and complicates access for emergency responders. This scenario has occurred numerous times in the Town of Wallkill, including in the aftermath of Superstorm Sandy. This critically strained the ability of public officials and emergency responders to ensure essential services, sufficient access, and rapid mobility during severe storm and flood events.

The Town of Wallkill has taken measures to address the power outage problems, including amending building codes to require all new development to bury power lines to reduce the risk of downed trees causing future outages. Municipal officials have noted a degree of futility in the stepwise process of ensuring electric service by implementing these changes by code over the course of many years. Even if all power lines within the town limits were buried, they would still connect to above ground transmission lines that remain vulnerable, thereby threatening the Town's energy security. Figure 1.9 illustrates the primary causes of power outages for Orange & Rockland Utilities, Inc., which provides electric power to the Town of Wallkill.

Major power failures also have an economic impact in terms of lost work hours, loss of perishable food items, overtime pay for emergency personnel and utility response teams, and more. These losses have reportedly been in the hundreds of thousands of dollars.

Orange & Rockland Utilities, Inc., a subsidiary of Consolidated Edison, Inc., is the electric utility provider

FIGURE 1.9 – CAUSES OF POWER FAILURE FOR ORANGE & ROCKLAND UTILITIES, INC., 2012



Source: Public Service Commission, 2012 Electric Reliability Performance Report

for the Town of Wallkill. This power provider has improved its vegetation management plan since the August 2003 blackout on the Eastern Seaboard, which affected nearly 50 million customers, including those in the Town of Wallkill. However, electric utility providers serving large land areas and customer bases face challenges in their ability to respond quickly to local outage calls from major storm events. The economic impact attributed to such scenarios can be significant, even on an hourly basis, as local public works crews wait for the lines to be declared "dead" before they can proceed with clean-up or reopening of roadways.

In addition to power failure and the loss of traffic signals, the loss of other transportation routes due to flooding creates significant problems for the Town. In one instance, the roadways leading to the Town of Wallkill Braeside Water Treatment Plant have a history of flooding and forced closures during flood events. As 50% of the Town's water resources come from the Braeside Water Treatment Plant, the roads accessing the plant are critical and must remain open for crews to repair water services during an emergency.

Future Risk for Flooding of Community Assets and Homes

The single-most significant issue identified for the Town of Wallkill in the *Town of Wallkill and City of Middletown Hazard Mitigation Plan* (2014) was damages and impacts caused by flooding.

The Town's abundant water resources, which have historically fueled agricultural activities and currently provide a sustainable resource of clean drinking water for Wallkill residents, also place the Town's built environment at a continuous risk of flood damage.

Past agricultural and development projects, including stream straightening, residential growth in and around the floodplain, and increased impervious surfaces intensify surface water runoff and have magnified flood risk and the effects of erosion in the Town's many waterways.

Repetitive Flooding from Lack of Stream and Debris Management on Private Property

Over time, deposits of gravel, illegal residential dumping of yard debris, and streambank erosion have led to increased flood risk and damage to properties throughout the Town. Specifically reported damages and repetitive damages from past floods have occurred at the Winding Brook in Scotchtown, the ShopRite Plaza and Middletown High School along State Route 211, and numerous other locations in Town.

Winding Brook in Scotchtown

True to its name, the Winding Brook curves and meanders through Scotchtown, and is known to rise above its banks during periods of heavy water flow. Field inspections show that many residents in this area continue to pile vegetative debris and other waste along the banks of the waterway, which often defines the rear property boundary. Field crews examining the brook found trash and yard waste, including discarded Christmas trees and brush. The initial flood risk is compounded when floodwaters interact with large amounts of residential debris, which are carried downstream and impede flow capacity.

Yard waste (lawn cuttings on the far shoulder of the culvert), storm debris, and sandbags (foreground) presumably used to mitigate past flooding, regularly clog small tributaries that run behind residential properties. This clogs culverts and creates new flood problems. Photo is courtesy of Tetra Tech, Inc.

State Route 211 near Middletown High School and ShopRite Plaza

The drainageway, which runs between the Middletown High School and the ShopRite Plaza in the Town of Wallkill, is not located in the FEMA-regulated floodplain, but it has experienced significant flooding in recent history. Surface water runoff from the High School athletic fields on the City side, and large areas of impervious surface used as overflow parking for commercial activities on the Town of Wallkill side, collectively drain to a shared drainageway.

This drainageway is hardened and routed through a single six-foot diameter pipe that runs underground, beneath the commercial plaza. Excess debris accumulation in this drainageway, coupled with debris

Already saturated water tables from Hurricane Irene, coupled with additional rainfall from Tropical Storm Lee, led to the flooding shown here. Insufficient stormwater capacity in the drainageway between the Middletown High School (property located behind the trees in the far ground) and the ShopRite Plaza (including buildings in the foreground) directly contributed to the flooding. Photo is courtesy of the Town of Wallkill.

caught in high-velocity sheet flow from stormwater, has caused this pipe inlet to clog repeatedly during heavy rain events. As the pipe becomes unable to convey the stormwater surge, backed-up water volumes overflow the banks and flood the surrounding properties.

Past efforts to ensure regular property owner maintenance and debris removal from this drainageway have been partially successful, as recent field inspections of the channel found debris collected from the floodway in piles further up the streambank. Unfortunately, efforts to remove the debris from the channel should involve complete removal from the flood fringe. Otherwise, the piles of cleared debris will remain flood hazards for future high water events.

Debris Accumulation in Highland Lakes State Park

Flooding is also reportedly problematic along the various creeks and tributary streams that run through Highland Lakes State Park in the eastern part of Town. Public input suggested that uncontrolled development of beaver dams seem to be clogging the waterways that run through this park causing back-stream flooding that affects neighboring property owners.

The 3,115-acre Highland Lakes State Park is the largest undeveloped park owned by the Palisades Interstate Park Commission. It is a popular outdoor recreation destination for activities such as fishing, hiking, and horseback riding. Because these natural lands also mitigate flooding downstream along unnamed tributaries and the Wallkill River, the flood storage capacity of Highland Lakes State Park is a critical asset for the Town of Wallkill.

Ultimately, the future risk of flooding in the Town of Wallkill is due in part to the lack of visibility, coordination, and management of local stream maintenance.

Coupled with regulatory requirements on in-stream work, this situation has complicated the implementation of any stream-based flood mitigation projects, such as debris removal, or other projects to address repetitive flood damage. Strategies for Town resiliency must strike a balance between the health of the natural environment, including riverine ecosystems, and flood protection for homes, businesses, and assets.

Aging Flood Control Infrastructure

A number of dams, culverts, and spillways in the Town have been highlighted as undermined, lacking sufficient maintenance, or in need of replacement by the Committee, in the *Town of Wallkill and City of Middletown Hazard Mitigation Plan* (2014), and through previously submitted FEMA project worksheets.

Pictured here is Prosperous Valley Lake. Photo is courtesy of Eric Thayer.

Prosperous Valley Lake Spillway

Flooding has been observed along Prosperous Valley Lake, particularly along the north bank, where the Lake is bounded by Prosperous Valley Road. An uncontrolled overflow spillway, releasing water from the Lake to flow under Prosperous Valley Road, regulates the Lake's outflow. The headwall of this small spillway is heavily encased in algae and appears to be rotting, and is likely in need of repair or replacement.

Overflow flooding from this area causes washout of the steep wooded area downstream. Downed trees and vegetative debris clog the channel, inhibit flow, and cause flooding of residences along York Road. These conditions have caused roadway washout and temporary closure of this section of York Road.

In addition to the aging condition of the spillway at Prosperous Valley Lake, the overflow spillway system has been uncontrolled and underutilized as a tool to mitigate flood damages before and during major rainfall events. A new or upgraded spillway system at this site could allow for an advanced release of water prior to a significant rain event, thereby minimizing the risk of future flood damage at properties and infrastructure downstream.

Impoundment Downstream from Webb Road

Significant water flow events and past flooding have undermined the spillway and retaining wall near the impoundment behind the Playtogs Plaza and Webb Road. Located close to the southern Town line and the Town boundary with the City of Middletown near Campbell Plaza, these structural repairs are prioritized in the *Town of Wallkill and City of Middletown Hazard Mitigation Plan* (2014).

Scotchtown

A private retaining wall on the Winding Brook in Scotchtown is undermined, due to bank erosion. A number of culverts along the Winding Brook in Scotchtown are undersized and have become overtopped during several past storms. A roadway washout over an insufficient culvert at Ben Lomond Drive resulted in a broken water main pipe, which was capped at both ends during emergency repairs and remains in that condition today. This and other culverts in the neighborhood, including one under Loch Lomond Lane, are still vulnerable and reportedly under structural strain. This stormwater conveyance system is in need of repair or replacement, both to minimize future damage to local residential properties, but also to safeguard critical water and sewer infrastructure from future damage.

Code and Maintenance Enforcement on Private Property

The NYRCR Program offers an opportunity for the Town to review and improve existing codes and ordinances, and to ensure that local guidelines support and promote best practices in reconstruction relative to emergency preparedness at assisted living facilities, stormwater management, and future land development. Such recommendations will be based on up-to-date risk information, best practices in building standards and flood mitigation techniques, as well as the long-term goals and visions of supporting the well-being and livelihoods of future generations in the Town.

This image depicts one of the many private waterways in the Town of Wallkill. Photo is courtesy of Tetra Tech, Inc.

Participation in Reverse 911 Emergency Alert System

The Town of Wallkill operates a "Reverse 911" emergency alert system to notify residents in areas of danger via email, pager, or text message. While the system is effective in broadly disseminating a message about dangerous situations, it relies on voluntary participation by residents, and requires residents to sign-up in order to receive these notifications. To increase the effectiveness of this system, more residents need to join the system, and more outreach will need to occur to inform and educate residents about its availability and purpose.

Housing Affordability

Increasing school taxes that have disproportionately impacted residential, rather than commercial property owners in Town, have led to significant cost burdens for many residents. Photo of houses is courtesy of Eric Thayer.

As local job opportunities increase in the Town, the ability to work near home is becoming a greater reality for more residents. However, the availability of affordable workforce housing is lacking in the Town, as it is throughout Orange County. Housing affordability is an issue in many areas of the State, and evident in the Town of Wallkill through a general lack of housing to accommodate the full range of ages and incomes. This makes it very difficult to accommodate the growing population of seniors, as well as to attract a young and diverse workforce to fuel the local economy.

The school district tax structure has been a long-standing source of financial concern for Town residents, and may serve as a deterrent for working-class homebuyers. This issue, combined with increasing costs of flood insurance, contributes to a housing affordability issue throughout the Town.

Community Vision

Through collaborative discussions, stakeholder engagement, review of existing plans and studies, and a focus towards holistic recovery in the Plan Area, the Committee adopted the following vision to guide the recovery and resiliency effort for the Town of Wallkill:

For the preservation of our future, the Town of Wallkill stands united to build a more resilient community of tomorrow. The Town of Wallkill aspires to strengthen our infrastructure, not only to manage future storms, but also to ensure the future growth, development, and sustainability of our community.

Together with our neighbors of all ages and abilities, both within the Town of Wallkill and in the surrounding areas, we can establish a safer, more economically viable community and protect the spirit of the Town for generations to come.

This vision statement was developed to reflect community values, issues, needs, and opportunities, and serves as the foundation for identifying projects and implementation strategies in the Town of Wallkill NYRCR Plan.

Relationship to Regional Plans

The Committee recognizes the importance of identifying issues and challenges that transcend municipal boundaries and working collaboratively with neighboring communities to gain greater regional resiliency and prosperity.

Opportunities for Regional Collaboration

- Leverage existing regional plans and studies;
- Encourage stakeholder input from neighboring communities;
- Identify projects with regional benefits;
- Explore opportunities to leverage multiple funding sources;
- Protect assets with regional significance; and
- Foster interagency cooperation to address potential hurdles to project implementation.

Stakeholder Input

The Committee encouraged input from neighboring communities as often as possible during the development of the Town of Wallkill NYRCR Plan. Challenges of an individual community are rarely confined to its own boundaries; therefore, the Committee capitalized on numerous opportunities to discuss past experiences, current issues, and potential solutions with neighboring communities.

Interagency cooperation and collaboration are keys to the success of any planning effort that affects a community and region. Photo of Wallkill's Government Center and sign is courtesy of Tetra Tech, Inc.

Ongoing communications with the City of Middletown NYRCR Committee and planning team throughout the development of this Town of Wallkill NYRCR Plan proved successful in promoting actions and project recommendations with inter-municipal benefits, including solutions for flood mitigation through enhanced watershed management.

Projects with Regional Significance

The Committee made a focused effort to collaboratively advance projects in the Town of Wallkill and neighboring municipalities to affect positive change and cost efficiencies. Infrastructure projects that would benefit the Town and the region were considered, as well as emergency services, social services, waterway projects, and other ventures that naturally transcend municipal boundary lines.

In addition, the Committee recognized that it is common for one community to contain critical economic, cultural, or social assets that have significance for neighboring communities and the region at large. To that end, the Committee ensured that projects aiming to protect these assets or enhance their positive impact were identified and considered for implementation.

Interagency Cooperation

As the Committee identified and developed its list of projects, it conducted outreach to regional organizations, including the Orange County Planning Department, watershed councils, and regional economic development agencies. Collaborative project opportunities and any required regulatory approval processes were discussed.

Critically important to this process was the assessment of available resources that regional entities provided to the Committee to aid in the planning process. These included current datasets, feasibility assessments, and financial and regulatory resources to support project implementation. This collective process advanced with the State Agency Review Team (SART). The SART is comprised of representatives from dozens of State of New York agencies and authorities that provide feedback on projects proposed by NYRCR Communities. The SART team reviewed projects with an eye toward regulatory and permitting needs, policy objectives, and preexisting agency funding sources, helping to streamline permitting processes and move proposed projects through implementation.

The community participated in a "voting" exercise that helped the Town of Wallkill NYRCR Committee identify areas of greatest need and opportunity for recovery and resiliency. Photo of citizens voting is courtesy of Tetra Tech, Inc.

TABLE 1.6 – EXISTING PLANS AND STUDIES REVIEWED

Resource	Relevance	Key Components for Town of Wallkill NYRCR Plan
Town of Wallkill Comprehensive Plan, 2005	• Establishes a vision for the long-term maintenance, growth, and development of the Town • Provides overarching goals and recommended implementation actions for all areas of the community, including (but not limited to) infrastructure, community facilities, housing, economic development, and natural/cultural resources	• Community vision • Detailed community, demographic, economic data • Goals and recommendations for all areas of community and economic development
Town of Wallkill and City of Middletown Hazard Mitigation Plan, 2014	• Provides local strategies for mitigating all potential hazards to the City of Middletown and the Town of Wallkill • Provides detailed information on past and current flood issues, existing flood initiatives, and recommendations for additional mitigation actions to address future disaster events	• Detailed past flood information • Hazard vulnerabilities and flood-related issues • Assessed values and potential losses • Past and ongoing mitigation projects • Proposed mitigation initiatives
Regional Economic Development Council of the Southern Tier Strategic Economic Development Plan, 2011-2016	• A regional economic development strategy and vision for the Southern Tier Region of New York • Illustrates the economic climate, trends in job creation, and business growth for the Region, as well as strategies for leveraging assets, revitalizing traditional urban centers, and attracting desirable growth	• Key economic drivers • Regional economic advantages and challenges • Recommendations for economic development initiatives • Priority regional projects
Orange County Comprehensive Plan, 2010	• Establishes a vision for the long-term maintenance, growth, and development of the County • Provides overarching goals and recommended implementation actions for all areas of the County, including (but not limited to): infrastructure, community facilities, housing, economic development, and natural and cultural resources, among others	• County vision • Detailed community, demographic, economic data • Goals, and recommendations for all areas of community and economic development
Mid-Hudson Regional Economic Development Council Strategic Plan, 2011	• A regional economic development strategy and vision for the Mid-Hudson Region of New York • Illustrates the economic climate, trends in job creation and business growth for the Region, as well as strategies for leveraging assets, revitalizing traditional urban centers, and attracting desirable growth	• Key economic drivers • Regional economic advantages and challenges • Recommendations for economic development initiatives • Priority regional projects
A Three County Regional Housing Assessment: Ulster, Orange, and Delaware Counties, 2006-2020	• Provides a comprehensive look at current housing trends and issues in the three-county plan area • Provides detailed information relating to affordability, economic climate, as well as existing and projected housing gaps at the local and regional levels	• Existing housing gap analysis by income level • Target affordable home values and rents by local income • Projected future gaps • Recommendations for providing adequate housing to accommodate future populations
Orange County Water Authority Mid County Water Supply Feasibility Study Report, 2012	• Used as a guide to approaching new projects, operations, and day-to-day functions with a planning horizon of 10 years • Includes recommendations keyed to 1-year, 5-year, and 10-year periods until 2018	• Encourages municipal sharing through a "Town of Wallkill-City of Middletown Interconnection" priority action project, supported by water demand projections with build-out, and financing opportunities

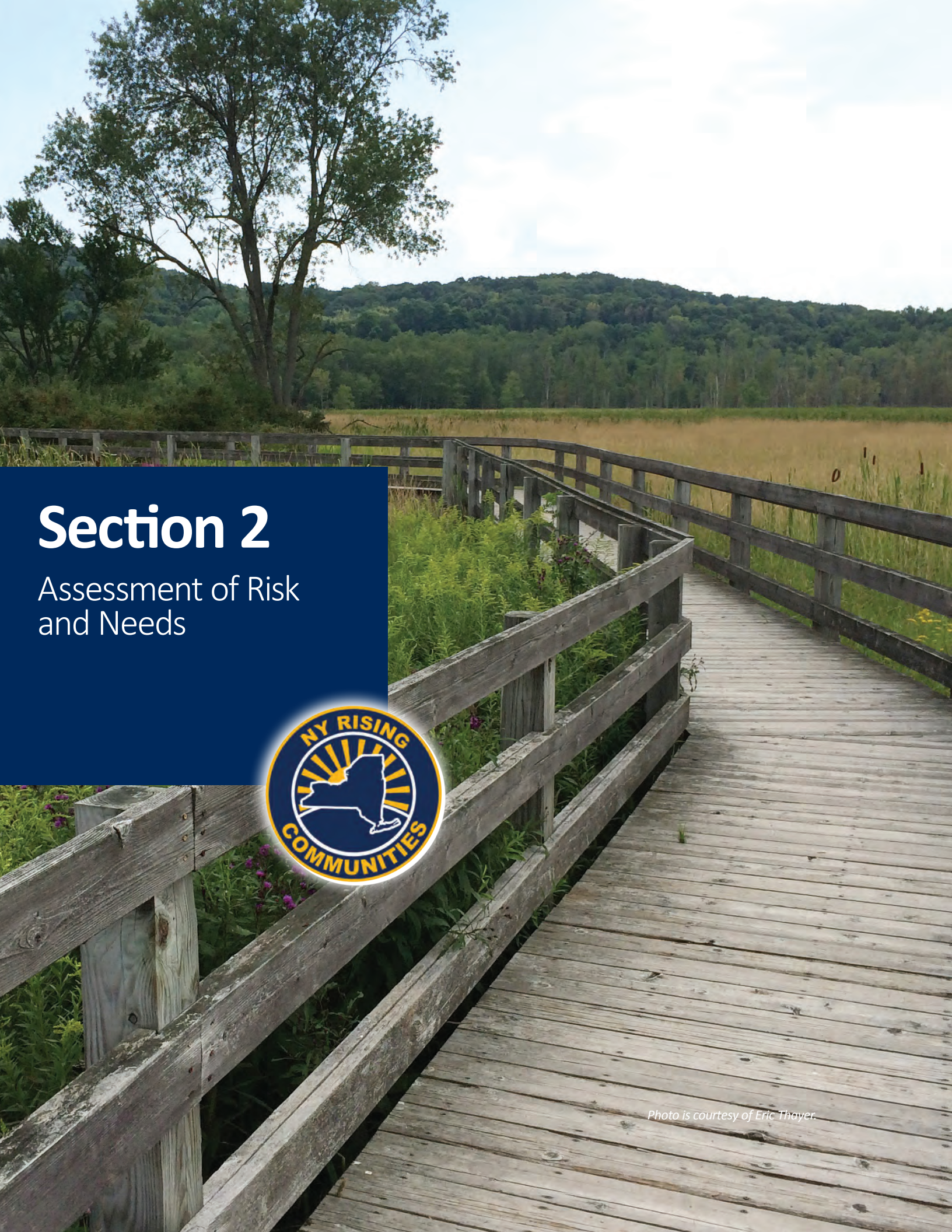
TABLE 1.6 – EXISTING PLANS AND STUDIES REVIEWED (CONT'D)

Resource	Relevance	Key Components for Town of Wallkill NYRCR Plan
State of New York Department of Public Service Electric Reliability Performance Report, 2012	• Presents this agency's staff assessment of electric reliability performance for all service providers in New York State for 2012	• Identifies the major causes for Orange & Rockland Utilities, Inc.'s service interruptions
Orange County Citizens Foundation, Orange County Quality of Life Report Card, 2012	• Defines goals and determines policy directions for Orange County, and measures quality of life progress on five-year intervals in eight external environments: arts and culture, economy, education, environment, government, health and well-being, public safety, and transportation	• Key demographic and health trends analyzed on the County level
Town of Wallkill Town Code	• Provides administrative regulations, such as local land use regulations for allowable uses and development standards, within the Town	• Establishes the context for reconstruction projects related to local development and public works projects

Review of Existing Plans and Studies

In recent years, the Town of Wallkill has participated in and developed a series of plans and studies that guide the growth and development of all aspects of the Town. These include infrastructure, community facilities, housing, economic development, tourism, environmental protection and stewardship, and historic preservation. By reviewing and incorporating these existing documents, the Committee was able to build on relevant data, methodologies, stakeholder engagement, and consensus that led to recommendations incorporated in the Town of Wallkill NYRCR Plan. A summary of these plans is included in Table 1.6.

Most importantly, perhaps, prior efforts associated with these plans helped position the Committee to use the Town of Wallkill NYRCR Plan development process to focus on particular needs not sufficiently addressed in existing documents, such as flood-specific needs and acute infrastructure challenges. Table 1.6 summarizes the existing plans and studies that were reviewed and incorporated into this planning process. It also includes an indication of the key components that will help to implement the Town of Wallkill NYRCR Plan.



Section 2

Assessment of Risk and Needs

Photo is courtesy of Eric Thayer.

Section 2: Assessment of Risk and Needs

Description of Community Assets and Assessment of Risk

A primary goal of the Town of Wallkill NY Rising Community Reconstruction (NYRCR) Plan is to ensure that both reconstructed assets and any proposed post-storm construction projects are more resilient during future storm events. To meet this goal, the Town of Wallkill NYRCR Planning Committee (Committee) developed a comprehensive inventory of assets within and beyond the Town of Wallkill NYRCR Plan Area (Plan Area). The asset inventory helped the Committee gain a comprehensive understanding of all areas of the Plan Area, and was an important step in the assessment of those economic, health/social services, housing, infrastructure, and natural/cultural resources in the Town of Wallkill (Town).

By completing the inventory of assets, the Committee compiled sufficient and accurate information to assess the risk to existing assets under current and future conditions within the planning horizon. The Committee was actively engaged throughout the risk assessment process, reviewed all aspects of the assessment, and collectively approved the results.

Inventory Process

DATA COLLECTION

To kick off this risk assessment process, the Committee prepared a preliminary inventory of assets through stakeholder outreach, Committee deliberations, and review of existing datasets. The New York State Department of State (NYS DOS) Risk Assessment Work Group facilitated development of a comprehensive list of datasets that were provided to the Committee. NYS DOS provided databases that included datasets from numerous public and private sources. In addition to the data provided by NYS DOS, the Committee compiled local-level data from the Orange County Geographic Information System (GIS) and the Town of Wallkill/City of Middletown Hazard Mitigation Plan (2014). Data was also gathered from Committee Members during scheduled meetings and via a community map portal.

A COLLABORATIVE APPROACH TO ENGAGING THE PUBLIC

Often, GIS services are a vital tool for communities undergoing an inventory of structures, natural features, or other assets associated with a physical location. However, GIS software, operating hardware, and databases used for analysis within GIS, are less available to most suburban and rural areas of New York State than for their urban counterparts. Local knowledge, therefore, is critical to augment data-driven content, particularly in areas where quantitative data may be limited.

The Committee was actively engaged throughout the risk assessment process, reviewed all aspects of the assessment, gathered public input, and collectively approved the results. Photo of three men in meeting is courtesy of Tetra Tech, Inc.

COMMUNITY MAP PORTAL

To capitalize on this knowledge, bi-monthly Committee Meetings and widely publicized Public Engagement Events were forums for collaborative dialogue to identify and compile assets. This local knowledge was compiled into an interactive GIS web-mapping portal that was created from the NYSDOS-provided datasets and information provided by the public.

This unique on-line tool allowed the Committee to identify, verify, and provide details on community assets and critical facilities.

The portal allowed Committee Members to visualize, interact with, edit, and add assets. It also allowed for the capture and use of local knowledge to populate and refine the asset inventory information (see Figure 2.1).

ASSET CLASSIFICATION

Identified assets were reviewed and classified into six categories, in accordance with the National Disaster Recovery Framework. These categories, along with examples, are described in Table 2.1. Assets were also classified as either "critical" or "non-critical" facilities. Critical assets, as defined by the Federal Emergency Management Agency (FEMA) include, but are not limited to, features that create or extend the useful life of structures, or facilities that provide important community services. These can include healthcare facilities, emergency operation centers, and power generation facilities, among others. A non-FEMA-designated critical facility may be deemed critical: (1) by the Committee, if the asset is locally significant; (2) by other federal agencies or state and local officials; or (3) by the local public. Together, these tiers of critical assets will give the Plan Area the most complete picture of overall risk.

FIGURE 2.1 – INTERACTIVE GIS WEB-MAPPING PORTAL (TOWN OF WALLKILL)

Source: Town of Wallkill NYRCR Committee, 2014. Picture of land map of Wallkill.

TABLE 2.1 – ASSET CATEGORIES

Asset Class	Examples
Community Planning and Capacity Building*	This RSF comprises plans, management functions, and recovery activities, not physical assets
Economic	Office buildings, business and industrial parks, manufacturing facilities, warehouses, storage facilities, groceries, restaurants, banks, lodging, storefronts, downtown center, and seasonal/tourism destinations
Health and Social Services	Schools, healthcare, daycare, elder care, emergency operations, government and administrative services, media and communications, police, fire, and rescue
Housing	Single-family and multi-family dwellings, supportive housing/group homes, senior housing, and affordable housing
Infrastructure Systems	Pedestrian, bicycle, and vehicular ways; transit; bridges; airports; rail; ports; ferries; gas stations; water supply; stormwater; wastewater; solid waste; recycling; and power generation facilities
Natural and Cultural Resources	Natural habitats, wetlands and marshes, recreation facilities, parks, public access, open spaces, agricultural areas, religious establishments, libraries, museums, historic landmarks, and performing arts venues

**Because this Recovery Support Function (RSF) does not comprise physical assets, the Community-identified assets for the NYRCR Plan were not assessed according to this category. However, needs and opportunities for this RSF were still considered, due to the importance of this function.*
Source: NYS DOS, 2013

Description of Risk Areas

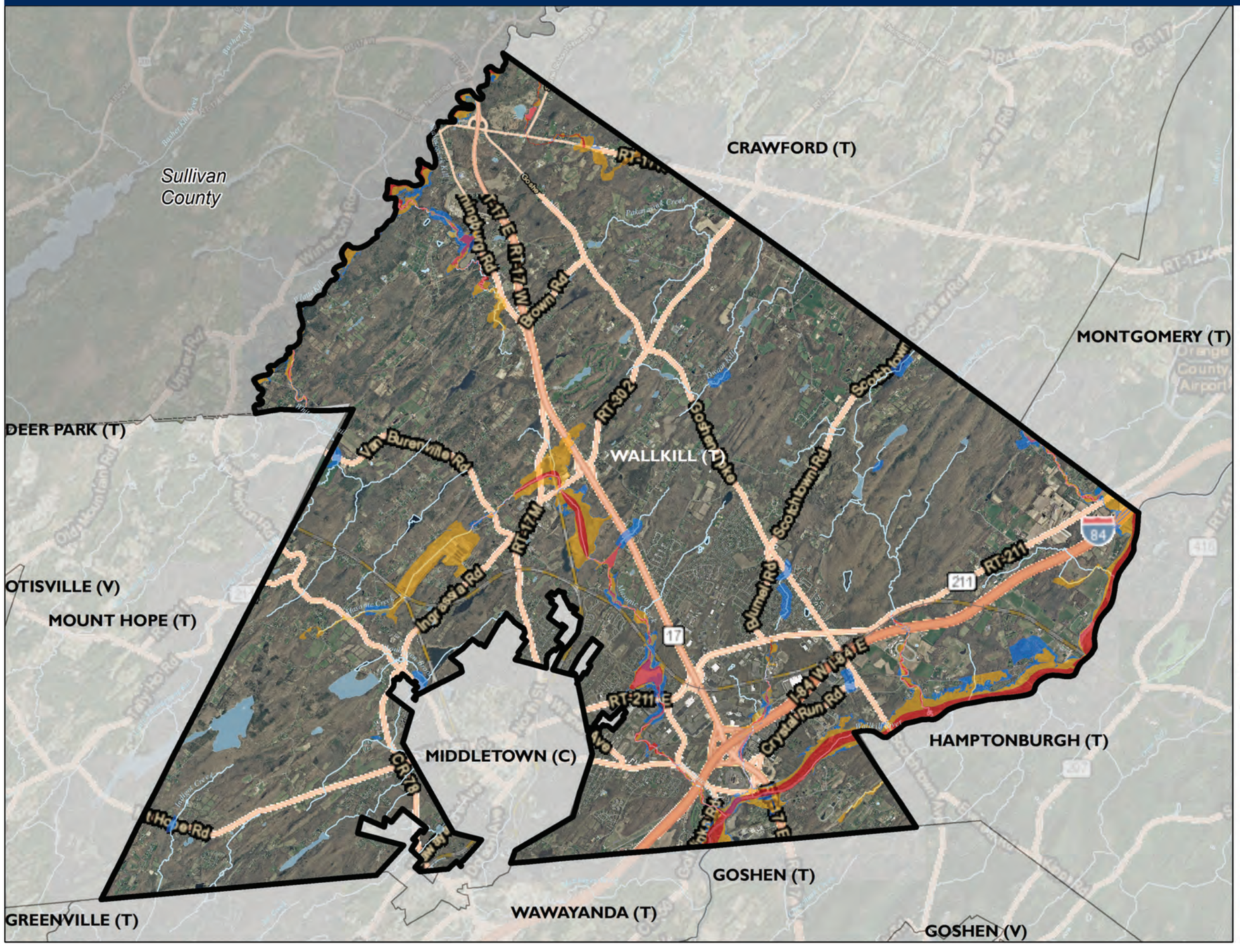
Once assets were identified and classified, it was essential to understand which geographic areas have been and will be affected by flooding to determine which assets are at risk and to what degree. The three risk areas for riverine communities are based on the current Flood Hazard Area (FHA) and the FEMA National Flood Insurance Program (NFIP) severe repetitive loss data. These areas reflect the frequency and likelihood of flood inundation and are classified as "extreme," "high," or "moderate" in descending order of risk magnitude.

Because the Plan Area includes a significant amount of land outside of the riverine risk area, where past flood damage has repetitively impacted residential properties, transportation infrastructure, and emergency operations, the Committee decided to include additional areas of "moderate" risk associated with those historic damage areas. In order to accurately classify assets in these areas, two additional geographic risk areas were included in the analysis. First, areas with a 1000-foot radial buffer of a past flood damage location were added. Second, a new detailed layer of streams, creeks, and other minor waterways in the Plan Area was used to generate additional risk areas for land within 1,000 feet of those waterways. These two additions to the overall risk area helped the Committee paint an accurate picture of the frequency and likelihood for flood inundation throughout the Plan Area, rather than limiting the analysis to only areas within an identified FEMA FHA.

Figure 2.2 shows the risk areas in the Town of Wallkill NYRCR Plan Area.

NYRCR: Town of Wallkill, Orange County

FIGURE 2.2 – RISK AREA MAP



Legend

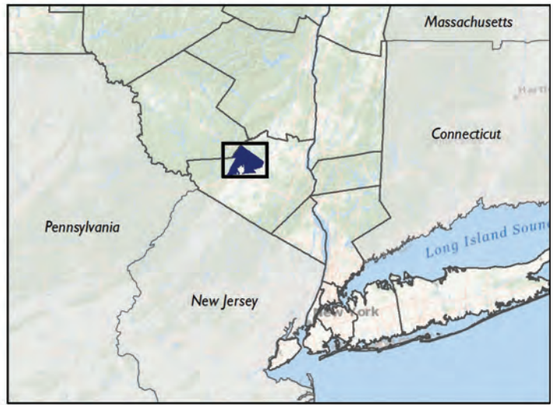
- Town of Wallkill Planning Area
- Municipal Boundary

Risk Area

- Extreme
- High
- Moderate

Data Sources:
NYS - Railroads, Waterbodies, Boundaries
ESRI - Aerial
FEMA - Risk Area
NYRCR – Risk Area

1 0.5 0 1 Miles



Description of Community Assets

The following section describes the Town of Wallkill's identified assets by the FEMA National Response Framework's RSFs and provides additional information for each asset group. Figures 2.3 through 2.8 illustrate the assets' locations and extent of the defined risk area by RSF within the NYRCR Plan Area.

ECONOMIC ASSETS

The Town of Wallkill is a regional retail destination and employment hub, home to hundreds of employers that range from small mom-and-pop stores to large-scale industrial operations. A majority of these assets are located near the intersection of State Route 17 and Interstate Highway 84. The densest clustering of economic assets in the Town is west of this intersection, along State Route 211, a known as the "Miracle Mile."

A number of industrial, warehousing, and manufacturing assets are clustered in the northern tip of the Town, near the confluence of State Routes 17 and 17k, the Goshen Turnpike, and Bloomingburg Road.

Using local knowledge to verify and update a number of datasets provided by NYS DOS and Orange County, the Committee identified nearly 200 economic assets in the Plan Area, including restaurants, gas stations, shopping malls, banks, pharmacies, and grocery stores.

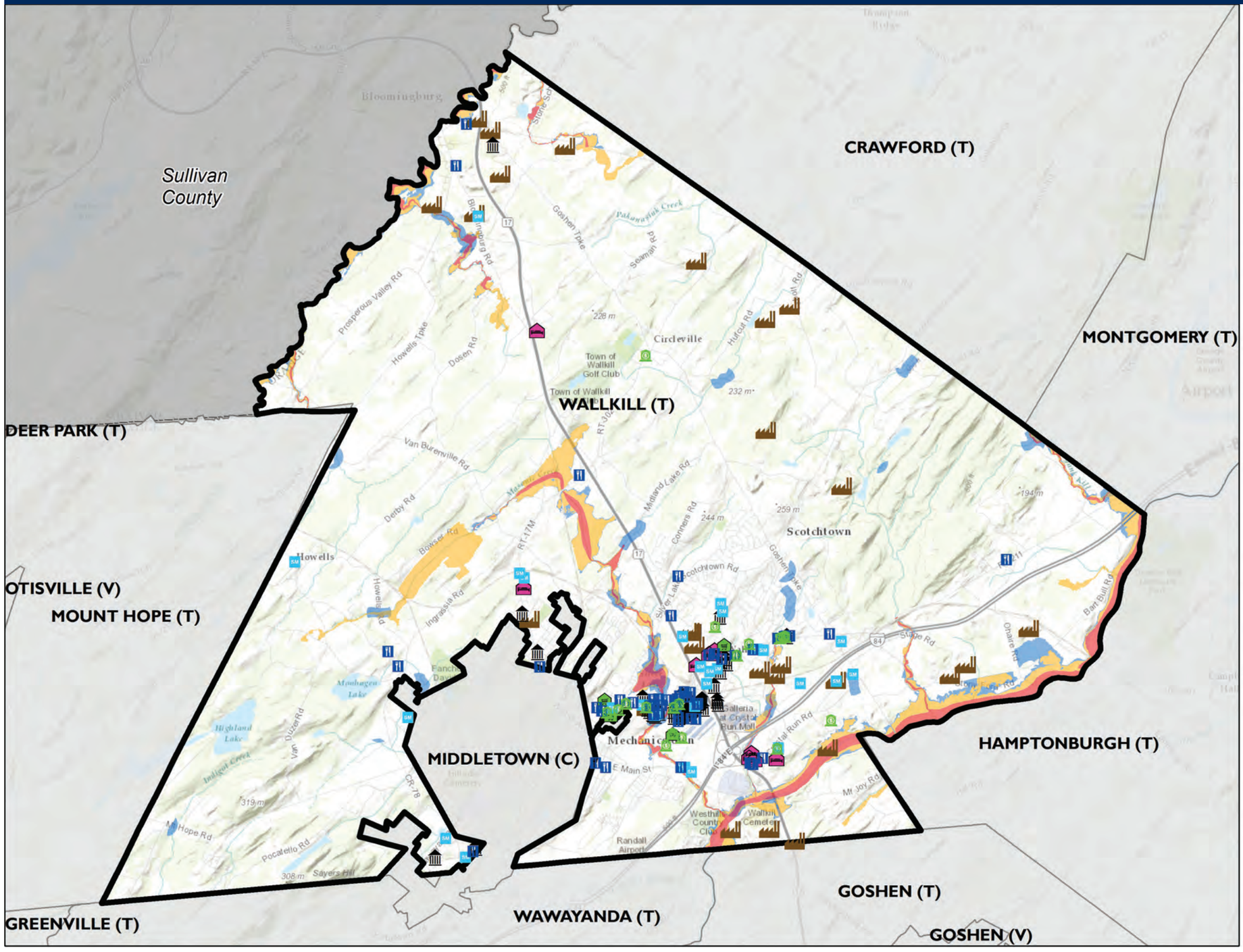
One quarter of these assets are restaurants, and another quarter are large businesses. The remaining assets in this category fall under one of the following sub-categories: industrial/warehousing/manufacturing; small businesses; and lodging.

These assets support Town residents in disaster situations by providing supplies, food, and services. Furthermore, income-generating economic systems and assets provide the critical tax base that town residents rely on for a variety of public services and utilities. Finally, the security of these economic assets is critical to the Town's resiliency–open businesses get people back to work.

The Galleria Mall, pictured above, is a significant economic asset in the Plan Area, inasmuch as it provides employment and generates tax revenues for the local economy. Photo is courtesy of Eric Thayer.

NYRCR: Town of Wallkill, Orange County

FIGURE 2.3 – ECONOMIC ASSETS



Legend

- Town of Wallkill Planning Area
- Municipal Boundary

Risk Area

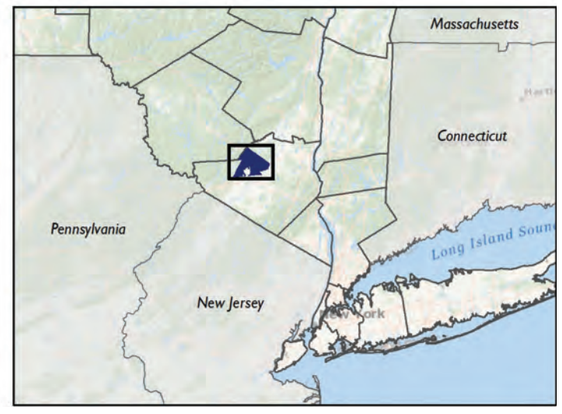
- Extreme
- High
- Moderate

Assets

- Banks and Financial Services
- Restaurants
- Grocery/Food Suppliers
- Lodging
- Small Business
- Large Business
- Industrial, Warehousing and Manufacturing
- Economic

Data Sources:
NYS - Railroads, Waterbodies, Boundaries
FEMA – Risk Area
NYRCR – Assets, Risk Area
ESRI - Topo

1 0.5 0 1 Miles



HEALTH AND SOCIAL SERVICE ASSETS

This asset category includes items that serve a variety of public functions, from health treatment facilities to general-purpose shelters in public schools, as well as post offices and town halls. During a flood event, these facilities could serve as critical disaster response and recovery centers, and their identification is essential to future disaster management and preparedness.

Fire protection facilities, pictured above, are vital assets that provide first response and potential sheltering assistance, while offering opportunities to host social functions. Photo is courtesy of Eric Thayer.

This category also includes many critical assets, including fire protection, police services, hospitals, and emergency operations facilities.

Parts of the Town of Wallkill were severely impacted from flooding after Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy. These storms hindered residents' and business owners' ability to access health and social services to varying degrees, largely due to impassable and damaged roads and bridges.

The Committee identified 60 facilities within the Health and Social Service Assets category, 15 of which were included in the two subcategories, Emergency Operations/Response and Healthcare Facilities. The remaining assets in the Health and Social Service Assets category are divided between Higher Education Institutions, Government and Administrative Services, Schools, Public Works Facilities, Daycare and Eldercare, and Primary/Regional Hospitals.

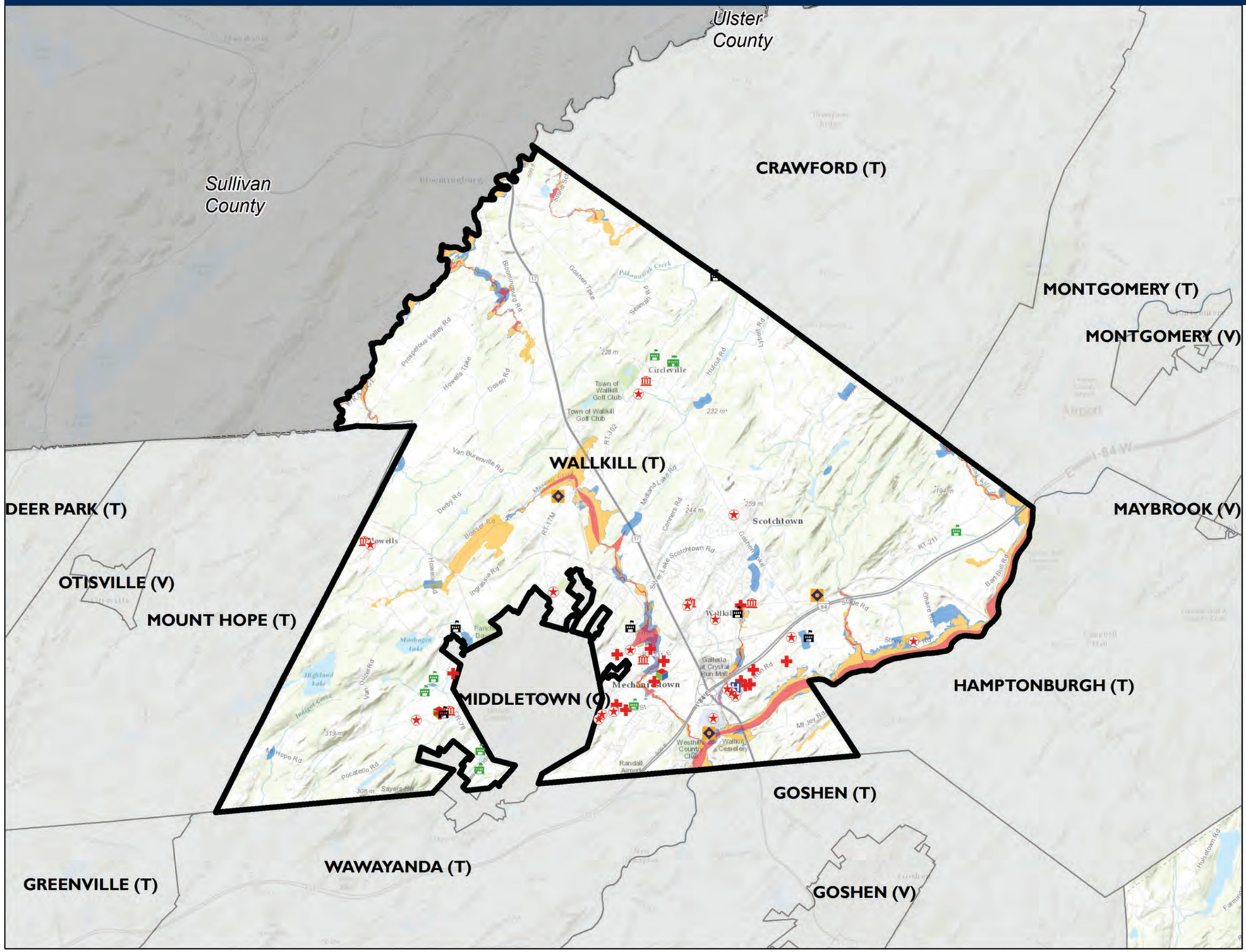
Understanding Critical Facilities

Critical facilities are assets the community relies on for essential services. They may include:

- Facilities that produce, use, or store highly volatile, flammable, explosive, toxic, or water-reactive materials;
- Hospitals and nursing homes, and housing for the elderly. Occupants of these facilities may not be mobile enough to avoid injury or escape death during a flood or a severe storm event;
- Emergency operation centers, or data storage centers that contain records or services that may be lost or inoperative during flood and storm events; and
- Power-generating plants and other principal points of utility lines.

NYRCR: Town of Wallkill, Orange County

FIGURE 2.4 - HEALTH AND SOCIAL SERVICES ASSETS



Legend

- Town of Wallkill Planning Area
- Municipal Boundary

Risk Area

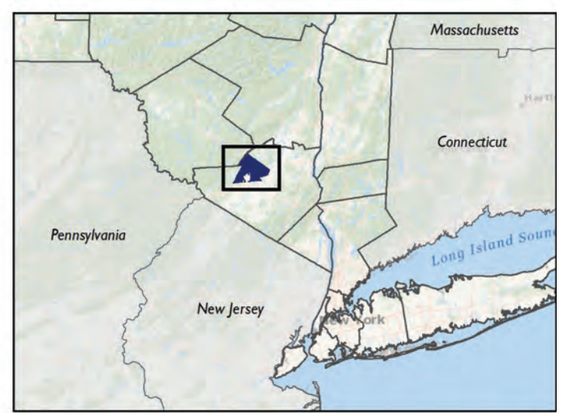
- Extreme
- High
- Moderate

Assets

- Schools
- Higher Education Institutions
- Emergency Operations/Response
- Primary/Regional Hospitals
- Government and Administrative Services
- Healthcare Facilities
- Public Works Facilities
- Daycare and Eldercare

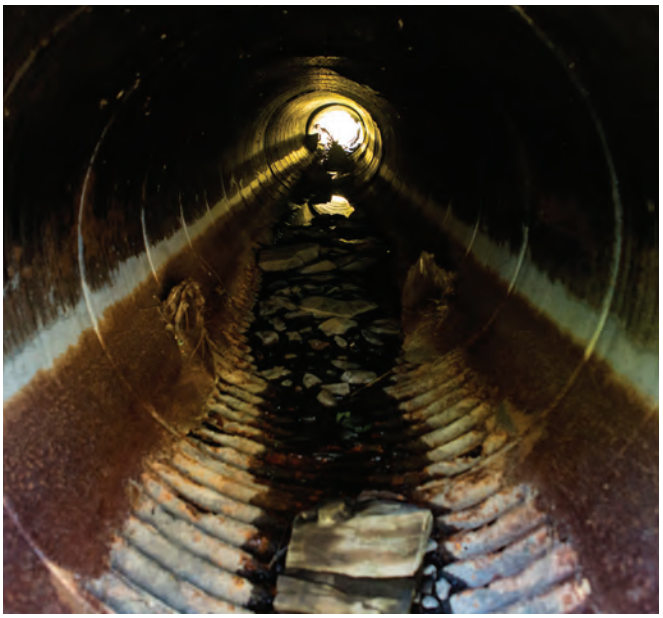
Data Sources:
NYS - Railroads, Waterbodies, Boundaries
FEMA – Risk Area
NYRCR – Assets, Risk Area
ESRI - Topo

1 0.5 0 1
Miles



INFRASTRUCTURE ASSETS

Infrastructure assets include resources such as pedestrian, bicycle, and vehicular ways; transit; roadways and bridges; airports; rail tracks, bridges, and stations; electric, telephone, and natural gas facilities; gas stations; water supply; stormwater, wastewater, and solid waste management facilities; recycling centers.

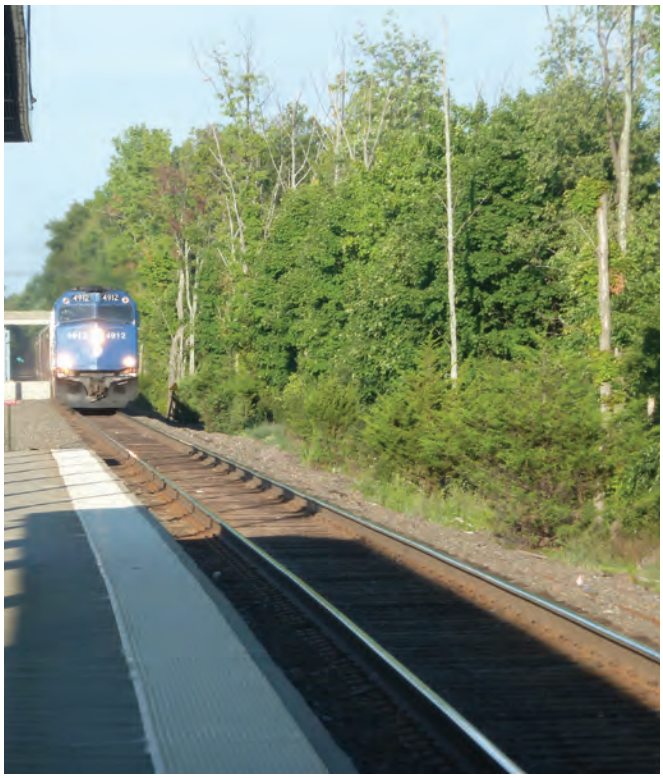


Stormwater systems are critical infrastructure assets that help to alleviate flooding. Photo of drain is courtesy of Eric Thayer.

Roadways

Major roads in the Town of Wallkill include: Interstate Highway 84 and U.S. Route 6/State Route 17; State Route 211; and County Route 67 (known locally as East Main Street). These corridors provide primary access into and out of the Town's bustling commercial core, provide easy access to New York City, New Jersey and Pennsylvania, and serve motorists from around the region.

During past storm events, a number of the state and county routes in the Town of Wallkill were inundated. Furthermore, recurring power outages in the Town during and after severe weather events have caused traffic signals to lose power creating significant evacuation and safety issues.



Pictured here is the Metropolitan Transit Authority (MTA) Port Jervis Line of the Metro-North Commuter Railroad. Photo is courtesy of Neil Meyer.

Transit

The Metropolitan Transit Authority (MTA) provides commuter rail service that links the Town of Wallkill and other points in Orange County to New York City via the Port Jervis Line of the Metro-North Commuter Railroad.

While these regional transportation assets may be less vulnerable to impacts from flooding, local residents depend on these modes of transportation to get to work. The Wallkill MTA station is located north of the Galleria at Crystal Run Mall. During Hurricane Irene, rail stops along the Wallkill/Middletown line were rendered useless for days after the storm, because the entire Metro-North line was suspended, due to widespread flooding and debris.

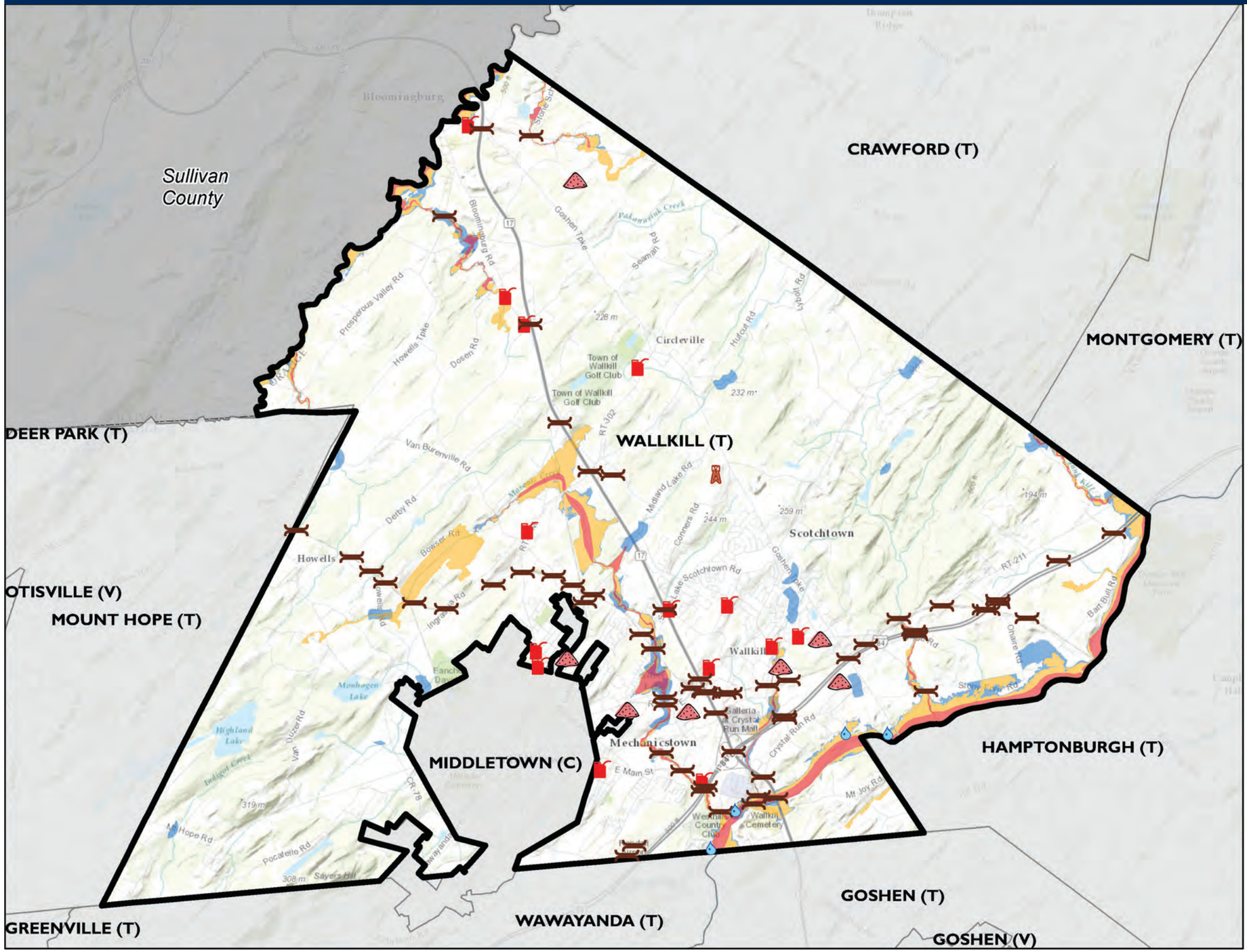
During a storm event, infrastructure facilities may provide access to critical disaster response and recovery personnel, and may also allow for the maintenance of sanitary conditions. Safe access to and from the Town during storm events was a clear priority, based on public comment and Committee feedback.

Pictured above (flooded) and at right (dry), Silver Lake Tunnel is a heavily traversed infrastructure asset in the Town of Wallkill. Flooding, in the wake of Hurricane Irene, impedes traffic and the ability of rescue personnel to rapidly respond. Photo is courtesy of Eric Thayer. Photo at right is courtesy of the Town of Wallkill.

A total of 88 facilities were identified in Infrastructure Assets category, including gas stations, bridges, stormwater culverts, communications facilities, and numerous transportation facilities. Transportation facilities comprised 62 of the 84 facilities.

NYRCR: Town of Wallkill, Orange County

FIGURE 2.5 – INFRASTRUCTURE ASSETS



Legend

- Town of Wallkill Planning Area
- Municipal Boundary

Risk Area

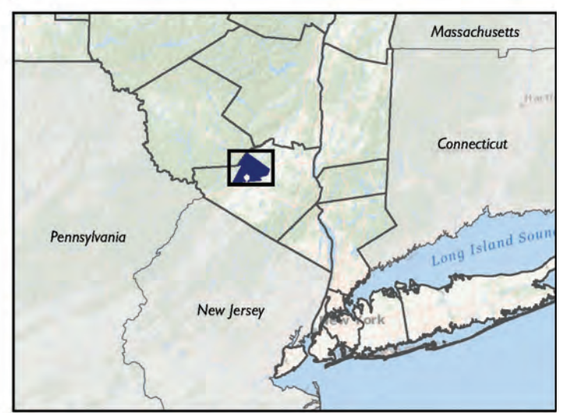
- Extreme
- High
- Moderate

Assets

- Telecommunications
- Liquid Fuels
- Water Supply
- Transportation
- Hazardous Materials, Solid Waste, and Recycling
- Stormwater
- WTP Wastewater

Data Sources:
NYS - Railroads, Waterbodies, Boundaries
FEMA – Risk Area
NYRCR – Assets, Risk Area
ESRI - Topo

1 0.5 0 1 Miles



NATURAL AND CULTURAL RESOURCES ASSETS

Natural and cultural resources are important to the quality of life within the Town of Wallkill. Natural resources, such as wetlands and rivers, offer scenic, recreational, and environmental benefits. They also offer a measure of protection from potential flood impacts for other community assets.

Cultural resources contribute to community cohesiveness and well-being, and provide critical social support systems for residents. Identifying these assets is important to understand ways to protect historic and cultural resources, and to determine where natural resources, such as wetlands or floodplains, could be enhanced to help protect the Town's infrastructure and other assets during storm events.

Floodplains

Floodplains are lands that border rivers and streams that normally are dry, but are covered with water during floods. Buildings and structures constructed in the floodplain have the potential to be damaged by floods. These structures can also change the pattern of water flow, and increase flooding and flood damage on adjacent properties.

The Town of Wallkill (approximately 40,207 acres in size), has about 2,079 acres (5%) of its land in the 100-year FHA and about 345 acres (1%) of its land in the 500-year FHA. These floodplains are associated with the Wallkill River, Shawangunk Kill, and the Masonic Creek. While many of the minor tributaries to these waterways and smaller waterways, such as the Indigot Creek, are not in the mapped FHAs, some have been known to contribute to flood damage in the Town.

Wetlands

Wetlands function as natural sponges that trap and slowly release surface water, rain, snowmelt, groundwater, and flood waters. Trees, root mats, and other wetland vegetation also slow the speed of flood waters and distributes them more slowly over the floodplain.

Wetlands within and surrounding urban areas are valuable, because they can greatly decrease the rate and volume of surface water runoff from impervious surfaces, thereby reducing the volume and velocity of flood waters. Wetlands exist throughout the Town of Wallkill, most significantly skirting the Wallkill River floodplain, and stretching east-to-west across the center of the Town.

Lakes and Waterways

The Town's many lakes also have flood storage and mitigation capabilities, and are identified as locally significant, highly valued recreational amenities for Wallkill residents.

In addition to natural areas of the Town, there are six parks that provide a wide range of recreational facilities for all the Town of Wallkill residents. These facilities can accommodate an array of activities that include, but are not limited to: baseball, basketball, bicycling, picnics, playgrounds, soccer, swimming, tennis, and a place to relax with friends and family. The Town's parks provide a means for its residents to enhance their quality of life.

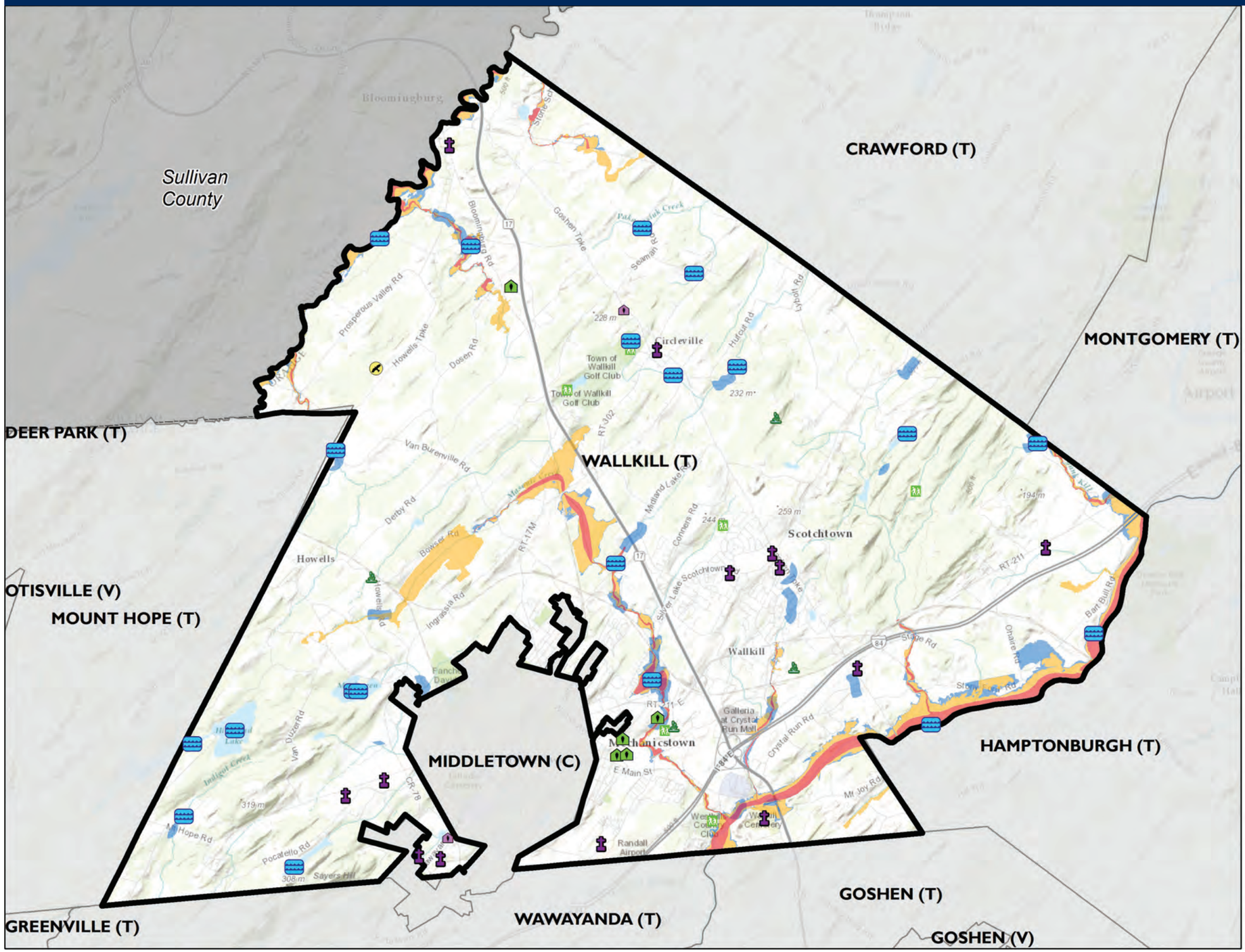
Fifty-seven facilities were identified in the Natural and Cultural Resources Assets category for the Town of Wallkill, including Silver Lake, the Townley Hall Club, Highland Lakes State Park, wetlands and marshes, and numerous cultural and religious establishments. The 26 named water bodies, including lakes, ponds, streams, creeks, rivers, and wetlands, made up the majority of this asset group.

Wetland vegetation plays an important role in slowing the velocity of floodwaters, acting as a natural sponge in the floodplain. They are also assets for future flood storage in the Town of Wallkill. Photo of boardwalk through the marsh is courtesy of Tetra Tech, Inc.

Upper Jay's Lake, pictured above, is a picturesque location for outdoor recreation among the many waterways in the Town of Wallkill. Photo is courtesy of Eric Thayer.

NYRCR: Town of Wallkill, Orange County

FIGURE 2.6 – CULTURAL AND NATURAL RESOURCES ASSETS



Legend

- Town of Wallkill Planning Area
- Municipal Boundary

Risk Area

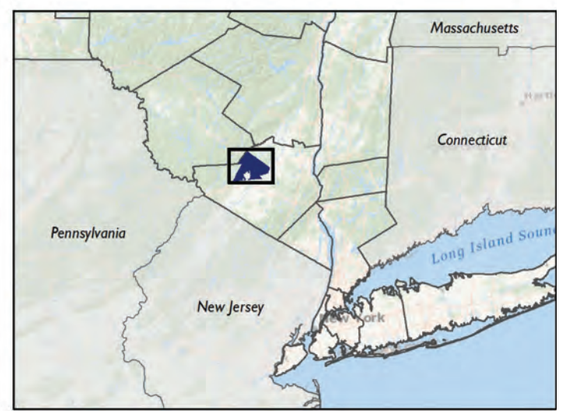
- Extreme
- High
- Moderate

Assets

- Wetlands and Marshes
- Cultural or Religious Establishments
- Parks and Recreation
- Community Centers
- Museums, Performing Arts Centers, Stadiums
- Natural Protective Features
- Water Bodies

Data Sources:
NYS - Railroads, Waterbodies, Boundaries
FEMA – Risk Area
NYRCR – Assets, Risk Area
ESRI - Topo

1 0.5 0 1 Miles



HOUSING ASSETS

The Town of Wallkill has a diverse array of housing types scattered throughout the Plan Area. The Committee chose to include multi-family residential structures, supportive housing facilities (including group homes and senior housing facilities), and single-family residential complexes in this asset category. The one mobile home park in the Town is included as a single-family residential asset.

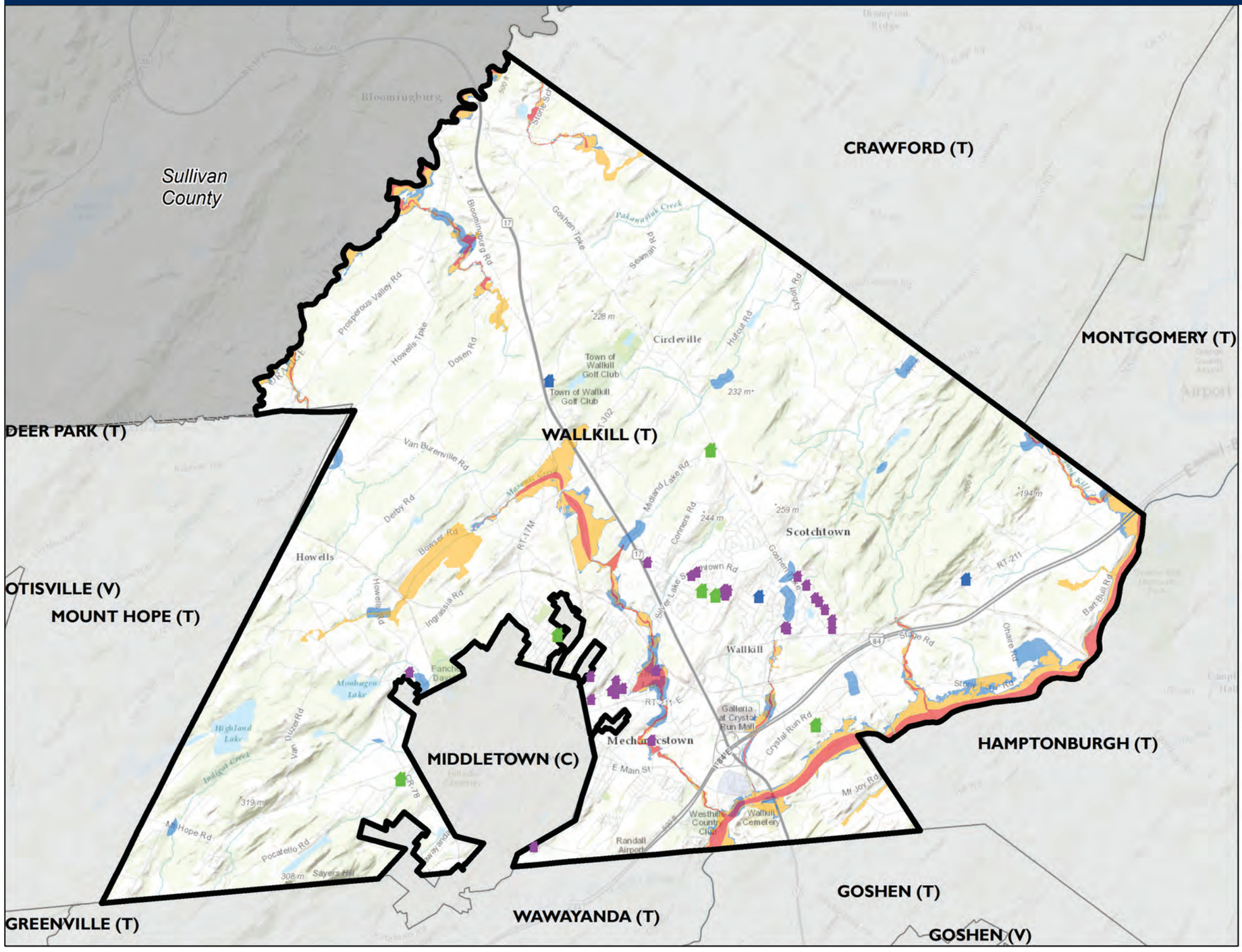
Housing assets serving vulnerable populations are of particular concern to the Committee, as many of these facilities suffered power failures and inhibited roadway access from past storm events.

A total of 38 facilities were identified in this asset category, with the majority (28) of assets falling under the multi-family residential sub-category. A majority of the multi-family residential facilities are located in the southern part of the Town, in neighborhoods surrounding Silver Lake and in the Hamlets of Mechanicstown and Scotchtown. The Committee placed high value on all seven supportive housing facilities, which were also deemed critical facilities, based on the services they provide to vulnerable populations.

The Town of Wallkill NYRCR Plan Area is characterized by a wide variety of housing types. Photos of housing on this page are courtesy of Eric Thayer.

NYRCR: Town of Wallkill, Orange County

FIGURE 2.7 – HOUSING ASSETS



Legend

- Town of Wallkill Planning Area
- Municipal Boundary

Risk Area

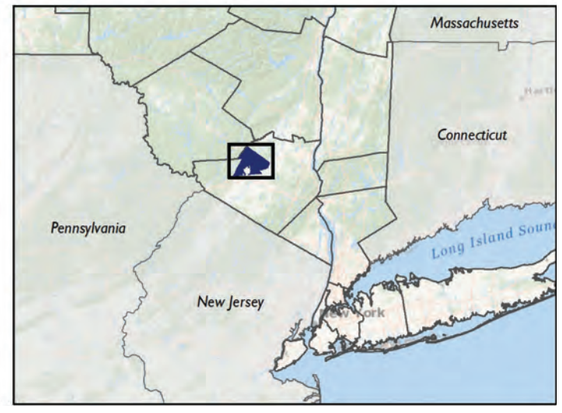
- Extreme
- High
- Moderate

Assets

- Multi-Family Residence
- Single-Family Residence
- Supportive Housing

Data Sources:
NYS - Railroads, Waterbodies, Boundaries
FEMA – Risk Area
NYRCR – Assets, Risk Area
ESRI - Topo

1 0.5 0 1 Miles



Assessment of Risk to Assets and Systems

Risks for the Town of Wallkill's assets were assessed using the NYS DOS-provided Risk Assessment Tool, and were based on public and Committee feedback, in conjunction with information captured by the asset inventory. The goal of the risk assessment was to identify community assets and resources with the highest risk, in order to target these for further consideration in the development of resiliency strategies and projects. Figure 2.8 depicts the geographic distribution of risk within the Plan Area. Tables 2.2 – 2.6 list the assets and their associated risk scores.

Description of Methodology

The Risk Assessment Tool is designed to assess and quantify the risk to individual community assets through built-in formulas that calculate an overall risk score category based on three factors: hazard, exposure, and vulnerability. The tool calculates a score for each of these factors and combines them, representing the relative risk of each asset in the community to one another.

Each factor in this equation is calculated automatically, based on appropriate inputs and are assigned as follows:

HAZARD
x EXPOSURE
x VULNERABILITY
= RISK

- **HAZARD SCORE**: assigned for each asset, based on a 100-year storm event occurring within the next 100 years.
- **EXPOSURE SCORE:** determined by the risk area where the asset is located, and local landscape attributes that influence the potential for storm impacts. This score reflects how landscape features can moderate damage to individual assets.
- **VULNERABILITY SCORE:** reflects the level of impairment or consequences that assets may experience from a hazard event, and reflects the ability of the asset to resist damage from the hazard.

INTERPRETATION OF RISK

Risk scores help to identify assets with an elevated potential for storm damage. Some factors that may be considered for each asset in developing a community risk management strategy include:

- Contribution to life safety;
- Whether the asset is a critical facility;
- Value of the asset to the community;
- Environmental services provided;
- Economic contribution of the asset;
- Whether alternatives are available; and
- Capacity of the asset to adapt.

FLOODPLAIN VS. FLOODWAY

*A **floodplain** is defined as the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that becomes inundated with water during a flood. Most often, floodplains are referred to as 100-year floodplains. A 100-year floodplain is not the flood that will occur once every 100 years, rather it is the flood that has a 1% chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once in a relatively short period of time. (Delaware County Hazard Mitigation Plan Update, 2013)*

*A **regulatory floodway** is the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood, without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure there are no increases in upstream flood elevations.*

The Consultant Team evaluated risk for both a 100-year event (1% annual chance) and a 500-year event (0.2% annual chance). Risk was calculated for each asset, and each asset was placed in one of several categories. For further information regarding risk scores, refer to Section 5: Additional Materials.

Severe Category

If possible, both exposure and vulnerability may be reduced for assets in this category. Relocation of these assets could be considered a priority option.

High Category

Risk scores in the high category indicate conditions that could lead to significant negative outcomes from a storm. Actions are recommended to reduce vulnerability, such as elevating or flood-proofing the asset to help avoid a long-term loss of function.

Moderate Category

Risk scores in this category pose moderate-to-serious consequences, but adaptation may be a lower priority based on exposure, or because vulnerability remains relatively low. It is recommended that a combination of measures be considered to reduce exposure or vulnerability.

Residual Category

Risk scores in the residual category occur either when both exposure and vulnerability are relatively low, or when an asset does not fall within the risk area. This situation may suggest that floods would pose minor or infrequent consequences. However, an asset may have a high vulnerability score and only return a residual risk score if it is not located within the mapped risk area. An exposure score for a facility with repetitive historic flood damage from stormwater, for instance, could be null if that asset is not located within the mapped risk area.

Given this limitation in the risk assessment model, regardless of an asset's location, risk is never completely eliminated. Some residual risk still remains even after management measures have been implemented. It is recommended to monitor conditions and adapt, as necessary.

Assessment Results

Many assets identified in the Town are within or proximate to the Town's commercial core, near the intersections of State Routes 211 and 17, and Interstate Highway 84. While little of the development within this area lies in the Wallkill River regulatory floodplain or the identified risk area for the purposes of this analysis, many assets have been affected during historic storm events by overland stormwater draining to the Wallkill River watershed.

In heavily commercialized and "hardened" areas, where rain water has no opportunity to reenter the groundwater table through natural permeation, stormwater flooding often poses the greatest risk.

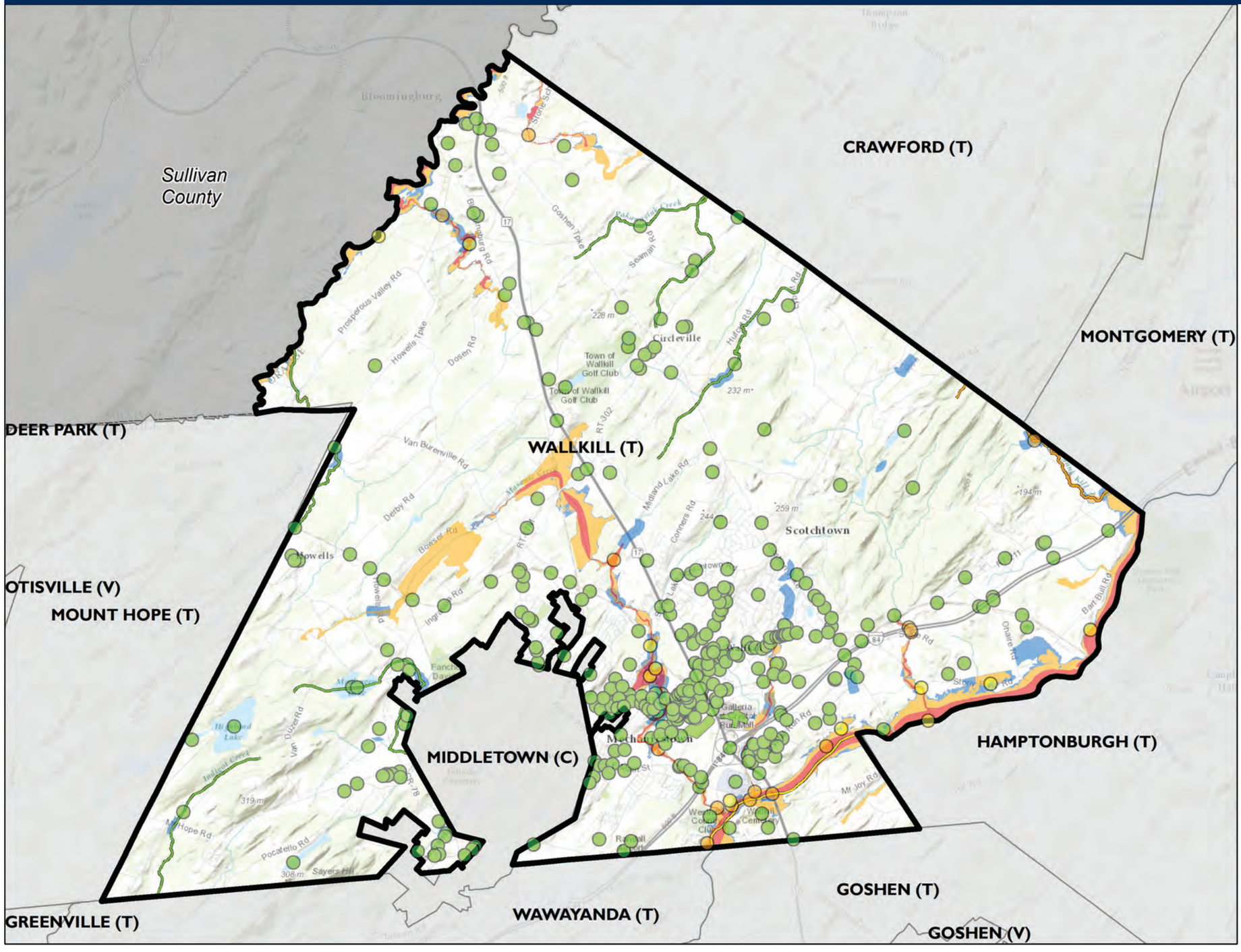
The increased severity and frequency of storms in recent years has rendered the Town of Wallkill more susceptible to the devastating effects from flooding. Clearly, many assets within the Town are exposed and extremely vulnerable to storm events, including many assets not included in the risk area for the purposes of this analysis.

Not all assets vulnerable to severe and repetitive flooding are located in the regulatory 100-year floodplain or in an identified "risk area." For instance, a number of roadways in the Town of Wallkill not included in the 100-year floodplain or "risk area" experienced significant damages during Hurricane Irene, a storm that caused flooding that exceeded most projected expectations.

The risk scores depicted at Figure 2.8 indicate the vulnerability of those assets that fall within the identified risk area. Figure 2.8 also shows the geographic distribution of risk scores for a 100-year storm event.

NYRCR: Town of Wallkill, Orange County

FIGURE 2.8 – RISK SCORE MAP



Legend

- Town of Wallkill Planning Area
- Municipal Boundary

Risk Score

- Severe
- High
- Moderate
- Residual

Risk Area

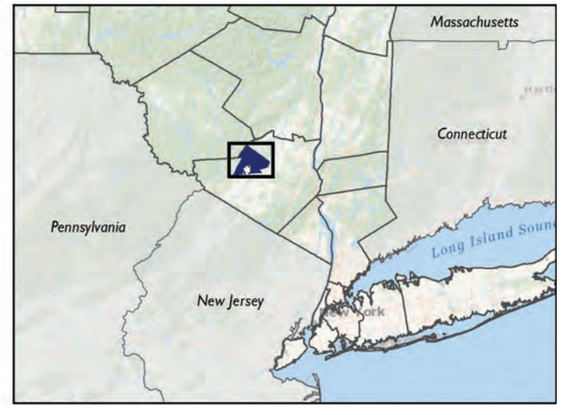
- Extreme
- High
- Moderate

Note:
Wetland assets are not displayed on the map; their risk scores are either 'Moderate' or 'Residual.'

Assets are represented as points, polygons and lines

Data Sources:
NYS - Railroads, Waterbodies, Boundaries
FEMA – Risk Area
NYRCR – Assets, Risk Area
ESRI - Topo

1 0.5 0 1 Miles



As shown Figure 2.8, a number of assets with high risk scores during a 100-year event are along or near one of the many waterways that run through the Town of Wallkill. These waterways include the Wallkill River, Shawangunk Kill, Masonic Creek, Harvey Roe Brook, and their tributaries. This risk reflects information provided by the people living in the Town of Wallkill, the Committee, and the existing datasets available at the time of the analysis.

A number of businesses and facilities in the Town have been routinely affected by flood events, especially events associated with Hurricane Irene and the remnants of Tropical Storm Lee. These businesses and facilities did not generate a risk score above zero, due to their locations outside an identified risk area.

The Committee considered high- and moderate-risk assets, along with others assets known to have experienced past flood damage; this was done to help identify potential projects to mitigate future damage and to minimize future risk.

Economic Assets

The risk scores shown in Table 2.2 indicate that a number of the Town's economic assets are located in severe- or high-risk areas from flooding. While the majority of economic assets in the Plan Area are not FEMA-designated Critical Facilities, the Committee designated 13 of the assets as Locally Significant. These 13 assets include some major grocery stores and food suppliers, one major income-generating retail center, as well as private suppliers of propane, sand and gravel, and other materials. All these assets could be critical for sustaining the impacts of and recovering from a flood or severe storm.

The Lesko, John Jr. & Mayer, Sidney Mine along the Wallkill River near the Town border with Hamptonburgh, was the only economic asset identified at high risk from flooding during a 100-year event. The Mine lies almost directly within the Wallkill River floodway, making it highly susceptible and at-risk to flood events. The Dunkin Donuts at 425 State Route 211 E. was identified at moderate risk, and was the only other economic asset in the Town of Wallkill that fell within an identified risk area.

Table 2.2 lists the risk scores for economic assets in the Town of Wallkill.

TABLE 2.2 – ECONOMIC ASSETS

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Lesko, John Jr. & Mayer, Sidney Mine	Industrial, Warehousing and Manufacturing	High	High
Dunkin Donuts	Restaurants	Moderate	Moderate
53 Large Businesses	Large Business	Residual	Residual
32 Small Businesses	Small Business	Residual	Residual
4 Grocery/Food Suppliers	Grocery/Food Suppliers	Residual	Residual
26 Industrial, Warehousing and Manufacturing	Industrial, Warehousing and Manufacturing	Residual	Residual
9 Lodging Establishments	Lodging	Residual	Residual
49 Restaurants	Restaurants	Residual	Residual
18 Banks/Financial Services	Banks and Financial Services	Residual	Residual

Source: NYRCR 2014, NYS DOS 2014

Health and Social Service Assets

The Committee identified 60 Health and Social Services Assets in the Plan Area. Two of the Town's health and social services facilities are located in a risk area: one in the extreme-risk area (Wallkill Wastewater Treatment Plant [WWTP]) and one in the moderate-risk area (Mechanicstown Fire Station). Based on its location in the high-risk area, with the Monhagen Brook located less than 300 feet to the east, the Wallkill WWTP was identified at a high risk from flooding during a 100-year event. The Mechanicstown Fire Station is in a moderate-risk area along the northern bank of the Wallkill River on Stony Ford Road. The remainder of the Health and Social Service Assets (58 facilities) are located outside of the risk area and therefore, have residual risk from flooding during a 100-year event.

Many of the Town's Health and Social Service Assets are designated as FEMA-critical facilities, Locally Significant critical facility, and are highly valued by those in the Town of Wallkill. While most assets in this category did not generate an exposure score, they are, nonetheless, considered throughout the assessment as critical, vulnerable, and subject to residual risk from flooding.

Table 2.3 lists the risk scores for Health and Social Service Assets in the Town of Wallkill.

TABLE 2.3 – HEALTH AND SOCIAL SERVICE ASSETS

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Wallkill Water Department – Braeside Wastewater Treatment Plant	Public Works Facility	High	High
Mechanicstown Fire Department	Emergency Operations/ Response	Moderate	Moderate
Circleville Elementary School	Schools	Residual	Residual
Circleville Middle School	Schools	Residual	Residual
Harmony Christian School	Schools	Residual	Residual
Mechanicstown Elementary School	Schools	Residual	Residual
Pakanasink Elementary School	Schools	Residual	Residual
Maple Hill Elementary School	Schools	Residual	Residual
Monhagen Middle School	Schools	Residual	Residual
St. Albert's Campus	Schools	Residual	Residual
Our Lady of Mt. Carmel School	Schools	Residual	Residual
Curious Cubs Daycare	Daycare and Eldercare	Residual	Residual
Middletown Park Manor	Daycare and Eldercare	Residual	Residual
Wallkill Department of Public Works Facility	Public Works Facility	Residual	Residual
Valley View Park Wastewater Treatment Plant	Public Works Facility	Residual	Residual
Orange Regional Medical Center Horton Pavilion	Primary/Regional Hospitals	Residual	Residual
16 Emergency Operations/Response Facilities	Emergency Operations/ Response	Residual	Residual
15 Healthcare Facilities	Healthcare Facilities	Residual	Residual
6 Higher Education Institutions	Higher Education Institutions	Residual	Residual
7 Government and Administrative Service Centers	Government and Administrative Services	Residual	Residual

Source: NYRCR 2014, NYS DOS 2014

Infrastructure Assets

The Committee identified a total of 88 infrastructure assets, including gas stations, bridges, stormwater culverts, communications facilities, and numerous transportation facilities. Based on information provided by the Townspeople and the Committee, 12 infrastructure assets are within the extreme-risk area and at high risk from flooding during a 100-year event. An additional five assets (three within the high-risk and two within the moderate-risk areas) were identified to be at moderate risk. The remaining 71 assets were identified as having residual risk.

Infrastructure assets with high-risk scores are transportation assets, including bridges, culverts, and roadway segments crossing the Wallkill River, Shawangunk Kill, Masonic Creek, Harvey Roe Brook, and their tributaries, and water supply assets.

Even greater numbers of infrastructure assets, including communications and electrical utility assets, have been impacted by flood events, especially during the flood events associated with Hurricane Irene and Tropical Storm Lee. Table 2.4 lists the risk scores for infrastructure assets in the Town of Wallkill.

The Committee considered mitigation actions to reduce both vulnerability and exposure of these culverts, bridges, and roadway segments that are most vulnerable to flooding.

TABLE 2.4 – INFRASTRUCTURE ASSETS

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
East Main Street (Masonic Creek crossing)	Transportation	High	High
East Main Street south of Orange Regional Medical Center (Tributary to Wallkill River crossing)	Transportation	High	High
Golf Links Road (Masonic Creek crossing)	Transportation	High	High
I-84 East (Harvey Roe Brook crossing)	Transportation	High	High
I-84 West (Harvey Roe Brook crossing)	Transportation	High	High
Maltese Drive (Masonic Creek crossing)	Transportation	High	High
Midway Road bridge (Wallkill River crossing)	Transportation	High	High
Schutt Road Extension (Masonic Creek crossing)	Transportation	High	High
Stage Road (Harvey Roe Brook crossing)	Transportation	High	High
State Route 17 (Wallkill River crossing)	Transportation	High	High
State Route 17k near Stone School House Road (Shawangunk Kill crossing)	Transportation	High	High
Wallkill Water Department – Braeside Water Treatment Plant	Water Supply	High	Moderate
York Road (Tributary to Shawangunk Kill crossing)	Transportation	High	High
Silver Lake Scotchtown Road Tunnel (Masonic Creek crossing)	Transportation	Moderate	Moderate
Stony Ford Road between Stage and Slaughter Roads (Tributary to Wallkill River crossing)	Transportation	Moderate	Moderate
Wallkill Water Department – Kosuga Wells and Control Building	Water Supply	Moderate	Moderate

TABLE 2.4 – INFRASTRUCTURE ASSETS (CONT'D)

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Wallkill Water Department – Rykowski Ln. Water Treatment Plant and Wells	Water Supply	Moderate	Moderate
Circleville Radio Tower	Telecommunications	Residual	Residual
Wallkill Water Department – Crystal Run Treatment Plant and Wells	Water Supply	Residual	Residual
48 Transportation Entities	Transportation	Residual	Residual
14 Liquid Fuel Facilities	Liquid Fuels	Residual	Residual
7 Hazardous Materials, Solid Waste, and Recycling Facilities	Hazardous Materials, Solid Waste, and Recycling	Residual	Residual

Source: NYRCR 2014, NYS DOS 2014

Natural and Cultural Resources Assets

Of the 51 assets identified in the Natural and Cultural Resources Assets category for the Town of Wallkill, 2 water body assets were identified as high-risk, and another 9 assets (including both water body, wetlands and marsh assets) were identified as moderate-risk. The remaining 40 assets were identified as having residual-risk from a 100-year event.

Evaluating flood risk can be confusing when an asset contributes to the source of the hazard. While riverine assets contribute to the flood risk of assets in this and other categories, the health and natural functionality of these assets face unique risks, based on their geographical location to other physical elements of the natural and manmade landscape. For instance, Silver Lake is located in a high-risk area and is listed in Table 2.5 at moderate-risk from flooding during the 100-year event. In this case, the Lake contributes to the increased risk of flooding to adjacent housing and infrastructure assets. However, the Lake is at-risk from pollution carried by stormwater. Furthermore, high velocity flood waters can lead to severe bank erosion that disrupts sediment and increases turbidity in lakes and riverine waterways. This can also have negative impacts on fish and aquatic ecosystems. Wetlands can be compromised by pollutant loading or by high-velocity flood waters.

Table 2.5 lists the risk scores for Natural and Cultural Resources Assets in the Town of Wallkill.

The buildings and facilities listed in Table 2.5, where historical flood damages have occurred, suggest future vulnerability could be considered for flood-proofing mitigation measures and possible relocation.

TABLE 2.5 – NATURAL AND CULTURAL RESOURCES ASSETS

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Mannayunk Kill	Water Bodies	High	High
Midland Lake	Water Bodies	High	High
Jays Lake	Water Bodies	Moderate	Moderate
Little Shawangunk Kill	Water Bodies	Moderate	Moderate
Shawangunk Kill	Water Bodies	Moderate	Moderate

TABLE 2.5 – NATURAL AND CULTURAL RESOURCES ASSETS (CONT'D)

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Silver Lake	Water Bodies	Moderate	Moderate
Unnamed Lake	Water Bodies	Moderate	Moderate
Wallkill River	Water Bodies	Moderate	Moderate
Wetlands Ward 1	Wetlands and Marshes	Moderate	Moderate
Wetlands Ward 2	Wetlands and Marshes	Moderate	Moderate
Wetlands Ward 4	Wetlands and Marshes	Moderate	Moderate
American Legion	Community Centers	Residual	Residual
Nature Conservancy	Natural Protective Features	Residual	Residual
Townley Hall Club	Community Centers	Residual	Residual
Wetlands Ward 3	Wetlands and Marshes	Residual	Residual
12 Water Bodies	Water Bodies	Residual	Residual
13 Cultural or Religious Establishments	Cultural or Religious Establishments	Residual	Residual
6 Parks and Recreation Facilities	Parks and Recreation	Residual	Residual
5 Museums, Performing Arts Centers, Stadiums	Museums, Performing Arts Centers, Stadiums	Residual	Residual

Source: NYRCR 2014, NYS DOS 2014

HOUSING ASSETS

Of the total 38 facilities identified in the Housing Assets category, one asset—the Senior Horizons multi-family residential facility—was located within a risk area, and therefore, is at moderate risk from flooding during a 100-year event. Senior Horizons is located on 141 Bert Crawford Road on a peninsula extending into Silver Lake. A portion of the property is located within the 1% annual chance floodplain. This property is located near identified locations of past flood damages, including roadway washouts from Hurricane Irene on Bert Crawford Road in the immediate vicinity of the Senior Horizons building.

Table 2.6 lists the risk scores for Housing Assets in the Town of Wallkill. Most housing assets in the Town are outside of the mapped risk areas; however, housing facilities that were identified as critical facilities with high community value, in addition to those within the risk area, could be considered for flood-proofing or other mitigation measures to reduce both vulnerability and exposure.

TABLE 2.6 – HOUSING ASSETS

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Senior Horizons	Multi-Family Residence	Moderate	Moderate
27 Multi-Family Residences	Multi-Family Residence	Residual	Residual
3 Single-Family Residences	Single-Family Residence	Residual	Residual
7 Supportive Housing Establishments	Supportive Housing	Residual	Residual

Source: NYRCR 2014, NYS DOS 2014

Hydraulic Modeling: An Additional Tool for Analyzing Risk

The Town of Wallkill has suffered numerous damages caused by the repetitive flooding of the Wallkill River, Shawangunk Kill, and the Masonic Creek, along with other minor waterways and unnamed tributaries draining land areas within the Town.

This substantial flood risk is primarily caused by proximity of the residential and commercial development to the waterways throughout the Town, as well as obstructions in the streams which impede the flow of water and contribute to increased flood risk for the surrounding properties. Confluences of tributaries and culverts may also have impacts on flood conditions of waterways throughout Town.

In order to understand the underlying causes of flooding and sediment transfer in the area, a hydraulic analysis was completed for riverine sections of the Plan Area where existing Hydrologic Engineering Centers River Analysis System (HEC-RAS) models were available. These existing models were modified to include current physical characteristics. The existing flood conditions were evaluated to identify the effect of specific obstructions located within specific sections of the waterways.

Flooding Overview – HEC-RAS Results

The Town of Wallkill has suffered recent damage by repeated flooding of the Wallkill River and, in particular, of Masonic Creek and Winding Brook, and their tributaries. Masonic Creek flows through Silver Lake just north of Route 211 and merges with the Wallkill River near Golf Links Road, just north of the Westhills Country Club. Winding Brook's headwaters are located near Scotchtown Collabar Road, and flows through culverts and drainage ditched across residential neighborhoods in Scotchtown before ultimately merging with the Wallkill River roughly three miles downstream.

Flooding within the community is primarily caused by overflow of Masonic Creek's and the Wallkill River's banks at locations where their main channel is shallow. The water velocities along Masonic Creek and the Wallkill River are fairly slow, increasing the potential of sediment accumulation upstream of bridges, culverts, and spillways, and therefore increasing the chance for flooding. Confluences of tributaries may also have impacts on flood conditions of Masonic Creek and the Wallkill River. In addition, localized flooding due to stormwater runoff, and overwhelmed drainage infrastructure, has affected some areas throughout Wallkill, in particular the Scotchtown Winding Book neighborhood and the commercial zone west of the Middletown High School. Flooding issues in these areas appear to be exacerbated by undersized culverts and inefficient stormwater drainage networks.

The available HEC-RAS models for the Masonic Creek, the Wallkill River and its tributaries are dated and poorly reproduce the existing site conditions and the published FEMA data. The existing models were field-validated and updated to the greatest extent possible, but new models were not created as part of this project. Additional simplified models were developed as needed to analyze areas prone to severe flooding.

Based on the extension of the FEMA 100- and 500-year floodplain and the hydraulic analysis conducted, the main areas of the Wallkill community that are most prone to flooding are: the Silver Lake-Scotchtown Road section near the NJ Transit Railroad Bridge; the Silver Lake's shoreline; and the Wallkill River's riverine area between the golf course and Philipsburg Road, where important water infrastructure assets are located. The community indicated additional areas that flood during major storm events but for which no HEC-RAS models are currently available for the analysis, including: the Winding Brook's riverine area within the Scotchtown neighborhood; and the commercial zone west of the Middletown High School. The analysis of these sites is being conducted using alternative methods, such as estimating the flood storage capacity of potential retention areas and assessing the capacity of existing culverts or stormwater drainage systems.

Several tributaries were identified along the course of Masonic Creek and the Wallkill River, and their flow contribution is included in the available HEC-RAS models. However, physical geometry of these tributaries was not included in the available models so they were not explicitly assessed as part of this project. Bank erosion along these tributaries might have increased the amount of sediment deposits behind bridges, culverts, and spillways in the mainstem of the Masonic Creek and Wallkill River, particularly along Silver Lake's shoreline and the Masonic Creek section upstream of Silver Lake. In addition, flooding issues might have increased throughout the years as a result of stormwater drainage outfalls located along Masonic Creek and Silver Lake.

Critical buildings and facilities have been identified within the 100-year floodplain, including: water utilities (i.e., a water pumping stations, water wells, and the wastewater treatment plant) east of Route 50; and several residential and commercial buildings. The impact of flooding and the amount of protection required is assessed on a case-by-case basis using the hydraulic analysis.

Potential flood mitigation projects are currently being assessed by the community of Wallkill. For example, analysis of the 100- and 500-year Water Surface elevation (WSE) and floodplain extent would support the selection of flood protection measures for infrastructure along the Wallkill River. The upgrade of the existing culverts and streambed along Winding Brook are being evaluated for the Scotchtown neighborhood. Potential flood mitigation of the commercial zone west of the Middletown High School might be obtained by improving the drainageway, riparian area, and downstream culvert, and additional flood storage capacity is evaluated by examining water level management of Silver Lake using a gate in the spillway.

Assessment of Needs and Opportunities

The Committee identified preliminary needs and opportunities for the Town of Wallkill, categorized by the six RSFs. The needs identified hereafter align with and speak to the issues discussed previously in this Town of Wallkill NYRCR Plan, and address vulnerable and at-risk assets. The opportunities that arise from those needs capitalize on the Town's existing strengths, and on the NYRCR Program. These opportunities can help to protect and enhance those highly valued assets that are critical to the Town's continuing capacity to thrive and become more resilient to future disaster events. The needs and opportunities presented will also provide the necessary foundation and structural framework for the strategies and projects that are described in detail in subsequent sections of this Town of Wallkill NYRCR Plan. Inherent to the process, some strategies and preliminary project ideas are also identified during the needs and opportunities compilation.

Infrastructure

Much of the critical infrastructure in the Town of Wallkill is frequently incapacitated by the impacts of major wind, rain, and flood events, including those caused by Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy. Crippling power outages, transportation interruptions, stormwater system overflows, and sewer back-flows into private residences that occurred during these storms all highlight the need for investment in infrastructure. Re-building infrastructure with increased

Pictured here is significant flooding that led to damage at Ben Lomond Drive following Superstorm Sandy. Photo is courtesy of the Town of Wallkill.

capacity, flexibility, and resilience is critical to decreasing the Town's vulnerability to future disasters.

As described in Section 1, the loss of electrical power to many traffic signals in the Town of Wallkill in the aftermath of Superstorm Sandy caused gridlock conditions, which hampered or prevented emergency vehicle movement within the Town.

During Hurricane Irene, torrential rains and high winds also caused power outages, along with widespread flooding throughout Town. Several of the Town's water and sewer pump stations lost both power and sustained flood damage, including Belmont Avenue Pump Station, Northern Woods Sewer Pump Station, and Woodland Acres Water Pump Station. Without power, the pumps at these stations no longer operated, threatening an overflow of sewage material into the surrounding residential areas.

Figure 1.8 (in Section 1) shows several arterial roadways that provide access to and from the major activity centers in Town that were completely cut off after Hurricane Irene. State Route 211, which serves as the main access way east of the Town and Interstate Highway 84, was inundated with several feet of water at the eastern boundary of the Town of Wallkill. Insufficient culverts in several locations led to flood waters overtopping roadways, and left cracked asphalt and collapsed roadway shoulders in its wake. These locations included the Loch Lomond and Patricia Road crossings of Winding Brook in Scotchtown, at Bedami Drive, on Gordon Road near Lybolt Road, and at the Ballard Road crossing of a tributary to the Wallkill River at East Galleria Drive.

The inlet off Bert Crawford Road at Silver Lake washed out, causing the roadway to flood. In some cases, bright orange construction barrels still stand in place around shoulder washouts on these town roads, diverting traffic towards solid ground.

Based on these experiences, and on the results of the risk assessment that identified critical roadway segments at high risk of future flood damage, the following needs and opportunities have been identified with regards to infrastructure systems and facilities in the Town of Wallkill.

Gordon Road gave way under the rushing floodwaters in the wake of Hurricane Irene. Photo of caved -in road is courtesy of the Town of Wallkill.

INFRASTRUCTURE NEEDS AND OPPORTUNITIES

Need: Reinforce vulnerable roadway segments and address constricted drainageways and undersized culverts that cannot handle the flow from major storm events.

Opportunity: Reduce constrictions in the Winding Brook floodplain, including replacement of degraded and insufficient culvert pipes on Loch Lomond, Bedami Drive, and Gordon Road with larger box culverts to increase flow capacity and protect roadways from future damage and collapse.

Opportunity: Facilitate an emergency easement and dam release/operations agreement between the Town of Wallkill and the private property owners of the Silver Lake Dam. Consider the potential to work towards a mutual public-private partnership for operations and maintenance, and to reduce flooding on Bert Crawford Road at the Silver Lake Dam inlet.

Opportunity: Develop a financial aid or incentive program to help private dam owners upgrade dam gates.

Opportunity: Fix lingering, flood damaged roadway segments along Loch Lomond and Patricia Roads in Scotchtown.

Opportunity: Identify locations for and install flood storage, rain gardens, and bio-retention cells to reduce the overall volume of water reaching various riverine floodways in the Town. Reduce stormwater sheet flow, and improve the natural groundwater filtration cycle.

Need: Ensure back-up power to critical traffic signals and other critical infrastructure components to reduce the likelihood of future outages.

Opportunity: Upgrade the electric transmission infrastructure.

Opportunity: Integrate renewable energy sources to reduce reliance on the existing electricity grid and to reduce vulnerability to future system-wide outages.

Need: Improve the regular maintenance of stormwater drains on private properties throughout the Town.

Opportunity: Educate existing commercial and private property owners about the risks associated with debris accumulation, and the proper maintenance techniques and schedules to reduce future flood impacts.

Need: Ensure the functionality of critical emergency, health, and safety infrastructure facilities and operations during future storm events.

Opportunity: Install flood protection measures to protect the Braeside Water Treatment Plant.

Need: Improve sewer system infrastructure to prevent back flow into private residences during storm events.

Opportunity: Conduct an education and outreach campaign focused on the financial risks and health and safety hazards associated with sewer backflows, and provide information to homeowners about the installation of backflow preventers in private homes.

Economic Development

The primary economic concern after a disaster is returning economic and business activities to a state of health.

The ability to get the Town's economy "up and running" in short order after a major disaster is an indication of resilience, and requires a diversified approach both to hazard mitigation and economic development planning.

Furthermore, recovery periods often present unique opportunities for communities to develop new economic strengths that result in a more sustainable and robust local economy. Communities that strategically design an economic development strategy, and support these elements in their planning process, are more likely to capitalize on opportunities for economic improvement, such as those presented through recovery programs, such as the NYRCR Program.

The Town of Wallkill is known as an attractive and inviting place to do business, as evidenced by the massive amounts of investment in the Town in recent decades. It is home to thriving retail, medical, and engineering sectors that add to the Town's allure; other sectors of the local economy are still struggling to rebuild, however.

Image of a typical "mom-and-pop" store in the Town of Wallkill. Photo is courtesy of Robert Beemer.

For instance, local retailers that serve the traditional hamlet centers far from the regional commercial areas in the Town are not guaranteed the same consistent flow of shoppers, nor are they likely to be backed by corporate financial systems to support quick structural repairs, when needed. Similarly, the Town of Wallkill's many agricultural landowners and farmers have limited resources for self-promotion and advertisement; therefore, they are not readily leveraged to the greatest extent possible as a source of local food or community pride. The Town could benefit by more fully utilizing and marketing its legacy of local agricultural and small-scale commercial assets to diversify its economic landscape as a whole, and to increase the Town's draw.

The Committee considered these factors, along with the vulnerability and flood risks to specific economic assets and transportation systems that provide access to the various commercial and retail nodes throughout the Town. These factors helped to identify economic development needs and opportunities.

ECONOMIC DEVELOPMENT NEEDS AND OPPORTUNITIES

Need: Support the Town's legacy industries and economic assets to ensure a diverse economy, improve sense of community, preserve quality of life for long-term residents, and to increase visitors' foot-traffic to and around the Town.

Opportunity: Install sidewalks and make streetscape improvements in Mechanicstown along State Route 17M.

Need: Assist agricultural landowners and farmers in the Town of Wallkill to improve marketing and broaden their local presence in town.

Opportunity: Engage local farmers and small business owners in a group marketing effort to increase local presence.

Opportunity: Establish a flagship Town of Wallkill farmer's market in a location that offers convenient access for local residents, while providing access to transient, regional visitors. The market could include vendors who offer local produce, along with crafts and other goods. Other options include the establishment of temporary "pop-up" markets at various venues and times throughout the Town, and a "Taste of Wallkill" event or series of events at local restaurants and/or businesses.

Need: Secure transportation, utility, and other critical infrastructure systems from future flood damages in order to instill confidence in future investors.

See Infrastructure Opportunities.

Community Planning and Capacity Building

The Community Planning and Capacity Building recovery support function addresses a community's ability to implement storm recovery activities and to mitigate the effects of future storms. The NYRCR Program offers an opportunity for the Town of Wallkill to review existing codes and ordinances, and to ensure that local guidelines support and promote best practices in reconstruction.

Strong community planning will ensure that both new, "green" development and reuse of former industrial or commercial sites, also known as "brownfield" redevelopment, will build a better Town of Wallkill. This would require instituting flood-resilient infrastructure that is based on current risk information, flood-proofing best practices, and the long-term goals and visions of that support the well-being and livelihoods of future generations.

The Committee identified the following needs and opportunities in community planning and capacity building.

COMMUNITY PLANNING AND CAPACITY BUILDING NEEDS AND OPPORTUNITIES

Need: Develop and implement policies, incentives, and regulations to support the preservation of farmland and agricultural industries in the Town.

Need: Ensure the provision and protection of an adequate supply of open space, maximizing the recreational value of natural areas for all citizens.

Opportunity: Update local zoning codes to concentrate development around existing infrastructure and away from sensitive natural resources.

Opportunity: Create a community garden on natural public land in a high-density residential part of the Town.

Health and Social Services

After a disaster, one of the more immediate issues is whether public health, healthcare facilities, and essential social service needs have been restored. To help develop appropriate strategies and management measures, the Committee reviewed the existing Town assets that support vulnerable populations, and identified key needs critical to protecting the health and well-being of all residents in a post-disaster environment. Transportation infrastructure failures and access interruption are the main hindrances to providing basic care at a level equal to those provided during "blue skies."

Past flood events in the Town of Wallkill, including those associated with Hurricane Irene and Tropical Storm Lee, led to widespread structural damage to local roadways and to critical facilities, including water pump stations. As residential basements began to flood, a significant amount of residents used sump pumps and directed water into the sanitary system, against local regulations. This caused sewer system overflows, which caused sludge to flow back into homes that were not equipped with backflow check valves. This occurred in many homes in the Mechanicsville neighborhood, and resulted in homeowners with thousands of dollars in damages that insurance companies would not pay to repair, since most homeowner's policies do not include coverage for sewer or drain water backup unless such coverage is added by endorsement for an additional premium.

The significant vulnerability posed by these interruptions to critical public health and safety services underlies a number of the needs and opportunities the Committee identified in this category.

Vulnerable populations, such as the individual with the cane pictured above, are at particularly high risk during disasters. Image is courtesy of Tetra Tech, Inc.

HEALTH AND SOCIAL SERVICES NEEDS AND OPPORTUNITIES

Need: Protect water infrastructure that is vulnerable to flooding.

Need: Provide back-up power for critical facilities.

Opportunity: Install permanent back-up generators in all assisted living facilities.

Need: Prevent future storm and sewer system overflows.

Opportunity: Design and conduct an outreach education campaign that advises homeowners about the need to install sewer backflow preventers, or check valves, both to satisfy local building codes and to prevent costly damages that result from sludge entering homes during future system overflows. The Town can consider a requirement to check sump pumps before the sale of residences.

Opportunity: Educate homeowners about local codes that require sump pump water to be sent to daylight, not to the sanitary system.

Opportunity: Establish a revolving loan to assist homeowners with the installation of check valves on a reimbursement basis.

Need: Provide additional outreach and education on key issues related to disaster preparedness, evacuations, sheltering in place, and stream maintenance.

Housing

Local housing goals emphasize increasing the preparedness and resiliency of the existing housing stock, and increasing affordable housing options outside the flood zone. Resiliency alternatives are directed toward the types and locations of housing assets with the greatest needs, the provision of sufficient housing alternatives for owners and renters, and the enactment of incentive programs for homeowners to undertake mitigation retrofits.

Working from an intimate knowledge of these factors, the Committee identified housing-related needs and opportunities to further evaluate in the planning process.

HOUSING NEEDS AND OPPORTUNITIES

Need: Support the Town's settled neighborhoods by maintaining existing public sewer capabilities, while ensuring the environmentally sound operation of private septic systems.

Need: Protect assisted living housing facilities.

Opportunity: Install permanent back-up generators in all assisted living facilities.

Need: Work with homeowners to ensure all homes with sewer system connections are equipped with a backflow check valve. See Health and Social Services Needs and Opportunities.

Need: Increase stormwater retention throughout established residential neighborhoods and existing developments.

Opportunity: Evaluate the benefits of using land at Fredrick's Farm for future flood storage.

Need: Attract reinvestment to traditional hamlet and neighborhood centers to improve quality of life for residents.

Opportunity: Install sidewalks, street lights, and other improvements near memorial park in Washington Heights along State Route 17m North, in Circleville to increase safety and visual quality.

Opportunity: Create an informational pamphlet for prospective buyers to convey the dynamic of the Town of Wallkill, the various communities in Town, and where Town boundaries are located.

Natural and Cultural Resources

Natural infrastructure has been increasingly recognized as a low-impact and sustainable means to mitigate losses from natural hazards. The Committee identified a number of needs and opportunities to capitalize on these assets, such as marketing local historic resources and improving environmental and ecosystem protections through flood reduction.

NATURAL AND CULTURAL RESOURCES NEEDS AND OPPORTUNITIES

Need: Work with local, state, and federal partners to regulate development and maintenance of dams and other infrastructure in the floodplain.

Need: Protect the Town's natural and historic areas.

Opportunity: Establish an integrated, well-connected open space system.

Opportunity: Create passive recreation on the Palisades Interstate Parkway land within the Town.

Opportunity: Increase stormwater capacity on major waterways, including the Monhagen Brook headwaters areas.

Opportunity: Review residential stormwater impervious surface coverage standards for properties zoned R1 and R2.

Photo of fall leaves through barbed fence is courtesy of Eric Thayer.

Section 3

Reconstruction and Resiliency Strategies

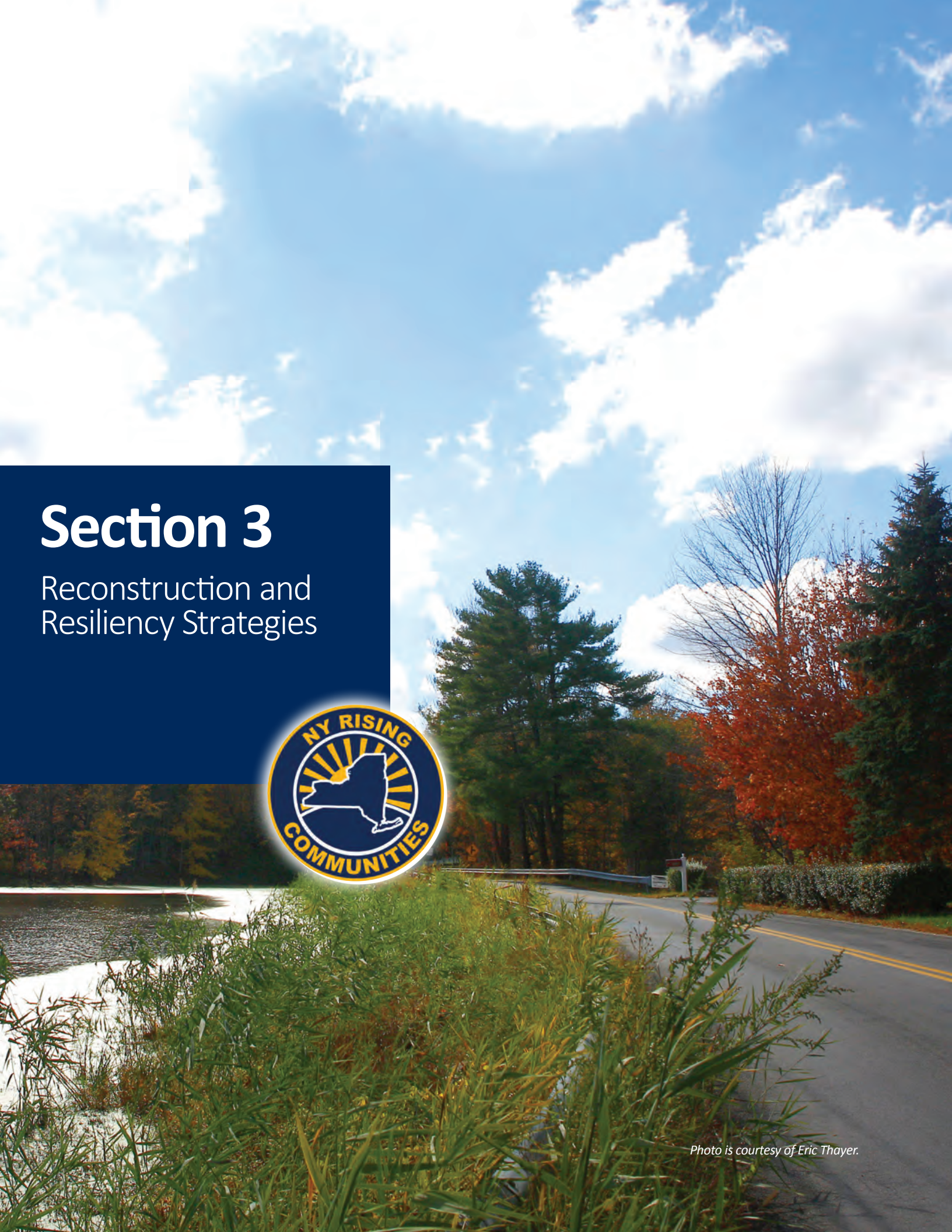


Photo is courtesy of Eric Thayer.

Section 3: Reconstruction and Resiliency Strategies

Through a combination of additional analysis and ongoing discussions at Town of Wallkill NY Rising Community Reconstruction (NYRCR) Committee (Committee) Meetings, and public feedback, the Committee identified a series of strategies to address the most critical needs related to community health, safety, resiliency, and quality of life.

The strategies reflect community values, issues, needs, and opportunities, and they are the foundation for identifying and prioritizing projects and implementation actions in Section 4 of this Town of Wallkill NYRCR Plan.

The following discussion draws the connection between many of the needs identified by the Committee (presented in Section 2: Assessment of Risk and Needs) and the related strategies presented here. Some of those needs and opportunities appear in more than one of the following strategies.

The Committee developed these strategies with input from the public, stakeholder groups, and municipal leaders. Section 4: Proposed and Featured Project Profiles contains descriptions and cost-benefit analyses of the proposed and featured projects. A full list of Proposed, Featured, and Additional Resiliency Recommendations is in Section 5: Additional Materials.

Strategy 1: Ensure an efficient, safe, and resilient transportation system.

Were a severe storm or flooding incident to strike its greatest blow to the Town of Wallkill, it would be through damage to the Town's roadways, bridges, and transportation infrastructure. Impacts to these assets could potentially cripple the continued operations of local and municipal emergency services and could jeopardize the health and safety of transportation users throughout the Town of Wallkill Plan Area (Plan Area).

Damaged roadways inhibit both the evacuation of affected populations out of a hazard area and the ingress of emergency responders to where help is needed.

Likewise, traffic infrastructure that relies on electrical power, such as traffic signals and street lights, fills a critical need and maintains orderly traffic flow during evacuation and emergency response.

In addition to facilitating the flow of traffic during an emergency, investors (i.e., major employers and developers) examine an area's transportation infrastructure when determining where to invest. The Town of Wallkill should demonstrate a reliable transportation network to continue to attract and retain investment in the community.

Strategy 1 considers local and regional transportation assets, and the role they play in resiliency. Photo of heavy traffic at intersection courtesy of Eric Thayer.

This strategy directs efforts and investment toward fulfilling several of the needs identified by the Committee, including, but not limited to, the following:

- Reinforce and/or inspect vulnerable roadway segments;
- Ensure back-up power to traffic signals and other critical infrastructure components to reduce likelihood of future outages; and
- Secure transportation, utility, and other critical infrastructure systems from future flood damages to instill confidence in future investors.

Opportunities that arise from this strategy include (1) fixing roadway segments with lingering flood damaged along various roads in Scotchtown; and (2) integrating renewable energy sources to reduce reliance on the existing electricity grid and to reduce vulnerability to future system-wide outages.

While the Committee had to assess project feasibility and could not propose all improvements for funding through this NYRCR Program, the Committee will recommend the future resiliency actions to the Town as other funding opportunities become available. The Committee, in support of its Community, seeks to address failures on local roadways segments and transportation elements throughout the Town to make the overall transportation network more resilient to future storms.

Priority locations for future investment under this strategy may include but would not be limited to:

- Ballard Road at East Galleria Drive
- Fitzgerald Avenue
- Karen Drive near High Barney Road
- Residential roadways in Scotchtown
- Van Burenville Road near the Mt. Hope Town line
- County Route 78 near High Barney Road

These and other projects would reduce disaster impacts by ensuring that the Town's transportation infrastructure remains viable during and after a wide-spread power outage, a major flood event, or other hazard incidents. Table 3.1 identifies those projects developed by the Committee to accomplish Strategy 1.

TABLE 3.1 – STRATEGY 1

Strategy 1: Ensure an efficient, safe, and resilient transportation system.

Project Name	Short Project Description	Recovery Support Function	Estimated Cost	Proposed/ Featured Project	Regional Project (Y/N)
Ballard Road at East Galleria Drive Flood Mitigation	Replace an undersized culvert to improve flood-level flow capacity, increase floodwater conveyance, and access available floodplain downstream. The roadway and shoulder sustained costly flood damages during Hurricane Irene and Superstorm Sandy, resulting in temporary road closure and sustained lane closure. The intersection is a high traffic area for both regional and local motorists and serves as a critical node for traffic headed from the south, accessing the Metro-North Middletown train station; or from State Route 17 and Interstate 84, heading to the Regional Medical Center or the Galleria Mall at Crystal Run. Industrial traffic also relies on this segment to access nearby facilities at all hours of the night.	Infrastructure; Health and Human Services; Economic	$1,207,599	Proposed	N
Natural Gas or Solar Back-up Power for Critical Facilities and Infrastructure	Install permanent natural gas or solar back-up power sources for critical facilities and infrastructure in the Town, including: traffic signals near Route 211 and Route 17 intersection; Wallkill Senior Housing, 88 Senior Way; and Senior Horizons, 141 Bert Crawford Road. Power sources would be obtained for specific facilities that service functional needs and vulnerable populations. This project would reduce the need to rely on emergency services and responders to meet basic health and safety needs during large-scale power outages. This project would also include an evaluation of existing shelter and other critical facilities needs for redundant power generation. Use of solar or green energy will be considered, where feasible.	Infrastructure; Health and Human Services; Economic	Traffic signals: $220,000; Wallkill Senior Citizens: $69,660; Senior Horizons: $69,660.	Proposed	N
Silver Lake Dam Modifications and Emergency Operations Agreement	Mitigate future flood damages at repetitively damaged roadways in the area, including the Silver Lake-Scotchtown Road and "Twin Bridges," along Bert Crawford Road near the inlet for Silver Lake; at the intersection of Fitzgerald Drive and Neely Street; and at State Route 211 East near Wallkill Plaza. Part 1 of the project would improve the Silver Lake outlet structure to enable timely WSE reduction in Silver Lake to increase flood storage capacity and reduce localized flooding. Part 2 of the project calls for coordination with the owners of the Silver Lake Dam to secure access for Town officials and the authority to lower the water level prior to a storm event.	Infrastructure; Natural and Cultural Resources; Community Planning and Capacity Building	$100,000	Proposed	N

TABLE 3.1 – STRATEGY 1 (CONT'D)

Strategy 1: Ensure an efficient, safe, and resilient transportation system.

Project Name	Short Project Description	Recovery Support Function	Estimated Cost	Proposed/ Featured Project	Regional Project (Y/N)
Winding Brook Floodplain Improvements	Mitigate future flood damages throughout the Winding Brook floodplain in the Scotchtown neighborhoods. The project will focus on the Ben Lomond Drive culvert, as its current state threatens several buried Town utilities. The current culvert will be replaced with an upgraded structure. The project will also reactivate two capped ends of the water main pipe under Ben Lomond Drive, which was broken during Tropical Storm Lee due to roadway collapse around the Ben Lomond culvert.	Infrastructure	$537,798	Proposed	N

Notes: *WSE* *Water Surface Elevation*
Y/N *Yes or no*

Strategy 2: Improve stormwater management and drainage systems throughout the town to decrease risk for homes, businesses, and residents.

Stormwater management infrastructure failures precipitated much of the flood damage in the Town of Wallkill from Hurricane Irene, Tropical Storm Lee and Superstorm Sandy. The stormwater management infrastructure became strained from the large volume of rain that fell during these storms. The Committee identified several needs related to improving the stormwater management and drainage systems throughout the Town. They include the following:

- Address constricted drainageways and undersized culverts that cannot handle the flow from major storm events;
- Prevent future storm overflows; and
- Increase stormwater retention throughout established residential neighborhoods and existing developments.

In total, this strategy addresses needs and opportunities across four recovery support functions (RSFs), proposing investments in Infrastructure, Natural and Cultural Resources, Housing, and Health and Social Services. It capitalizes on opportunities to reduce constrictions in floodplains, increase stormwater storage capacity along major waterways, maintain drains on public and private property, and review community standards for impervious surface coverage.

To reduce constrictions in the Winding Brook floodplain, the Committee located several degraded and insufficient culvert pipes on Loch Lomond Lane, Bedami Drive, and Gordon Road that should be replaced with larger culverts. Larger culverts will increase flow capacity and protect roadways from damage and collapse. Increasing the culvert capacity on Ballard Road would also improve flow in the Winding Brook floodplain further downstream.

The Community can achieve further damage reductions from stormwater runoff by increasing stormwater retention capacity along major waterways, such as along the Masonic Creek's and Monhagen Brook's headwater areas.

The Town can also maximize the natural stormwater storage potential of the land by reviewing and if necessary, improving the impervious surface coverage standards in residential neighborhoods. This approach ensures the maximum area possible will be left permeable on future development sites. This action also allows future rainwaters to be absorbed into the aquifer through the ground, rather than requiring the stormwater to be conveyed via surface sheet flow to the nearest surface water body.

Table 3.2 identifies those projects developed by the Committee to accomplish Strategy 2.

Proper stormwater management plays an integral role in reducing a community's risk to flooding. Photo of clear drainage pipe is courtesy of Tetra Tech, Inc.

TABLE 3.2 – STRATEGY 2

Strategy 2: Improve stormwater management and drainage systems throughout the Town to decrease risk for homes, businesses, and residents.

Project Name	Short Project Description	Recovery Support Function	Estimated Cost	Proposed/ Featured Project	Regional Project (Y/N)
Channel Daylighting and Riparian Improvements	Implement channel daylighting and riparian improvements along the drainageway between the commercial properties at 280 State Route 211, the Shoprite Plaza, and the Middletown High School to reduce local flooding. The extent of this project depends on the amount of additional land the Town can acquire from private property owners to increase the riparian area.	Infrastructure; Natural and Cultural Resources	$615,434	Featured	Y
Masonic Creek Watershed Stormwater Storage: Fredrick's Farm Stormwater Storage and Public Park	Increase, improve, and preserve stormwater storage capacity and retention along a tributary to Masonic Creek. This project would accomplish multiple goals, including increasing floodwater storage and retention and creating recreational opportunities. The project would be completed in two phases. The first phase would include transforming the roughly 22-acre Fredrick's Farm site into a public park with passive recreation, a natural trail system, restored wetlands, edible forests, and interpretive signage about the site's history and the black dirt resource. Phase 2 would consist of additional acquisition of suitable land for flood storage along the Masonic Creek and improving those sites for maximum flood storage. Phase 2 is not part of the Featured NYRCR project.	Infrastructure; Housing; Natural and Cultural Resources; Community Planning and Capacity Building	Phase 1: $5,367,084; Phase 2: $20,447,801	Featured	N
Silver Lake Dam Modifications and Emergency Operations Agreement	Mitigate future flood damages at repetitively damaged roadways in the area, including the Silver Lake-Scotchtown Road and "Twin Bridges," along Bert Crawford Road near the inlet for Silver Lake; at the intersection of Fitzgerald Drive and Neely Street; and at State Route 211 East near Wallkill Plaza. Part 1 of the project would improve the Silver Lake outlet structure to enable timely WSE reduction in Silver Lake to increase flood storage capacity and reduce localized flooding. Part 2 of the project calls for coordination with the owners of the Silver Lake Dam to secure access for Town officials and the authority to lower the water level prior to a storm event.	Infrastructure; Natural and Cultural Resources; Community Planning and Capacity Building	$100,000	Proposed	N
Winding Brook Floodplain Improvements	Mitigate future flood damages throughout the Winding Brook floodplain in the Scotchtown neighborhoods. The project will focus on the Ben Lomond Drive culvert, as its current state threatens several buried Town utilities. The current culvert will be replaced with an upgraded structure. The project will also reactivate two capped ends of the water main pipe under Ben Lomond Drive, which was broken during Tropical Storm Lee due to roadway collapse around the Ben Lomond culvert.	Infrastructure	$537,798	Proposed	N

Strategy 2 may lead to projects for enlarging and replacing culverts, providing stormwater storage, and clearing drainageways such as the one shown above near Ben Lomond Drive, in order to reduce future flood damage and losses. Photo of wild flowers growing among rocks in drainage way is courtesy of Eric Thayer.

Strategy 3: Improve on existing emergency preparedness, response, and communications, including public outreach and education.

This strategy focuses on improving the capability of local government emergency services personnel, local fire districts, and all Plan Area residents to prepare for and respond to future storms, so that future storm impacts are less severe than the impacts from Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy.

Implementing this strategy begins with educating the public on the potential impacts and consequences of future storms, along with what individuals can do to protect themselves and their neighbors. Primary education needs should include:

- Family disaster planning;
- Evacuation and shelter-in-place considerations;
- Maintaining clear waterways and drainageways on residents' property; and
- Preventing backflow of sewer lines into residential homes.

The Community could distribute this information as widely as possible and in a variety of formats to ensure the greatest number of people can receive and act on the messages. This strategy also includes protecting critical emergency, health, and safety facilities in the Town of Wallkill.

Back-up power generation for all identified critical facilities will help ensure that emergency response operations can continue at the times when they are most needed.

Back-up power not only plays a crucial role in maintaining uninterrupted municipal services, it is also critical to providing basic healthcare necessities for residents living with functional needs. Assisted living facilities, which care for many of the Town's vulnerable populations, strongly need additional protection against storm events. The installation of back-up power generators can ensure that critical medical systems inside the facilities will continue to function even during a widespread power outage.

The Town's water infrastructure has demonstrated its susceptibility to flooding, as evidenced by damages sustained at various pump stations during flooding from Tropical Storm Lee. That same infrastructure is also susceptible to failure during power outages, because not all facilities contain sufficient back-up power to keep the system operational. To better protect the critical functions of water and wastewater treatment in the Plan Area, the Committee has recommended actions to protect water facilities (such as the Braeside Water Treatment Plant) from future flood and power outage events.

The Committee also recommends a targeted outreach and education campaign to reduce unnecessary and inappropriate loads on the municipal sanitary system during flood events. Due to existing improper connections of residential sump pumps to the sanitary sewer lines, a heavy rainfall event can significantly increase the volume of water flowing to the sewer treatment plant. Educating residents about the proper connection protocol would also help prevent basement sewage backflow, a potential consequence of sanitary system overflow, by increasing awareness about residential back-flow prevention. In addition, the Committee will forward the recommendation for sump pump inspections prior to the sale of a residence to the Town Board for consideration.

Emergency communications and planning initiatives form the core of all Committee recommendations regarding emergency preparedness and response.

This strategy addresses the needs of first responders and vulnerable populations, two populations that rely on unique aspects of emergency preparedness to safely and effectively weather severe storms. Shown above is the Town of Wallkill Senior Center, currently the only emergency shelter in the Town. Photo is courtesy of Eric Thayer.

To provide immediate and coordinated assistance in response to disasters or emergencies, the Committee recognizes a need for interoperable communications investments to allow public safety personnel to communicate with each other effectively, securely, and in real time during any ongoing hazard incident. Emergency shelters and warming stations also must be accessible to residents in all parts of Town. Future investments may include updating the Comprehensive Emergency Management Plan (CEMP) to ensure efficient, coordinated response to a range of future disaster events.

Table 3.3 identifies those projects developed by the Committee to accomplish Strategy 3.

TABLE 3.3 – STRATEGY 3

Strategy 3: Improve on existing emergency preparedness, response, and communications, including public outreach and education.

Project Name	Short Project Description	Recovery Support Function	Estimated Cost	Proposed/ Featured Project	Regional Project (Y/N)
Circleville Hamlet Preparedness and Public Space Improvements	Improve disaster preparedness for rural residents of central and northern Wallkill, and transform the historic hamlet center surrounding the intersection of State Route 302 and the Goshen Turnpike to increase pedestrian access. Preparedness project elements would include equipping the Circleville Park Recreation Center as an emergency shelter. Public improvements include sidewalks and streetlights installation to provide safe walking routes between the schools, the park, and the many goods and service providers in the Hamlet. Solar-powered traffic signals and streetlights are recommended to reduce vulnerability to future power outages.	Health and Human Services; Infrastructure; Natural and Cultural Resources	$129,000 for Circleville Park Shelter; $1,932,569for Circleville Public Space Improvements; Total Cost $2,061,569 $1,932,569 for Circleville Public Space Improvements; **Total Cost $2,061,569**	Featured	N
Interoperable Communications Program	Develop and implement an interoperable communications program to support effective and strategic emergency management activities. Interoperable communications refers to the ability of emergency responders to communicate and share voice and data information. These communications will ultimately lead to more efficient disaster response and recovery.	Health and Human Services; Infrastructure	$150,000 - $400,000	Proposed	Y
Natural Gas or Solar Back-up Power for Critical Facilities and Infrastructure	Install permanent natural gas or solar back-up power sources for critical facilities and infrastructure in the Town, including: traffic signals near Route 211 and Route 17 intersection; Wallkill Senior Housing, 88 Senior Way; and Senior Horizons, 141 Bert Crawford Road. Power sources would be obtained for specific facilities that service functional needs and vulnerable populations. This project would reduce the need to rely on emergency services and responders to meet basic health and safety needs during large-scale power outages. This project would also include an evaluation of existing shelter and other critical facilities needs for redundant power generation. Use of solar or green energy will be considered, where feasible.	Infrastructure; Health and Human Services; Economic	Traffic signals: $220,000; Wallkill Senior Citizens: $69,660; Senior Horizons: $69,660.	Proposed	N

TABLE 3.3 – STRATEGY 3 (CONT'D)

Strategy 3: Improve on existing emergency preparedness, response, and communications, including public outreach and education.

Project Name	Short Project Description	Recovery Support Function	Estimated Cost	Proposed/ Featured Project	Regional Project (Y/N)
Vulnerable Populations and Community Emergency Alert, Education, and Support	Implement and disseminate public education materials regarding disaster readiness. These materials will be designed for public and private sectors, families and individuals, and persons with access and functional needs and other vulnerable populations. The materials will be designed to benefit low and moderate income populations lacking reliable access to Internet.	Health and Human Services	$20,000	Featured	N
Silver Lake Dam Modifications and Emergency Operations Agreement	Mitigate future flood damages at repetitively damaged roadways in the area, including the Silver Lake-Scotchtown Road and "Twin Bridges," along Bert Crawford Road near the inlet for Silver Lake; at the intersection of Fitzgerald Drive and Neely Street; and at State Route 211 East near Wallkill Plaza. Part 1 of the project would improve the Silver Lake outlet structure to enable timely WSE reduction in Silver Lake to increase flood storage capacity and reduce localized flooding. Part 2 of the project calls for coordination with the owners of the Silver Lake Dam to secure access for Town officials and the authority to lower the water level prior to a storm event.	Infrastructure; Natural and Cultural Resources; Community Planning and Capacity Building	$100,000	Proposed	N
Sump Pump Backflow Prevention and Cross-Connection Control	Education and outreach program to minimize the occurrences of improper sump pump connections to the municipal sanitary sewer system and increase the overall number of residences equipped with backflow preventers that meet current standards. This project aims to reduce unnecessary and inappropriate load on the municipal sanitary system during flood events and to prevent basement sewage backflow with voluntary backflow installation and improper connection repair programs.	Housing; Infrastructure; Community Planning and Capacity Building	$30,000	Featured	N
Water and Sewer Treatment Plant Flood Damage Mitigation Measures	Implement strategic flood-proofing and operational mitigation activities to reduce further service interruptions and costly damage repairs. The project proposes upgrades to the Kosuga, Braeside, Crystal Run, and Rykowski Well Roads; the Braeside and Kosuga Water Treatment Plants; the Braeside Sewer Treatment Plant; and the Northern Woods and Woodland Acres Sewer Pump Stations.	Infrastructure	$998,704	Proposed	Y

Notes: TICP=Tactical Interoperable Communications Plan

Strategy 4: Preserve, protect, and enhance the town's natural, recreational, and cultural resources, and strengthen the local sense of place and community.

The Committee identified several needs and opportunities to capitalize on the Town's natural and cultural resources (i.e., some of its greatest economic assets). These needs and opportunities also have a secondary goal of enhancing the Town's sense of community and the quality of life for its residents.

Developing a sense of place in the Town of Wallkill could begin with providing information to residents, visitors, and prospective homeowners regarding the Town's geography and borders, character, recreational opportunities, local farmers and artisans, and economic assets.

The preservation, conservation, and protection of historical buildings, landmarks, and notable places, such as traditional hamlet centers, also add to the Town's societal definition as they represent the Town's culture and complexity over the years.

The needs related to this strategy include a focus on enhancing the local agricultural industry, with specific regard to enhancing the regional community's awareness of it. The Town could leverage the opportunity to establish a "Taste of Wallkill" event in the Town, which would serve to highlight the local food services industry, including large restaurants and local independent agricultural providers. Combined with an initiative to engage local farmers and small business owners in a marketing effort to build awareness of their crops and products/services, these two opportunities would help broaden local business owners' presence and impact in the Town.

Improving the quality of life in the Town also includes attracting reinvestment to the existing neighborhoods, specifically the historic hamlet centers, which traditionally act as the economic centers of activity in Town.

The "face" of the Town in these areas is especially important. Installing sidewalks and improving streetscapes invites pedestrian traffic and human-scale activities and instills greater investor confidence. The installation of a public community garden, perhaps in cooperation with one of the local educational assets, such as the Cornell Coop Extension, could bring people together from throughout the region to see a different side of the Town of Wallkill.

Additional opportunities to enjoy nature, such as public access to waterways for boating or a recreational trail for walking, running, nature watching, and biking, will also enhance residents' quality of life and bring visitors into the Town.

Table 3.4 identifies those projects developed by the Committee to accomplish Strategy 4.

Focusing resiliency spending on traditional Hamlet centers, such as the area surrounding the Post Office in Circleville shown above, is one way that Strategy 4 seeks to enhance Wallkill residents' sense of place. Photo is courtesy of Eric Thayer.

TABLE 3.4 – STRATEGY 4

Strategy 4: Preserve, protect, and enhance the Town's natural, recreational, and cultural resources, and strengthen the local sense of place and community.

Project Name	Short Project Description	Recovery Support Function	Estimated Cost	Proposed/ Featured Project	Regional Project (Y/N)
Circleville Hamlet Preparedness and Public Space Improvements	Improve disaster preparedness for rural residents of central and northern Wallkill, and transform the historic hamlet center surrounding the intersection of State Route 302 and the Goshen Turnpike to increase pedestrian access. Equip the Circleville Park Recreation Center as an emergency shelter. Public improvements include sidewalks and streetlights installation to provide safe walking routes. Solar-powered traffic signals and streetlights are recommended to reduce vulnerability to future power outages.	Health and Human Services; Infrastructure; Natural and Cultural Resources	$129,000 for Circleville Park Shelter; $1,932,569for Circleville Public Space Improvements; Total Cost	Featured	N
Marketing and Outreach Campaign about Life in the Town of Wallkill	Develop and produce materials to strengthen the sense of place for the Town of Wallkill residents. These materials could include the creation of an informational pamphlet for prospective buyers and visitors.	Community Planning and Capacity Building; Economic Development	$40,000	Featured	N
Masonic Creek Watershed Stormwater Storage: Fredrick's Farm Stormwater Storage and Public Park	Increase, improve, and preserve stormwater storage capacity and retention along a tributary to Masonic Creek. This project would accomplish multiple goals, including increasing floodwater storage and retention and creating recreational opportunities. The project would be completed in two phases. The first phase would include transforming the roughly 22-acre Fredrick's Farm site into a public park with passive recreation, a natural trail system, restored wetlands, edible forests, and interpretive signage about the site's history and the black dirt resource. Phase 2 would consist of additional acquisition of suitable land for flood storage along the Masonic Creek and improving those sites for maximum flood storage. Phase 2 is not part of the Featured NYRCR project.	Infrastructure; Housing; Natural and Cultural Resources; Community Planning and Capacity Building	Phase 1: $5,367,084; Phase 2: $20,447,801	Featured	N
Silver Lake Dam Modifications and Emergency Operations Agreement	Mitigate future flood damages at repetitively damaged roadways in the area, including the Silver Lake-Scotchtown Road and "Twin Bridges," along Bert Crawford Road near the inlet for Silver Lake; at the intersection of Fitzgerald Drive and Neely Street; and at State Route 211 East near Wallkill Plaza. Part 1 of the project would improve the Silver Lake outlet structure to enable timely WSE reduction in Silver Lake to increase flood storage capacity and reduce localized flooding. Part 2 of the project calls for coordination with the owners of the Silver Lake Dam to secure access for Town officials and the authority to lower the water level prior to a storm event.	Infrastructure; Natural and Cultural Resources; Community Planning and Capacity Building	$100,000	Proposed	N

Strategy 5: Promote sustainability and resilience through local planning mechanisms and regulation/code enforcement.

The Committee recognizes the strength in local plans, programs, and regulations as a means to protect the people, property, and environment. The Committee also recognizes that implementation of these standards can minimize vulnerability for the Town. This strategy addresses needs and opportunities in the Community Planning and Capacity Building and the Natural and Cultural Resources RSFs.

The Committee identified the need to preserve farmland and the agricultural industries in the Plan Area. To do this, the Town will need to develop and implement policies, incentives, and regulations to support such preservation and to maintain a critical aspect of the Town's character and economy.

Likewise, the Committee intends to encourage the protection of open space in the Town, both as part of an overall floodplain management strategy and as a public benefit.

Natural areas, such as floodplains, can provide opportunities for recreational activities and a better quality of life in the Town. To maximize the recreational value of natural areas throughout the Community, the Committee recommends concentrating future development around existing infrastructure and away from natural resources, thus preserving natural open spaces for generations to come.

Table 3.5 identifies those projects developed by the Committee to accomplish Strategy 5.

Protecting wetlands and open space for future flood storage and floodplain restoration are two ways in which Strategy 5 directs resiliency projects. Shown above is Fredrick's Farm, located along a tributary to the Masonic Creek, and recommended for future use as a public park and permanent conservation for flood storage. Photo is courtesy of Eric Thayer.

TABLE 3.5 - STRATEGY 5

Strategy 5: Promote sustainability and resilience through local planning mechanisms and regulation/code enforcement.

Project Name	Short Project Description	Recovery Support Function	Estimated Cost	Proposed/ Featured Project	Regional Project (Y/N)
Masonic Creek Watershed Stormwater Storage: Fredrick's Farm Stormwater Storage and Public Park	Increase, improve, and preserve stormwater storage capacity and retention along a tributary to Masonic Creek. This project would accomplish multiple goals, including increasing floodwater storage and retention and creating recreational opportunities. The project would be completed in two phases. The first phase would include transforming the roughly 22-acre Fredrick's Farm site into a public park with passive recreation, a natural trail system, restored wetlands, edible forests, and interpretive signage about the site's history and the black dirt resource. Phase 2 would consist of additional acquisition of suitable land for flood storage along the Masonic Creek and improving those sites for maximum flood storage. Phase 2 is not part of the Featured NYRCR project.	Infrastructure; Housing; Natural and Cultural Resources; Community Planning and Capacity Building	Phase 1: $5,367,084; Phase 2: $20,447,801	Featured	N
Sump Pump Backflow Prevention and Cross-Connection Control	Education and outreach program to minimize the occurrences of improper sump pump connections to the municipal sanitary sewer system and increase the overall number of residences equipped with backflow preventers that meet current standards. This project aims to reduce unnecessary and inappropriate load on the municipal sanitary system during flood events and to prevent basement sewage backflow with voluntary backflow installation and improper connection repair programs.	Housing; Infrastructure; Community Planning and Capacity Building	$30,000	Featured	N

Section 4

Proposed and Featured Project Profiles

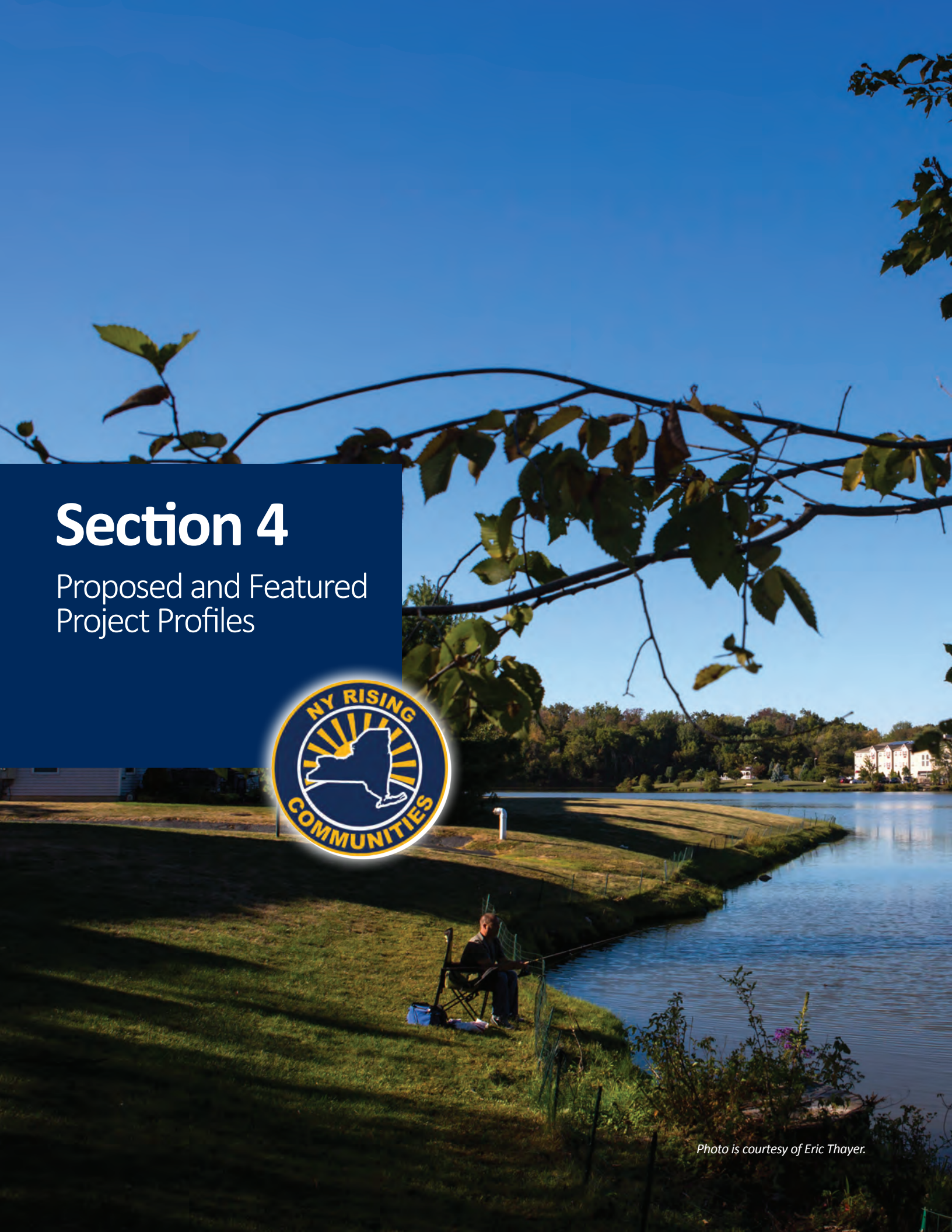


Photo is courtesy of Eric Thayer.

Section 4: Proposed and Featured Project Profiles

Natural Gas or Solar Back-up Power for Critical Facilities and Infrastructure

Project Background

Critical facilities and infrastructure in the Town of Wallkill provide vital services to residents on a day-to-day basis, and they are also crucial components of emergency preparedness, response, and hazard mitigation.

Connection to the Disaster

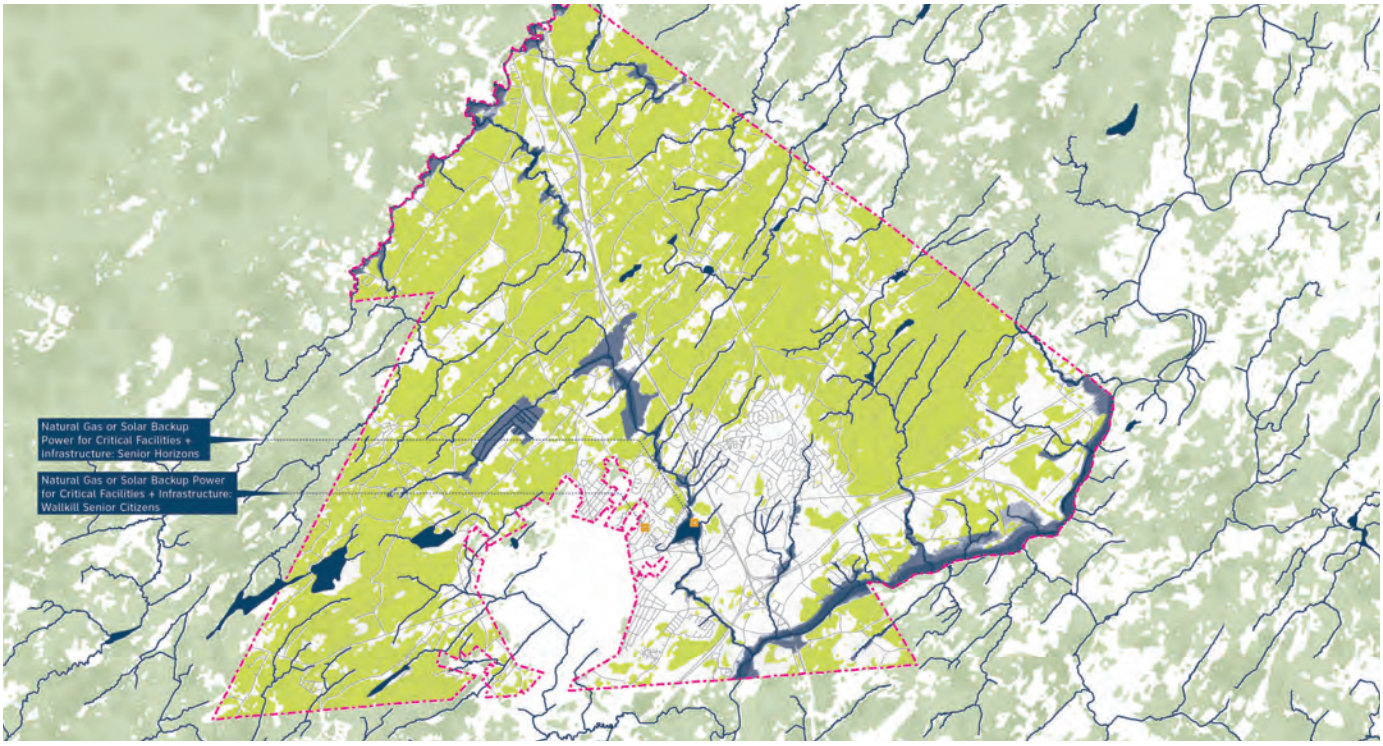
Many of the issues encountered by the Town of Wallkill due to major storms, including Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy, relate to the loss of power to critical infrastructure. The loss of electrical power to the Town's traffic signals caused serious congestion on the Town's roadways, which prevented the movement of emergency response vehicles throughout the Town of Wallkill NY Rising Community Reconstruction (NYRCR) Plan Area (NYRCR Plan Area).

In addition, many of the Town's police officers had to direct traffic at intersections where the traffic signals were not functioning. This use of resources may have prevented those officers from instead providing necessary emergency assistance throughout the Town. This scenario has occurred many times in the Town of Wallkill. Major power failures also have an economic impact in lost work hours, loss of perishable food items, overtime of emergency personnel and utility response teams, and more. These losses have been estimated as high as hundreds of thousands or millions of dollars.

Description of Project

This Proposed Project aims to obtain and install permanent back-up power sources for those critical facilities and infrastructure in the Town not addressed in other proposed projects. It also proposed permanent back-up power sources for specific facilities serving

Image above is of heavy traffic in a typical non-peak traffic flow near SR 211/I84 in the Town of Wallkill. Photo is courtesy of Eric Thayer.



The image here depicts locations for back-up power for Senior Horizons and Wallkill Senior Citizens. Image is courtesy of Tetra Tech, Inc.

functional needs and vulnerable populations who would otherwise rely on emergency services and responders to meet their basic health and safety needs during large-scale power outages.

This project would include an evaluation of existing shelter and other critical facilities' needs for redundant power generation. Use of solar or green energy will be considered, where feasible. Priority locations include:

- **Traffic signals** near State Route 211 and State Route 17.
- **Wallkill Senior Citizens Housing, 88 Senior Way**: Wallkill Senior Citizens Housing is an apartment community containing 74 assisted rental units. The property contains 56 assisted bedrooms and based on typical apartment occupancy limits, Wallkill Senior Citizens Housing is home to no more than 102 persons when fully occupied.
- **Senior Horizons, 141 Bert Crawford Road:** Senior Horizons provides 84 one- and two- bedroom luxury-style residences at below market rents. One resident in the household must be 55 years or older, although some non-age restricted apartments are available for persons with disabilities.

In advancing this project, consideration should be given to the following:

- The structural features and space required to house large generators;
- Elevating generators at critical facilities vulnerable to flooding;

Shown above is Senior Horizons, 141 Bert Crawford Road. Photo is courtesy of Tetra Tech, Inc.

Shoppers from around the region result in heavy traffic surrounding retail centers, such as the Galleria at Crystal Run pictured above. As shown by the road signs at the image at right, the Town of Wallkill provides travelers with easy access to many major roadways and interstates. Photos are courtesy of Eric Thayer.

- Schedules and costs of regular inspection, maintenance, and testing of new equipment; and
- Local weather patterns and equipment siting factors contributing to the feasibility of effective solar solutions at each location.

Project Cost Benefit Analysis

Cost Estimate

The estimated project cost for the project, which includes installation of the generators and the electrical work to connect them to the facilities, is $359,320. This cost is distributed as follows:

- Traffic signals: $220,000
- Wallkill Senior Citizens Housing: $69,660
- Senior Horizons, Bert Crawford Road: $69,660

Please note that administrative costs are not included in the project cost estimates.

Project Benefits

The following summarizes the anticipated benefits of the project, based upon the historic losses.

ANTICIPATED REDUCTION OF RISK

This project reduces risk to residents and visitors by ensuring that critical infrastructure can continue to operate during and after a disaster. The Town of Wallkill NYRCR Committee (Committee) identified critical facilities as including, among others, water and sewer facilities, traffic control signals, and facilities that serve as shelters for the general public and vulnerable populations. This project also reduces the risk of additional damage or increased maintenance to systems and facilities as a result of a prolonged power outage.

ECONOMIC BENEFITS

This project strengthens local energy-dependent infrastructure to make the Town of Wallkill more resilient to future disasters, which may result in the loss of power. Investing in back-up power generation capabilities at critical facilities demonstrates a commitment to the future of the Town, its residents, and its workforce. This investment creates greater confidence for private investors.

On the busiest shopping days of the year, the Town's retail and commercial center may have up to 250,000 shoppers. The majority of these shoppers will access the businesses using one of a few main roadways and highway interchanges; most shoppers frequently utilize the same intersections then as well. Providing back-up power to traffic signals surrounding State Route 211, State Route 17, and Interstate 84 intersections ensures a

more orderly flow of traffic through Town. Additionally, the need to deploy numerous traffic safety personnel to these areas, would no longer tax local emergency services resources.

In addition, the physical installation of permanent generators at critical facilities may be awarded to local service providers. If awarded to perform this work, local service providers' increased revenue may result in increased wages being paid to local employees. This income can then be spent on other local goods and services, potentially creating additional jobs, increasing disposable income, and increasing taxes. In addition, by not outsourcing for temporary emergency power, the Town will save money that can be used on other projects.

Furthermore, the operation of natural gas or solar power generators will ultimately be cheaper than fueling generators by gasoline or diesel. The use of Natural gas is generally cheaper than gasoline or diesel fuel, and solar is free.

This work will create approximately 2.56 FTE construction and a total of 3.02 FTE support jobs from labor, materials, equipment, and other supply and support industries.[1] These numbers were adjusted to the $359,320 total estimated cost of this project.

ENVIRONMENTAL BENEFITS

Studies indicate that using natural gas in generators will result in a cleaner burn of the fuel and lower emissions. Solar-based generators result in zero emissions. Consequently, alternatives to gasoline or diesel will have positive effects on the environment. In addition, the facilities requiring generators may necessitate renovations to feasibly install and operate the generator. These renovations may increase the environmental quality inside the building due to health and safety improvements made during the renovation.

This kind of solar-powered trafffic light, pictured above, can keep traffic moving automatically during power outages. Photo is courtesy of GreenTechLead.com.

HEALTH AND SOCIAL BENEFITS

This project will have substantial health and social benefits to the Town. By installing back-up power for traffic signals along major roadways, the Town will reduce the risk of traffic accidents during and after a disaster. The Town will also minimize the threat to its police officers who would have performed traffic control at key intersections, as those officers risk injury from passing vehicles. The police officers freed from traffic control responsibilities will also be available to respond to other critical needs around the Plan Area.

Additionally, the two priority senior living facilities proposed for improvement serve the Town's vulnerable populations, i.e., the elderly and those with access or functional needs. The two senior care facilities may require critical medical equipment dependent on a steady flow of electricity to function correctly. Some of the facilities' residents may be particularly sensitive to ambient temperature, requiring functioning heating or air conditioning to remain healthy. By ensuring that these facilities can remain open to their regular residents and visitors, the Town verifies that these individuals do not need to rely on emergency services and responders to meet basic health and safety needs. Finally, these priority locations may serve as emergency shelters for individuals displaced by flooding; the shelter facilities will require uninterrupted power to serve evacuees.

1 The FTE construction jobs were estimated based on a methodology developed by the United States Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per $1,000,000 in construction spending.

ADDITIONAL BENEFITS

Completion of this project supports one of the Town's NYRCR resiliency strategies, specifically:

- **Strategy 1:** Ensure an efficient, safe, and resilient transportation system.
- **Strategy 3**: Improve on existing emergency preparedness, response, and communications, including public outreach and education.

IMPLEMENTATION TIME FRAME

This project can be implemented within one year.

REGULATORY REQUIREMENTS

Generator hook-ups must meet the local electrical code. Furthermore, any work on a State Highway in the Town would require a highway work permit.

JURISDICTION

Jurisdiction for this proposed project rests with the Town of Wallkill.

SUMMARY

Natural Gas or Solar Back-up Power for Critical Facilities and Infrastructure

- Investment: Traffic signals: $220,000; Wallkill Senior Citizens: $69,660; Senior Horizons: $69,660
- Assets protected: Immediate: 2, plus traffic signals; Long Term: 2 plus traffic signals
- Potential future loss prevented: The number of injuries prevented in the vulnerable populations at the senior facilities will depend on requirements for and operability of critical equipment. Overtime wages for local emergency services resources will not spent on the need to deploy numerous traffic safety personnel during future power outages.
- Jobs created: Immediate: 2.55; Total Jobs: 3.02
- Strategies accomplished: 2

Water and Sewer Treatment Plant Flood Damage Mitigation Measures

Project Background

Roughly half of the Town's water resources come from a series of treatment plants and pump stations in close proximity to the Wallkill River. The Braeside Water Pumping Station, located east of Route 50, was severely flooded and damaged during Hurricane Irene. Damages also occurred at the Kosuga Water Wells, located along the Wallkill River, while flooding during Hurricane Irene had minor impacts on the Braeside Wastewater Treatment Plant's buildings located next to the Wallkill River.

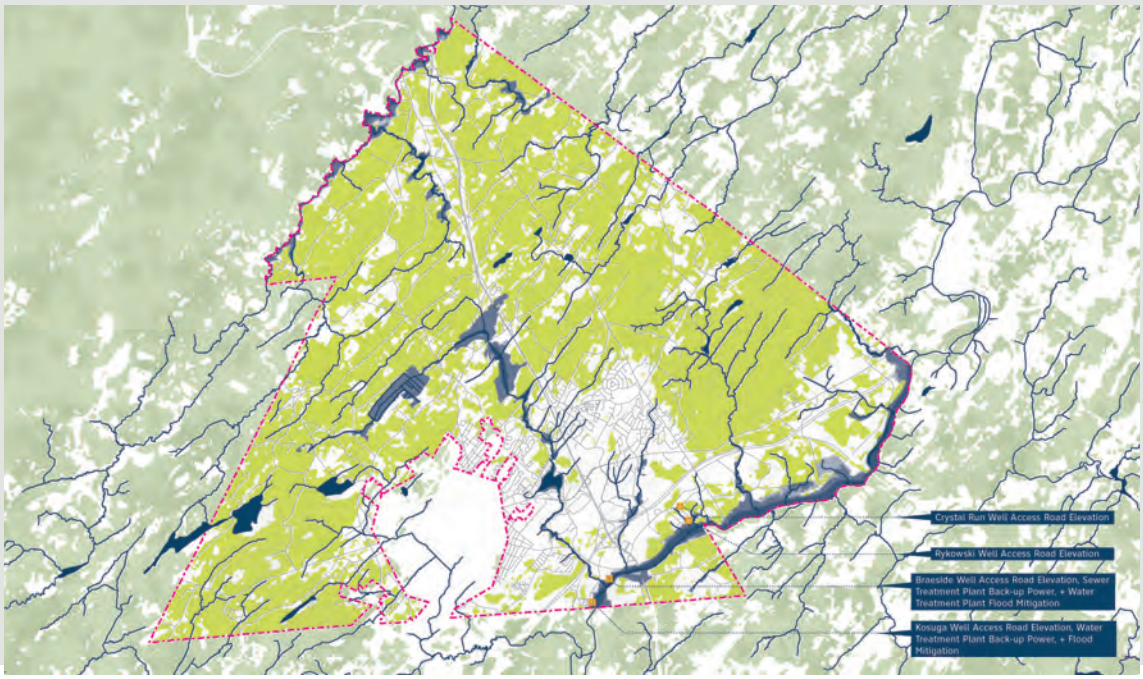
Connection to the Disaster

During past flood events, floodwaters inundated facility infrastructure, including buildings, pumps, operational equipment, and electronics, causing serious damage. Widespread power outages threatened the continued functionality of the sewage treatment system and led to power surges triggering costly damage to electrical systems. Furthermore, floodwaters damaged Kosuga and Braeside Well Roads, restricting vehicular access and causing potholes, washouts, and generally eroding swales on the sides of the road.

Pictured above is the Braeside Water Treatment Plant transformer building. Photo is courtesy of Tetra Tech, Inc.
Pictured below is the prospective project locations, courtesy of Tetra Tech, Inc.

Significant Town water and sewer treatment plants experienced the following specific damage:

Kosuga, Braeside, Crystal Run, and Rykowski Well Roads: The Braeside Water and Sewer Treatment Plant and the Kosuga Water Treatment Plant both received damage to their access roads from Hurricane Irene. Other damage occurred along the roads leading to the Rykowski and Crystal Run Wells.

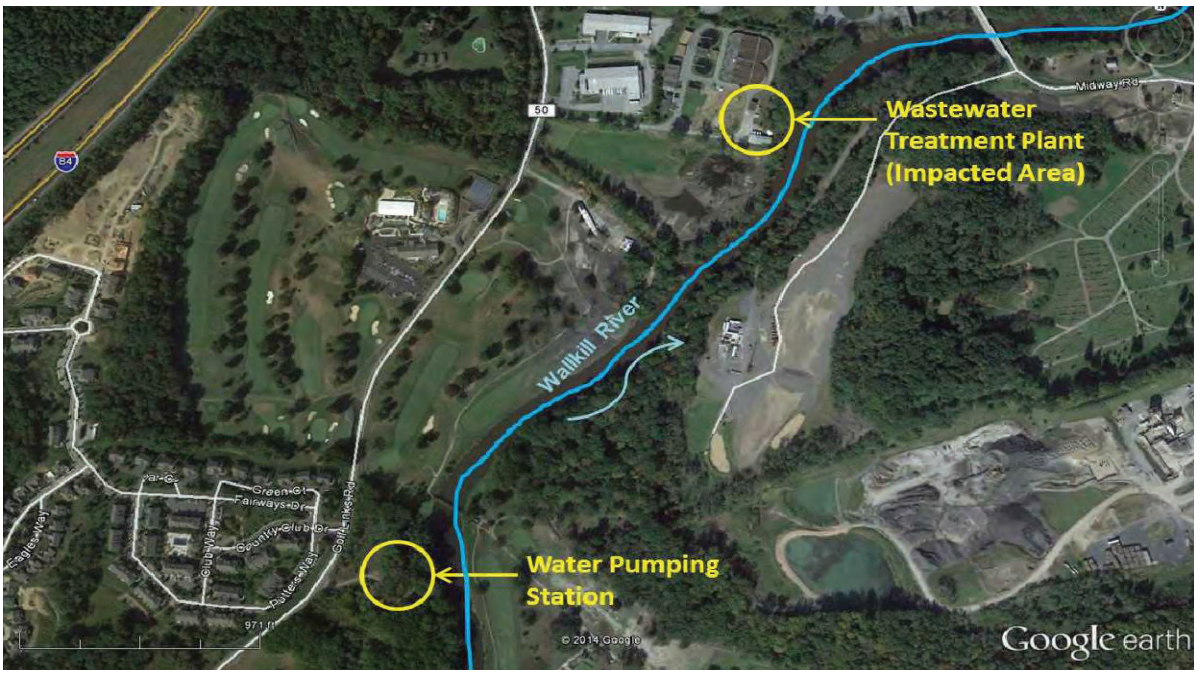


Braeside Sewer Treatment Plant: In addition to flooding, Hurricane Irene caused widespread power outages in the Town of Wallkill. While the Town's Braeside Sewer Treatment Plant did not suffer damage from floodwaters, it was subjected to numerous power surges as the power to the plant's equipment rapidly fluctuated on and off. These power surges caused damage to the timer, motor, and gearbox associated with the mixer at the sludge tank. The circuits for these items superheated and were damaged beyond repair. The shutdown of the mixer also had a negative effect on the pH level of the sewer water.

Braeside Water Treatment Plant: During Hurricane Irene, the Braeside Water Treatment Plant, located in the 100-year floodplain, was inundated with floodwater to a height of approximately 38 inches. Damaged items included electrically-controlled pumps, motors, controllers, terminal strips, components of a Motor Control Center, buckets, transformers, and a wall sheathing in an office area. Various repairs were made after the storm to the plant building and equipment to return everything to pre-disaster conditions. The Committee considered the elevation of wires for pump motors to minimize future damage as one mitigation project. The Town estimated repairs to cost approximately $70,000.

Kosuga Water Treatment Plant Control and Generator Building: During Hurricane Irene, floodwater rose to a height of approximately three feet above floor level, completely inundating the Kosuga Control and Generator Buildings. A 15- kilovolt-ampere (kVA) transformer was damaged beyond repair and later replaced, costing approximately $9,300.

Northern Woods and Woodland Acres Sewer Pump Stations: Although not physically damaged by floodwaters, two of the Town's pump stations lost power during Hurricane Lee and ceased to operate. The Town spent over $1,000 on a contractor for temporary power to the pump stations until power was restored. Temporary power was necessary to prevent sewer overflows in the surrounding communities and waterways.



This aerial view shows the location of the Kosuga (lower) and Braeside (upper) Water Treatment Facilities impacted during Hurricane Irene. Image is courtesy of Tetra Tech, Inc.

This is the Braeside Wastewater Treatment Plant (impacted area). Photo is courtesy of Tetra Tech, Inc.

This is the Kosuga Water Pump Station. Photo is courtesy of Tetra Tech, Inc.

Description of Project

This Proposed Project involves numerous actions, including strategic flood-proofing and operational mitigation actions to reduce further service interruptions and costly damage repairs.

- **Kosuga, Braeside, Crystal Run, and Rykowski Well Roads:** (See Federal Emergency Management Agency [FEMA] Project Worksheet [PW] Project No. 7799104 and 7799110) The Town owns and operates the Braeside Water and Sewer Treatment Plant and the Kosuga Water Treatment Plant. This project would elevate the well access roads to avoid future damages and ensure access to the wells during flood events.
- **Braeside Sewer Treatment Plant Back-up Power:** (See FEMA PW Project No. 7799111) Due to the damage sustained by power surges during Hurricane Irene, this project proposes to install back-up power solutions and to avoid similar damages in the future.
- **Braeside Water Treatment Plant Mitigation:** (See FEMA PW Project No. 7799101) To prevent flood damage similar to that experienced during Hurricane Irene, the following mitigation measures are proposed for this location:
  - Relocate the transformer out of floodplain;
  - Flood proof or relocate the plant office;
  - Elevate the risers to prevent them being breached by floodwaters;
  - Install natural gas or solar back-up power.
- **Kosuga Water Treatment Plant Control and Generator Building Mitigation:** (See FEMA PW Project No. 7799106 and 7799105) To prevent damage similar to that experienced during Hurricane Irene, the following mitigation measures are proposed for this location:
  - Relocate the transformer out of floodplain;
  - Install natural gas or solar back-up power.
- **Northern Woods and Woodland Acres Sewer Pump Stations Back-up Power:** (See FEMA PW Project No. 7799110) To mitigate the impact and costs associated with ensuring continuing operations at the pump stations, this project proposes the installation of emergency back-up power at each pump station facility.

Roughly half of the Town's water resources come from a series of treatment plants and pump stations near the Wallkill River, shown above, which is a frequent source of flooding for many such facilities. Photo is courtesy of Eric Thayer.

In advancing this project, consideration should be given to the following:

- Seasonal constraints relative to planning and construction activities;
- Availability of physical space to house relocated offices and/or equipment;
- Elevating generators at critical facilities vulnerable to flooding;
- Schedules and costs of regular inspection, maintenance, and testing of new equipment; and
- Local weather patterns and equipment siting factors contributing to the feasibility of effective solar solutions at each location.

Project Cost Benefit Analysis

Cost Estimate

Please note that administrative costs are not included in the project cost estimates.

PROJECT	INITIAL COST
Kosuga, Braeside, Crystal Run, and Rykowski Well Roads	475,084
Braeside Sewer Treatment Plant Back-up Power	$69,660
Braeside Water Treatment Plant Mitigation	$120,320
Kosuga Water Treatment Plant Control and Generator Building Mitigation	$104,320
Northern Woods and Woodland Acres Sewer Pump Stations Back-up Power	$139,320
Subtotals	**$998,704**

Project Benefits

The following summarizes the anticipated benefits of the project, based upon the historic losses.

ANTICIPATED REDUCTION OF RISK

This project reduces risk to residents and visitors by ensuring that critical infrastructure serving the general public and vulnerable populations, namely water and sewer facilities, can continue to operate during and after a disaster. This includes ensuring that critical facilities remain accessible to Town staff at all times. It also reduces the risk of additional damage or increased maintenance to systems and facilities as a result of a prolonged power outage or power surges.

ECONOMIC BENEFITS

This project is based on strengthening local infrastructure to make the Town more resilient to future disasters. Investing in flood-proofing and elevation measures for critical infrastructure and implementing back-up power generation capabilities demonstrates a commitment to the future of the Town, its residents, and its workforce. This investment creates greater confidence for private investors.

In addition, the physical work involved in upgrading the well access roads, elevating or relocating equipment, and installing permanent generators at critical facilities may be awarded to local service providers. The potential service providers' increased revenue may result in increased wages being paid to local employees. Locals may potentially spend their increased wages on local goods and services, which can have a cascading effect on the economy. Effects may include the creation of new jobs in the Town, additional expendable income for residents, and increased tax revenue. Additionally, the Town may save money by utilizing in-house services rather than contracting out for emergency power.

This work will create 7.09 FTE construction and approximately 8.39 FTE support jobs from labor, materials, equipment, and other supply and support industries.[2] These numbers were adjusted to the $998,704 construction estimate for the well access roads, Braeside Water Treatment Plant Mitigation, and Kosuga Water Treatment Plant Control and Generator Building Mitigation portions of this project.

Finally, utilizing generators fueled by natural gas or solar power will be cheaper than using gasoline or diesel fuel, the standard fuel typically utilized.

ENVIRONMENTAL BENEFITS

This project will benefit the environment by ensuring the continued operation of the water treatment plants, sewer treatment plants, and sewer pump stations during flood events and power outages. Ensuring continued operation of these facilities, in turn, reduces the likelihood that untreated water or wastewater will be released from the facilities, thereby contaminating the floodwaters and the local environment.

In addition, the type of fuel used by the generators will yield environmental benefits. Using natural gas or solar-powered generators, instead of those powered by gasoline or diesel fuel, will result in low or zero emissions and a cleaner burn.

Additionally, the facilities identified in this project may require renovations to upgrade/install and operate the generators. These renovations may increase the environmental quality inside the building due to health and safety improvements made during the renovation.

HEALTH AND SOCIAL BENEFITS

This project will have substantial health benefits to the Town and its residents. Notably, by ensuring that critical facilities, such as water and sewer infrastructure, can operate without interruption during and after a disaster, the Town will ensure basic community hygiene, protecting the health of its residents and visitors.

Pictured above, generators and back-up power are an important feature to most pump systems, and they can be designed and supplied in many different ways. Image from romtecutilities.com and northerntool.com.

ADDITIONAL BENEFITS

Completion of this project supports the Town's NYRCR resiliency Strategy 3: Improve upon existing emergency preparedness, response, and communications, including public outreach and education.

IMPLEMENTATION TIME FRAME

This project can be implemented within two years.

2 The FTE construction jobs were estimated based on a methodology developed by the United States Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per $1,000,000 in construction spending.

REGULATORY REQUIREMENTS

Generator hook-ups and installations must meet local codes and ordinances and comply with New York State Department of Environmental Conservation (NYSDEC) Article 24 Freshwater Wetland, where proposed projects must minimize impacts to regulated NYS Freshwater Wetlands.

JURISDICTION

Jurisdiction for this proposed project rests with the Town of Wallkill.

SUMMARY

Water and Sewer Treatment Plant Flood Mitigation Measures Project

- Investment: $998,704
- Assets protected: Numerous systems and facilities at six municipal water resources sites.
- Potential future loss prevented: Reduces the likelihood that untreated water or wastewater will be released from the facilities, which could contaminate floodwaters and the local environment; and reduces the risk of additional damage or increased maintenance of systems and facilities as a result of a prolonged power outage or power surges.
- Jobs created: Immediate: 7.09; Total Jobs: 8.39
- Strategies accomplished: 1

Silver Lake Dam Modifications and Emergency Operations Agreement

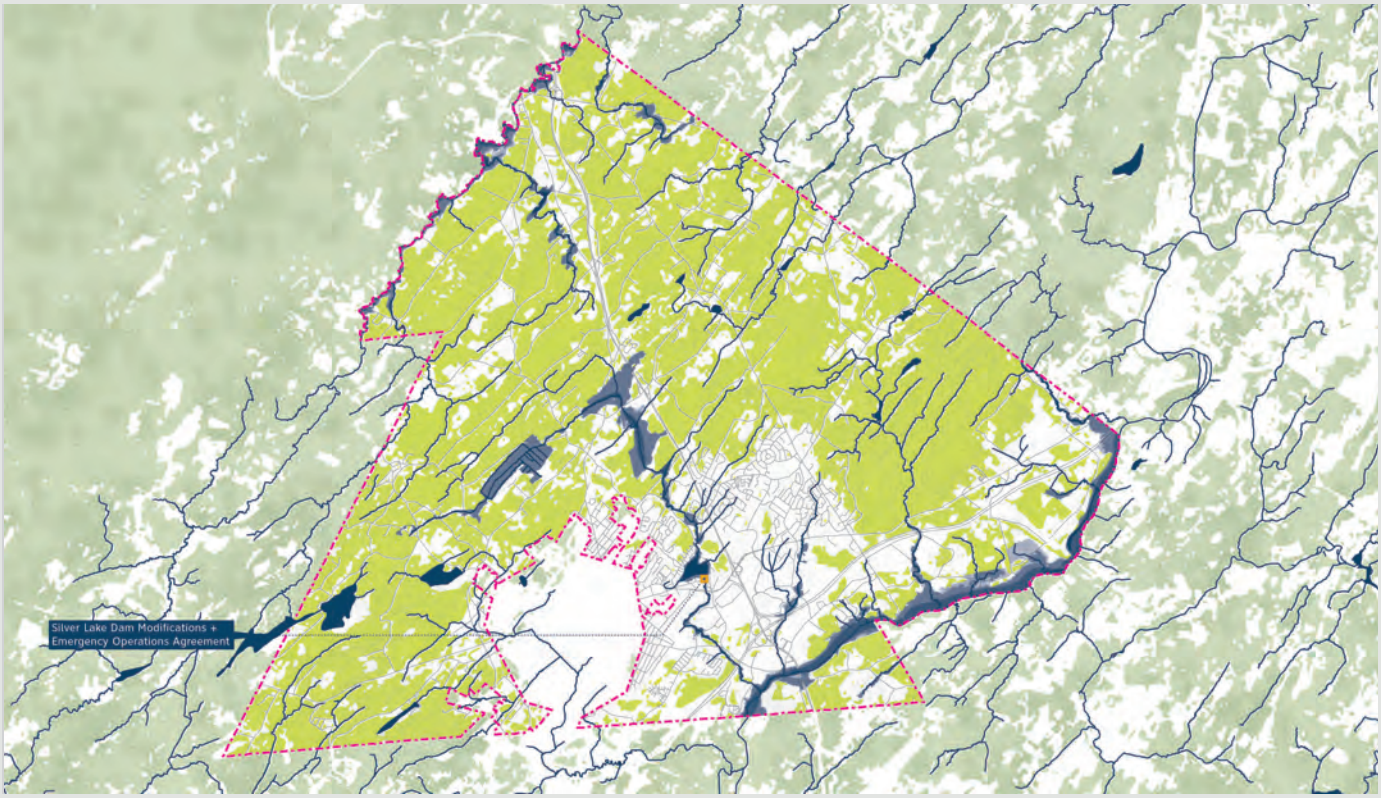
Project Background

Silver Lake is an approximately 35-acre human-made body of water serving as a recreational and aesthetic amenity for several residential communities. The lake receives drainage from two tributaries as well as from the Masonic Creek, a major waterway that winds through established residential neighborhoods and existing development along Silver Lake-Scotchtown Road, Bert Crawford Road, and others before passing through Silver Lake and continuing on towards its confluence with the Wallkill River.

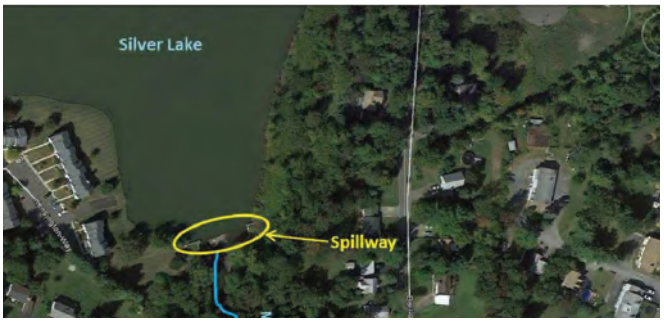
Silver Lake contains a crested spillway approximately 100 feet wide and four feet high. The water level of the lake was observed to be almost coincident with the spillway crest. A 3-foot diameter outlet was observed on the lower corner of the spillway and can be closed through a sluice gate.

The Silver Lake Dam, shown here, would be modified to facilitate emergency release and water surface elevation lowering prior to a storm event. Photo is courtesy of Eric Thayer.

At the current water surface elevation (WSE), Silver Lake does not provide significant capacity as a flood or stormwater storage. Furthermore, existing levels may actually exacerbate flood problems upstream as it causes a backwater condition at the two inlets to the Lake, contributing to reduced capacity even during smaller storm events.



Silver Lake receives waters from Masonic Creek and local tributaries before emptying these waters over the spillway into the main stem Masonic Creek roughly two miles north of its confluence with the Wallkill River near the West Hills Country Club. Graphic is courtesy of SCAPE / Landscape Architecture PLLC.



Silver Lake outlet location. Photo is courtesy of Tetra Tech, Inc.

Silver Lake spillway (outlet pipe). Photo is courtesy of Tetra Tech, Inc.

Connection to the Disaster

Flooding is an ongoing issue for the Town of Wallkill, as evidenced by the most recent version of its Hazard Mitigation Plan (HMP), which identifies 2,079 acres (5%) of the Town's total land acreage and 72 residences as being in the 100-year floodplain. Out of all the natural hazards profiled, including severe ice storms, hurricanes, tornadoes, severe storms, extreme heat, etc., flooding received the highest relative risk assessment rating.

From past storm events, including Hurricane Irene and Tropical Storm Lee, the Town of Wallkill has experienced repetitive flood damage along the Silver Lake- Scotchtown Road and Tunnels/"Twin Bridges," along Bert Crawford Road and near the inlet for Silver Lake; at the intersection of Fitzgerald Drive and Neely Street; and at State Route 211 East near the entrance to the Wallkill Plaza.

The Community has investigated solutions to reduce the water level of the lake to mitigate the flood risk along the overbanks. For instance, water could be released from the reservoir before a storm event to modify the peak flow and reduce the flood impact downstream. An alternative would be the creation of a vertical orifice at the bottom of the spillway crest that would lower the water level in the lake and generate a baseline flow towards Masonic Creek. This would provide permanent flood storage in the Lake that could improve conditions during a broad range of flows.

Left: Flooding at Silver Lake-Scotchtown Road at the Twin Tunnels after Hurricane Irene. Photo is courtesy of the Town of Wallkill.
Right: Masonic Creek flooding from Tropical Storm Lee at the Silver Lake-Scotchtown Road Tunnel. Photo is courtesy of the Town of Wallkill.

Description of Project

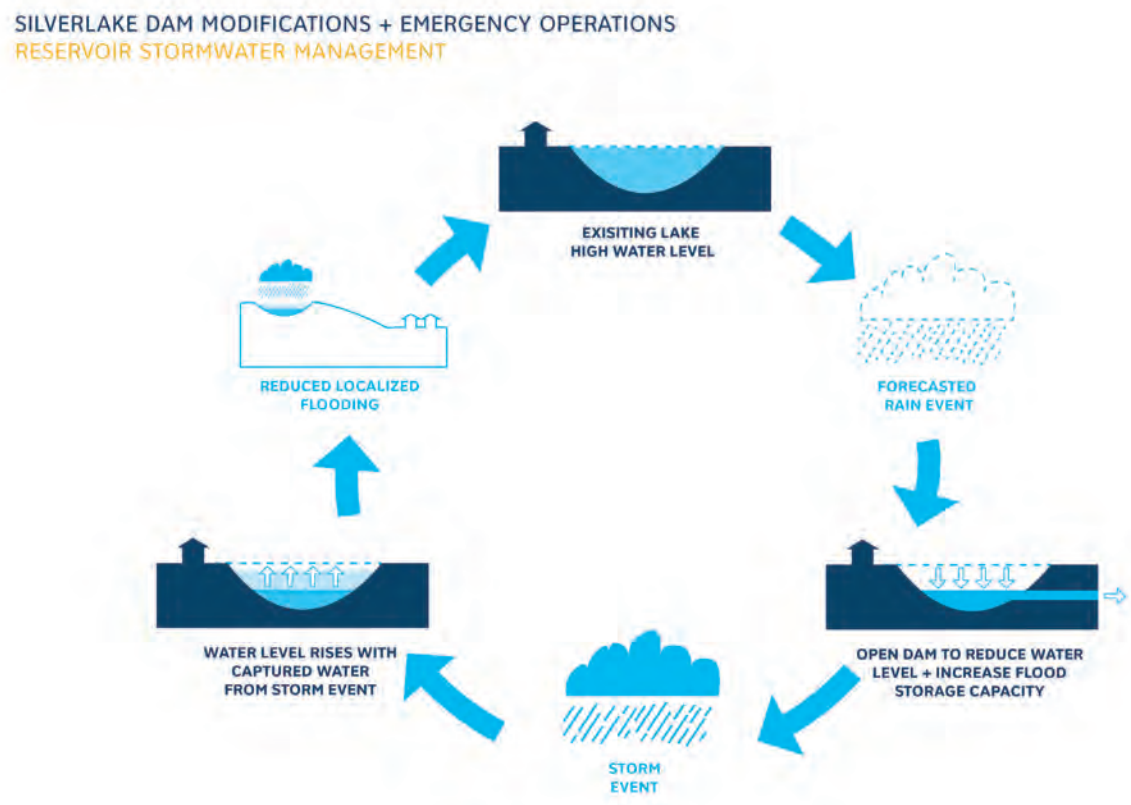
Current hydraulic analysis shows the potential for significant flood reduction benefits through the lowering the lake's WSE by 1.5 to 2 feet in advance of a heavy rainfall. This reduction would require examination and possible retrofit of the Silver Lake Dam outlet structure, at a minimum, as well as an emergency operations agreement between the owners of the Water's Edge Condominiums, owners of the lake and its infrastructure, and the Town of Wallkill. A more detailed analysis will be required to determine how the outlet structure impacts flows downstream during different increase flow events.

This Proposed Project has the potential to mitigate future flood damages at a number of repetitively damaged roadways in the area, including the Silver Lake - Scotchtown Road and Tunnels/"Twin Bridges," along Bert Crawford Road and near the inlet for Silver Lake; at the intersection of Fitzgerald Drive and Neely Street; and at State Route 211 East near the entrance to the Wallkill Plaza.

Along with temporary WSE reductions in Silver Lake to mitigate flood impacts throughout the local watershed, this project proposes long term public-private partnership agreements for emergency dam operation to enable the timely reduction of WSE in Silver Lake to increase flood storage capacity, reduce backwater flooding, and improve localized flood conditions.

In advancing this project, consideration should be given to the following:

- Analysis needed to evaluate the potential flood reduction benefits and to create a management plan for adjusting the water level prior to storm events;
- Coordination and participation towards a partnership agreement between surrounding property owners, such as Water's Edge Condominiums; the owners of the lake and its infrastructure; and Town officials; and



Graphic diagram of dam modifications during a storm event is courtesy of SCAPE / Landscape Architecture PLLC.

- Precautionary and temporary lake surface water level restrictions may need to be implemented while dam modifications are underway, and until the dam retrofit is complete.

Project Cost Benefit Analysis

Cost Estimate

The total project cost is $100,000, with approximately half of the cost devoted to modifying the dam outlet and half the cost devoted to modifications around Silver Lake to improve functionality and access.

Please note that administrative costs are not included in the project cost estimates.

Project Benefits

The following summarizes the anticipated benefits of the project based upon the historic losses.

FLOOD PROTECTION AND EMERGENCY RESPONSE

Initial results show that this project may have numerous beneficial impacts to localized flooding. Dam improvements would facilitate a slower outflow of floodwater into the Masonic Creek, which has the potential to decrease water levels downstream because the dam would not overtop as quickly. Preliminary models also suggest potential improvement in flood reduction of backwater effects on tributaries upstream, since backwater effects won't impact surrounding properties as much if water levels in Silver Lake are lowered, thereby increasing receiving capacity. Reducing localized flooding will maintain through access on local roadways, reducing emergency response times and facilitating efficient movement of emergency personnel to and through the area.

ANTICIPATED REDUCTION OF RISK

Initial results show that this project may have beneficial impacts to localized flooding, both upstream and downstream of the lake. Dam modifications would allow the lake level to be drawn down prior to storm events in a way that would not impact downstream reaches and could provide managed flow-rates during storm events, rather than overtopping the existing spillway.

Preliminary models also suggest potential improvement in flooding on tributaries upstream which are currently worsened by the reduced flow capacity into the lake. A detailed hydraulic study that considers the storage capacity of the lake, the dimensions of the existing or proposed outlet structures, and dynamic flood routing through the lake would be necessary to fully evaluate the flood reduction benefits of the project.

ECONOMIC BENEFITS

The partnership agreement between the dam owner and the Town has the potential to create a more economical approach to dam maintenance and operation.

At a minimum, the project will reduce the amount of potential flood damage and necessary post-storm/ post-flood inspections.

The project will also reduce the costs associated with response and repair to flood damage events, particularly in the neighborhoods around Silver Lake. This project will reduce the number of necessary road closures, both during the incident and immediately after, positively and indirectly encouraging less need for staffing overtime (i.e., for both police and administrative personnel), fewer supply costs for emergency protective measures (e.g., sandbags and road blocks), and less potential damage to municipal and personal vehicles.

Pictured above, local residents access Silver Lake for paddle boating, fishing, and canoeing. Photo is courtesy of Eric Thayer.

ENVIRONMENTAL BENEFITS

The existing lake shoreline consists of short grass that is heavily maintained. The absence of overhanging vegetation and an unmaintained buffer lead to increased lake temperatures during the summer and reduced pollutant removal capabilities. Providing a more natural shoreline edge and having the potential to drop the WSE of the lake to establish and maintain this natural edge would increase the pollutant removal capacity of Silver Lake along with increasing flood retention capacity.

HEALTH AND SOCIAL BENEFITS

This project will most directly benefit motorist safety by reducing the potential for road damage during flood events. It will also enable medical and emergency personnel to more easily access and aid residents in need, particularly those who live near the routinely flooded roads.

Additionally, national regulations require that the Silver Lake dam be maintained and kept in a safe condition. This project will help reassure Federal regulators during periodic, formal inspections that both the Town and the owner of the dam are committed to ensuring a safe, quality dam and are continuously implementing innovative flood control and mitigation activities. This will ultimately enhance the reputation of the Town among Federal agencies, State officials, and in the Community.

The second part of the project, concerning the development of a mutual public-private partnership will benefit the Plan Area by strengthening the relationship between local government and private investors. It will demonstrate the Town's interest and willingness to work with local residents to enhance the Town of Wallkill and improve safety/resiliency.

Not only will this agreement facilitate future partnerships with other private entities, it will also increase residential and investor trust in the Town leaderships' commitment to the Community.

ADDITIONAL BENEFITS

Completion of this project supports three of the Town's resiliency strategies, including:

- **Strategy 1:** Ensure an efficient, safe, and resilient transportation system.
- **Strategy 2:** Improve stormwater management and drainage systems throughout Town to decrease risk for homes, businesses, and residents.
- **Strategy 4:** Preserve, protect, and enhance the Town's natural, recreational, and cultural resources and strengthen local sense of place and community.

IMPLEMENTATION TIME FRAME

The dam modifications can be implemented within six months. Coordination to form the Emergency Operations Agreement may be completed within one year.

REGULATORY REQUIREMENTS

In-water work will be subject to NYSDEC Article 15 Protection of Waters and may require a Dam Safety Permit for any proposed alterations to the existing dam structure. Also, lowering the water levels of dam impoundments that contain State-regulated wetlands will require an Article 24 Permit, although no such wetlands have been identified in this project area

JURISDICTION

Jurisdiction for this proposed project rests with the Water's Edge Condominiums and the current owner of the Silver Lake Dam, and it would require an agreement with the Town of Wallkill.

SUMMARY

Silver Lake Dam Modifications and Operations Agreement

- Investment: $1,000,000
- Flood level reduction: Unknown at this time.
- Assets protected: Immediate: Housing and Infrastructure Systems; Long Term: Potential benefit to other assets (economic and health and social services)
- Repetitive flood properties removed: N/A
- Potential future loss prevented: Roadway damage and closures
- Jobs created: N/A
- Strategies accomplished: 2

Winding Brook Floodplain Improvements

Project Background

The Winding Brook runs from north to south through culverts and open drainage ditches, through the Scotchtown residential neighborhood, north of Silver Lake-Scotchtown Rd, and west of the Goshen Turnpike. The drainageway has developed a reputation for flooding during periods of heavy water flow.

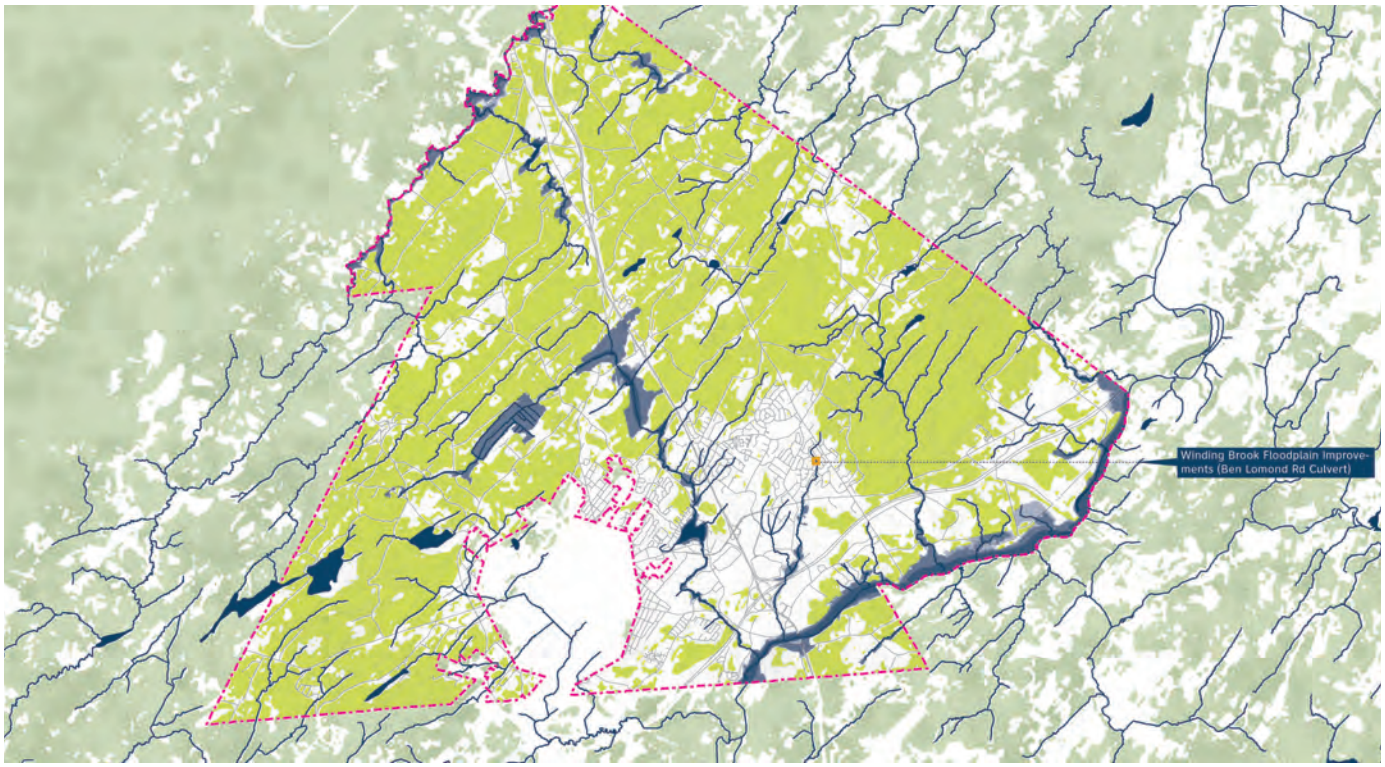
Pictured above, sinkhole formed at Patricia Road and Dominick Street due to Hurricane Irene flooding, destroying a culvert and forcing emergency protective action by Town crews. Photo is courtesy of the Town of Wallkill.

Pictured above, the Winding Brook area encroaches on drainage ways inhibiting the flow of floodwaters and contributing to dangerous debris constricting the floodway. Photo is courtesy of Eric Thayer.

A Town-contracted engineering firm conducted a basic analysis on stormwater conveyance infrastructure needs in this area and determined that overtopping of local culverts occurs during three-year interval storms—far less significant events than the weather systems associated with Hurricane Irene and Tropical Storm Lee in 2011. Flooding issues during lesser rainfall events have been exacerbated by large amounts of residential debris, such as discarded Christmas trees, brush, and other trash and yard waste that clog the culverts and inhibit flow in the drainageway; neighboring residents have also exacerbated the flooding issues by encroachment on the floodplain and riparian areas. The Plan Area has experienced partial success in ensuring regular property owner maintenance and debris removal; however, full success can only be achieved through complete debris removal from the flood fringe and re-establishment of a wider riparian buffer.

In addition to residential debris, flooding poses an increasing threat to the Scotchtown neighborhood due to the insufficient capacity of existing culverts and insufficient maintenance of the stormwater drainage network. Roadways, private structures, and utilities running underneath the roadways are vulnerable to repetitive flood damage.

Additionally, lingering damage to roadways from Hurricane Irene and Tropical Storm Lee remains in



Graphic is courtesy of SCAPE / Landscape Architecture PLLC.

Scotchtown on Alberta Drive, at the intersection of Winding Brook and Bedami Drive; on Loch Lomond Lane; and on Patricia Road. Most flooding issues in the area are stormwater-related events, and there is concern that additional development and construction in the area will increase the volume and speed of stormwater runoff in neighborhoods that already experience flooding.

Connection to the Disaster

The Scotchtown neighborhood has experienced multiple flooding events, particularly in areas adjacent to the Winding Brook, which drains in that area. During the rains associated with Hurricane Irene and Tropical Storm Lee, several residences and roadway segments in Scotchtown flooded. Numerous past damage claims have been submitted to FEMA by NFIP policy holders in this area from flooding in January 1978, August 2000, from Hurricane Irene in 2011, and in August 2013. While no records were available, other homeowners along Dundee Circle and Scotchtown Drive also experience flood damaged basements from past heavy rain events.

In an area known as Scotchville, fast moving water and embedded debris from Hurricane Irene storm runoff caused a fracture roughly six feet long in a Town-owned water main distribution pipe that runs under Ben Lomond Drive. When the pipe breached, supply water flowed out into the street and nearby residential properties.

The Town plugged the water main to isolate the leak and prevent future damage, for which it was reimbursed a total of $5,532.70 in FEMA funding; however, this incident raised concern that similar damage could impact the sewer main, creating major utility loss and public health hazards. This concern is partially why the Ben Lomond culvert has been identified as the priority culvert replacement for this project.

Additionally, during Tropical Storm Lee, high velocity water and flooding damaged a corrugated metal pipe (CMP) beyond repair and led to ditch and road washouts along Boorman and Ben Lomond Roads. A combination of the high velocity floodwaters and straight-line winds damaged both sides of the Winding Brook creek

Flooding and roadway damage at the culvert under Ben Lomond Dr. after Hurricane Irene (pictured at top) and Superstorm Sandy (pictured at bottom). Photos are courtesy of the Town of Wallkill.

embankment at Ben Lomond Road, just above the debris-laden culvert, which had already been damaged prior to the storm. The Town Highway Department monitored the roads and performed emergency protective measures throughout the active flooding period. These measures included, among others, placing sandbags, safety cones and barricades along affected zones, closing roads, and performing temporary repairs, as needed.

In addition, the Town of Wallkill's most recent HMP identifies the project area specifically as a part of the Town more vulnerable to flooding. "Although not listed as potential floodplain area, various streets and parcels in the Scotchtown neighborhood of Wallkill have experienced recent flooding events in the vicinity of Winding Brook. Flooding has been notable along Mabel Road, Beth Drive, Badami Drive, Loch Lomond Lane and Dundee Circle. This flooding appears to be due in part to the winding turns which the waterway takes—where excessive flows can jump the banks—however, is severely compounded by residential debris which is left near the brook that is carried away and clogs the flow."

Field inspections of this area show that many residential homeowners continue to pile vegetative debris and trash along the banks of the water. Other notable problems observed were severe scouring of the banks, a private retaining wall that is being undermined by erosion, and culverts in need of replacement.

Description of Project

The Winding Brook Floodplain Improvements Proposed Project seeks to mitigate future flood damages throughout the Winding Brook floodplain and the Scotchtown neighborhoods. Although there are several options to improve the floodplain management in the Winding Brook/Scotchtown area, the initial and primary emphasis is on increasing flow capacity and replacing culverts.

The key priority for this project will be replacing and upgrading the culvert at Ben Lomond Drive (41.473369,-74.356064), because (1) this culvert's current inadequacy poses the greatest threat to several buried Town utilities; and (2) the Town has shown through previous attempts at repair that it cannot improve the culvert to the extent necessary to avoid future damages. This culvert is the area where the Town previously experienced a water main break, which has not been re-activated (it is currently capped on two dead-ends).

The Ben Lomond culvert replacement will improve localized conditions by reducing local flooding under storms below the 25-year flood interval. Sizing culverts for the 25-year storm is a typical mitigation measure for secondary roads and should lead to secondary benefits, such as decreasing the number of road closures and preventing the potential loss of water, sewer, and other utilities.

After completing select upgrades of the most vulnerable culvert with NYRCR funding, the community may further reduce future damages and losses by investing in strategies to reduce flooding impacts through additional floodplain improvements. This can be accomplished through many possible strategies:

- Replace and upgrade other vulnerable culverts with insufficient capacity, including:
  - Dominick Street, 41.476432,-74.35652;
  - Loch Lomond Lane, 41.471402,-74.356094;
  - Mabel Road, 41.475829,-74.35755.
- Control flow rates upstream by providing storage and retention areas. Storage area could take up a significant amount of land area.
- Remove high-risk structures from the floodplain through a buy-out program (with a potential to use the procured land for additional storage and floodplain improvements).
- Offer buy-out and/or flood-proofing options to homeowners in the lower end of the Winding Brook watershed who have experienced flood damage to basements in past flood events.
- Establish a flood protection zone in the watershed to minimize future contributions to existing volumes of stormwater runoff.
- Conduct a detailed study and assessment of local stormwater systems and revise the local drainage plan.

Additional actions to mitigate flooding here would include stream widening, restoration of designed drainageway easements in the Scotchville neighborhood, and adding stricter stormwater management requirements or establishing a flood protection overlay zone in the watershed to control flow for future upstream development.

Specifically the Committee encourages the implementation team to consider working with the owner of a proposed 15-home development on Hasbrouk Lane, as well as the owner of a recently purchased 58-acre site with rumored intentions for residential sub-development, to ensure proper steps are taken to mitigate against additional stormwater runoff affecting neighboring residential areas. These partners should also contact the Palisades Park Commission to discuss potential agreements for receiving stormwater.

Undersized culverts, pictured above, serve as obstructions in an open drainage network, which can cause sediment and other debris to accumulate on the upstream end of these crossings. Image Courtesy of Tetra Tech, Inc.

To advance this project, consideration should be given to the following:

- Regular property owner maintenance and debris removal from floodway is a critical component of mitigation in the Winding Brook floodplain;
- Potential impact of increased upland development adding to stormwater loads over time; and
- Culvert improvements will reduce localized flood damage, and provide considerable flood control and protection for local utilities, whose safety is a major priority in the Town.

Project Cost Benefit Analysis

Cost Estimate

The total project cost for replacing the Ben Lomond Drive culvert, replacing the water main, and conducting reparative streambank stabilization on either side of the work site is $537,798. The majority of the cost will be due to mobilization and excavation. It is anticipated that the Town of Wallkill will need to conduct regular inspections of the project area.

Please note that administrative costs are not included in the project cost estimates.

Project Benefits

FLOOD PROTECTION AND SAFETY

This project will benefit the entire population of the Town of Wallkill, by proposing a number of floodplain improvements to reduce the overall impact of flooding on the Plan Area.

ANTICIPATED REDUCTION OF RISK

No existing Hydrologic Engineering Centers – River Analysis System (HEC-RAS) models are available in the Winding Brook community, so no hydraulic model analysis is available to establish flood mitigation benefits. A culvert sizing analysis was performed by a local consultant on several of the culverts in the area, including the Ben Lomond Drive culvert. This analysis shows that the existing culverts are undersized, according to revised hydrology and standard design criteria. Increasing the size of these culverts should provide local reductions in the WSE near the proposed crossings.

The simplified hydrologic modeling used in the report establishes the 25-year peak flows. These flows have been used to size appropriate culverts for replacement in certain areas, which would reduce local flooding for storms below the 25-year return interval.

The report does not analyze how the new culverts will affect flooding under the 100-year event or what effect they will have on downstream flooding. These determinations can only be made through additional detailed flooding analysis with a hydraulic model, which is currently unavailable.

ECONOMIC BENEFITS

An existing report of local infrastructure needs explains that overtopping occurs in a three-year interval storm. Such frequent road closures due to flooding cause lost trips, costs to detour people, costs for temporary repair, and potential loss of water, sewer, and other utilities.

Positive economic impacts are expected to be seen regarding future recovery and repair spending following a disaster.

Emergency protective measures alone for Tropical Storm Lee and Hurricane Irene led to Town expenses of $8,786.23 and $19,819.53, respectively.

Repair work for flood damage to roads and utility interruptions was even higher. The previously completed engineering report estimated utility losses and housing displacement from a catastrophic failure of the Ben Lomond and Loch Lomond roadway segments discussed previously. The roadways would be closed for an estimated 21 days, affecting up to 3,190 vehicles per day.

If the natural gas utility line or water main under the roadway were disrupted, the outages would leave 145 people without service for 72 hours. If the sanitary sewer line were affected by a roadway or culvert failure, complete loss of service would leave 278 people without wastewater treatment for roughly 336 hours. Total emergency repairs under such a scenario were estimated to cost $96,802.

The reduction in flood damage at Ben Lomond Drive created by this project will result in fewer staffing and emergency protective measure costs during storms and flood events. The Town will save on emergency personnel staffing time and overtime, transportation interruptions, and equipment to secure the road closures (e.g., sandbags, road blocks, signs). Ultimately, this will lead to reduced Town expenses and reduced damage costs submitted on FEMA PWs.

This project would create approximately 3.82 construction jobs, potentially creating employment for local and regional contractors and 4.52 total support jobs from increased materials and equipment sales for suppliers and support industries.[3] This injected funding into the regional construction supply line encourages economic growth through additional induced spending.

In addition to economic growth spurred by construction, these improvements aimed at building a more resilient Town will also create greater confidence for private investors in both Scotchtown and the Town of Wallkill. As the Town prioritizes and implements infrastructure projects that address lingering flood safety and accessibility issues, these investments illustrate a commitment to the future.

They will encourage individuals and private businesses to continue to invest in Wallkill. This investment will help ensure the 61% working age population in Town, i.e., those people between ages 20-64, have steady employment and will ideally help lower the current unemployment rate of 10%.

ENVIRONMENTAL BENEFITS

Undersized culverts serve as obstructions in an open drainage network, which can cause sediment and other debris to accumulate on the upstream end of these crossings. The sediment and debris accumulation buries existing aquatic habitat and can cause a large vertical barrier to aquatic organism movement up and down the channel. Appropriately sized culverts, especially culverts with natural bottoms, allow for material and debris to pass through stream sections during high flows, maintaining a continuous and connected aquatic ecosystem.

Encroachment on channel riparian areas can exacerbate flood conditions, but it also impacts the water quality of a stream. A thickly vegetated and continuous riparian buffer acts to stabilize the banks of the channel, preventing erosion and sedimentation. It also filters

3 The construction jobs were estimated based on a methodology developed by the United States Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per $1,000,000 in construction spending.

pollutants, such as oils and nutrients often found in residential areas, before they enter the stream.

The implementation of this project will help reduce erosion, and therefore reduce the amount of sediment that enters the Town's waterways. This reduction of sediment and debris will help to protect water quality and wildlife habitats.

HEALTH AND SOCIAL BENEFITS

The Winding Brook Floodplain Improvement project would most directly benefit residents of those streets nearest the proposed culvert replacements, specifically Dominick Street, Ben Lomond Drive, Loch Lomond Lane, Beth Drive, and Mabel Road. This would directly benefit a minimum of approximately 40 land parcels located near the culvert improvements, although it would indirectly benefit many of the nearby property owners as well by creating increased access to local roadways during severe storms and flooding events.

This project will have two main benefits to the local community, including (1) improving overall floodplain management and drainage throughout the Plan Area to decrease risk of damage to homes, businesses and residents, and (2) ensuring redundancy in transportation and access to roadways by decreasing the number of road closures in a flood event (i.e., thus increasing access to local homes, businesses, and other essential facilities such as hospitals, doctor's offices, etc.).

One of the most immediate and notable effects will be a decrease in the number of road closures due to flooding. A decrease in road closures also creates secondary benefits, such as preventing lost trips to local restaurants and shopping areas, decreasing the costs necessary to detour people, decreasing temporary repair costs, and preventing a potential loss of sewer, water, and other utilities.

Additionally, this project will help residents and emergency response or other essential personnel needing route access during storm events. Specifically, this benefits emergency and essential personnel during events that result in evacuations, the need for distribution of supplies, and any other need for emergency assistance. Socially vulnerable populations may be at greater risk during such events, and would also benefit from securing the roadways.

A last, important benefit to the culvert upgrade and other potential floodplain improvement measures consists of a decrease to the risk of utility interruption or a pipeline break. Water and sewer lines throughout Scotchtown have already demonstrated that their vulnerability to washouts, and an increase in flood control capacity would reduce the chance of future utility issues. Although the water main break that occurred as a result of Hurricane Irene and Tropical Storm Lee floodwaters did not result in any serious damage, a future water main break or an issue with a sewer line could have severe implications, including contaminated drinking water, increased health hazards to the community, or environmental degradation and contamination. Additionally, water main and sewer main breaks are expensive to repair, resulting in an additional secondary economic impact to the community.

ADDITIONAL BENEFITS

Springboard for Future Floodplain Improvements

Although the primary focus of this project is the upgrade and replacement of the Ben Lomond Drive culvert, this project identifies follow-on work and outlines other improvement steps to be implemented as funding becomes available. In particular, the priority culvert replacements after the Ben Lomond consist of the following locations:

- Dominick Street, 41.476432,-74.35652
- Loch Lomond Lane, 41.471402,-74.356094
- Mabel Road, 41.475829,-74.35755

Supports Multiple NYRCR Plan Goals – Completion of this project supports two of the Town's CR strategies, including:

- **Strategy 1:** Ensure an efficient, safe, and resilient transportation system.
- **Strategy 2:** Improve stormwater management and drainage systems throughout Town to decrease risk for homes, businesses, and residents.

IMPLEMENTATION TIME FRAME

This project may be implemented within six months of going to bid.

REGULATORY REQUIREMENTS

Infrastructure upgrades or improvements will be subject to State and local regulations, including NYSDEC Article 15 Protection of Waters and Article 24 Freshwater Wetlands. Future improvements to the Winding Brook watershed may require a FEMA study/map amendment.

JURISDICTION

Jurisdiction for this proposed project rests with the Town of Wallkill.

SUMMARY

Winding Brook Floodplain Improvements

- Investment: $537,798
- Flood level reduction: Local reductions in the WSE near the proposed culvert improvement during 25-year peak flows.
- Assets protected: Immediate: Utility and Transportation Infrastructure Systems; Long Term: Potential benefit to local habitats and water quality
- Repetitive flood properties removed: N/A
- Potential future loss prevented: Damages associated with roadway closures, emergency repairs, and utility failure.
- Jobs created: Immediate: 3.82; Total Jobs: 4.52
- Strategies accomplished: 2

Ballard Road at East Galleria Drive Flood Mitigation

Project Background

The Town of Wallkill maintains 166.2 miles of Town-owned paved and gravel roads. These corridors provide primary access into and out of the residential neighborhoods in Town, as well as provide access to medical facilities, regional shopping, and public buildings. In addition to local municipal roads, a number of private, county, state, and interstate roads pass through the Town of Wallkill.

Numerous roads have been impacted by floodwaters from the winding creeks and tributaries around the Town of Wallkill. These roads have the potential to suffer from collapse, culvert failure, washout, and other damages during storm events that not only impact the overall transportation system, but also threaten the health and safety of all motorists using them.

Making this transportation network more resilient to future storms involves addressing failures on roadway segments and transportation elements throughout the Town.

Of particular importance to the Town is the intersection of Ballard Road at East Galleria Drive, where an existing 36”-diameter, reinforced concrete pipe currently conveys Winding Brook underneath the roadway. The size of this culvert is a significant obstruction to the flow during heavy rainfall events, resulting in storms from the 10-year recurrence and higher to overtop the roadway.

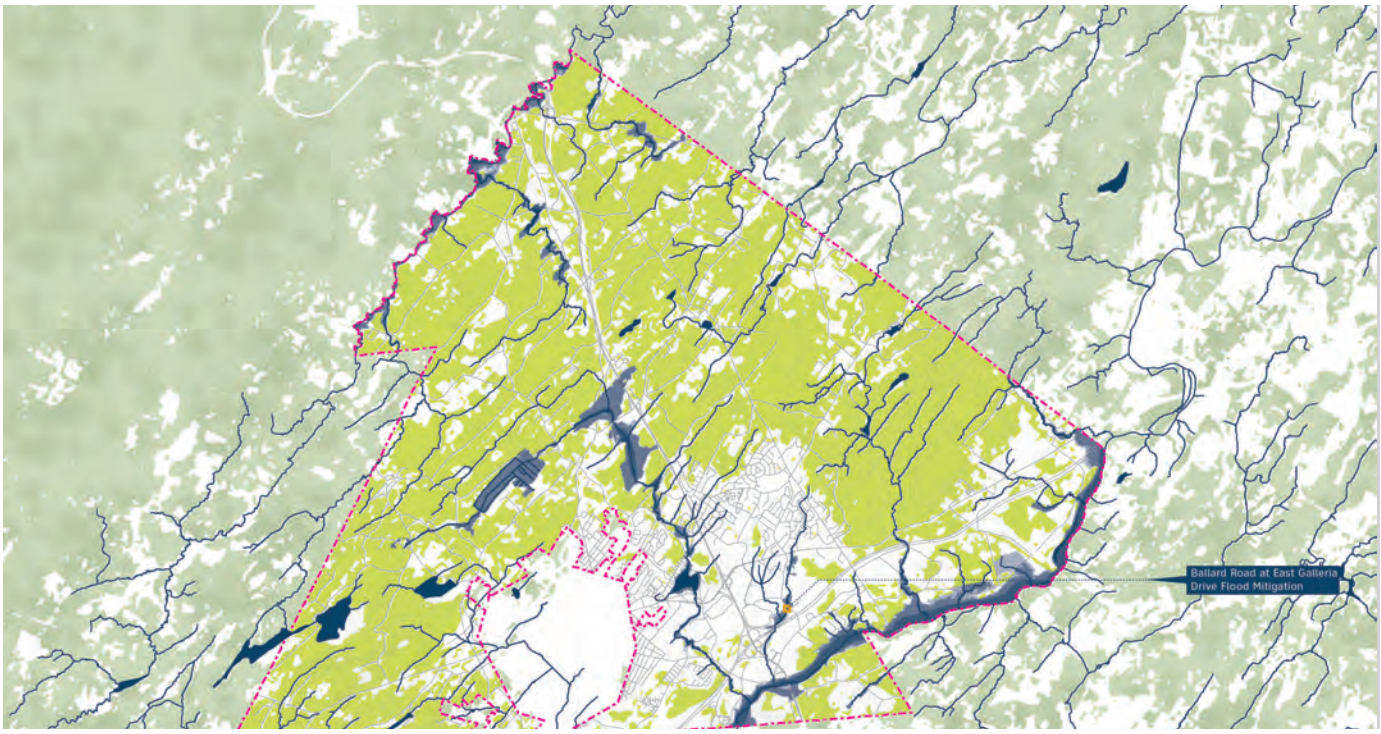
Connection to the Disaster

The intersection at East Galleria Drive and Ballard Road is a high traffic area for regional and local motorists, and it has a history of flooding from the Winding Brook during heavy rain events. The intersection serves as a critical access route for traffic headed from the south, accessing the Metro-North Middletown train station, or from State Route 17 and Interstate 84, heading to the Regional Medical Center or the Galleria Mall at Crystal Run, two of the Town’s greatest economic assets. The route’s most frequent night-time travelers are tractor-trailer trucks en route to the Town’s large grocers or retailers. The trucks provide a steady stream of traffic through all hours of the night.

Photo of floodwaters from Hurricane Irene that caused roadway washout at East Galleria Drive and Ballard Road. Photo is courtesy of the Town of Wallkill.

Floodwaters from Superstorm Sandy caused roadway washout at East Galleria Drive and Ballard Road. Photo is courtesy of the Town of Wallkill.

The intersection was barricaded off during Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy, when a roadway segment washed out along the shoulder, creating dangerous conditions for motorists and threatening the gas and water utility lines underneath the roadway. After each storm, damages forced the temporary closure of the intersection and prolonged closure of one lane while repairs occurred.



Graphic is courtesy of SCAPE / Landscape Architecture PLLC.

In February 2010, prior to the 2011 storms, the Town sought Federal transportation stimulus funding for roadwork along East Galleria Drive. This funding was to be used for a project to increase the size and capacity of culverts at this intersection. This application demonstrates the long-term need for upgrades and improvements to this stretch of roadway, even before the flooding and damages from the later declared disasters brought new attention to the need for investment in this location.

Flooding, shown here, at East Galleria and Ballard Road after Hurricane Irene.

Description of Project

The flooding problem in this area originates from Winding Brook, a tributary of the Wallkill River that begins near the bottom of the Winding Brook watershed (draining the Scotchtown residential area) and then receives stormwater from many acres of commercial development on State Route 211 as well as between State Route 17, North Galleria Drive, and WES Warren Drive. Fixing the problem for long-term resiliency requires replacing the existing culvert to facilitate larger flow capacity and to better convey large amounts of stormwater downstream and to the available floodplain

Results of Superstorm Sandy flooding, shown road collapse at East Galleria and Ballard Road. Photos are courtesy of the Town of Wallkill.

south of the roadway.

This Proposed Project would install new 3.5-ft x 16-ft box culverts in the northern and southern section of the roadway, and it would require excavation of existing materials, as well securing by replacement up to 200 linear feet of a water main and 150 linear feet of a sewer main, both of which run under that section of roadway.

In advancing this project, design and implementation schedules may be crafted to minimize congestion and other traffic impacts associated with project construction. Furthermore, upgrading both culverts would significantly enhance the project's environmental benefits.

Project Cost Benefit Analysis

Cost Estimate

The total project cost is $1,207,599. The Town anticipates the need for regular inspections of the project area (i.e., pre- and post-storm and flood events), maintenance and, potential restoration over the project useful life.

Please note administrative costs are not included in the project cost estimates.

Project Benefits

FLOOD PROTECTION AND EMERGENCY RESPONSE

This project will serve a flood control purpose by enabling the flow of floodwaters through the intersection during and after large rainfall events, reducing the risk of future roadway damages from flooding. This project will prevent future roadway closures and associated losses, as well as secure two critical utility lines.

ANTICIPATED REDUCTION OF RISK

Increasing the culvert at Ballard Road and East Galleria Drive to a 3.5-ft x 16-ft culvert significantly reduces flooding to the point where only the 500-year storm event overtops the road. The limiting factor then becomes the New Wakefern Driveway immediately upstream.

Improvement of the Ballard Road culvert can result in a WSE reduction of the 100-year floodplain of nearly 2.5 feet upstream of Ballard Road. There is no negligible reduction downstream of the crossing, but reducing the number of storms that overtop the roadway will help protect transportation and other infrastructure from erosive flows.

ECONOMIC BENEFITS

Improvements to build a more resilient transportation network create greater confidence for private investors in the Town of Wallkill, especially with regards to critical intersections frequented by a range of regional and commercial motorists. As the Town prioritizes and implements infrastructure and transportation projects addressing flood safety and accessibility issues, these investments will encourage individuals and private businesses to continue to invest in Wallkill. By creating safer and more reliable access to the Regional Medical Center, Galleria Mall, and other local commercial and industrial nodes, this project will benefit commercial and industrial business growth.

More specifically, this project has the potential to create approximately 8.57 construction jobs, potentially creating work for local and regional contractors, in addition to 10.14 new support jobs from increased materials and equipment sales for suppliers and support industries.[4] While this project will certainly create economic opportunity, there are limited direct

4 The construction jobs were estimated based on a methodology developed by the United States Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per $1,000,000 in construction spending.

economic benefits anticipated (permanent jobs, direct additional spending, and direct additional taxes).

ENVIRONMENTAL BENEFITS

Obstructions along Winding Brook that cause flows to back up and slow down can lead to excessive deposition and debris capture. These areas require continual maintenance to remove unwanted materials and reduce the stress on existing infrastructure. Similar to the Winding Brook Floodplain Improvements project proposed earlier in this NYRCR Plan, this project would remove the obstruction of an undersized culvert from an otherwise open drainage network, allowing for material and debris to pass through stream sections during high flows, maintaining a continuous and connected aquatic ecosystem.

The implementation of this project will also secure a water and sewer main, reducing the risk that untreated water or wastewater will be released, contaminating the floodwaters and the local environment.

HEALTH AND SOCIAL BENEFITS

Implementing flood control measures to mitigate future flood damage at the intersection of Ballard Road and East Galleria Drive will have significant social benefits. Perhaps most significantly, this major thoroughfare provides primary, and in some cases, sole access to the Town's bustling medical corridor, home to the Regional Hospital and other associated healthcare providers. Individuals drive from all over the Plan Area, as well as from other municipalities, to benefit from the high concentration of quality care providers in this area.

Many such care providers serve highly vulnerable populations, such as those individuals receiving dialysis services and cancer care. Patients who cannot reach their healthcare providers due to roadway closures may be faced with serious risks to their life and wellbeing. By decreasing future flood damage at this intersection, the Town will simultaneously increase confidence for service providers to continue to invest and build business in this area, and will also secure continuous access for patients to their critical care providers.

Ballard Road is a critical link in the route to the regional medical corridor in the Town of Wallkill. Photos of medical centers are courtesy of Eric Thayer.

ADDITIONAL BENEFITS

Provide Framework for Future Flood Control Resiliency Measures on Local Roads – Although only one roadway segment was selected for this project's focus, many other Town roadway segments are also highly vulnerable to the effects of flooding and have experienced repetitive damage. Upon successful completion of the Ballard Road/East Galleria Drive intersection, the Town could begin planning future transportation resiliency actions, including those discussed in Section 5: Additional Materials.

Supports NYRCR Plan Goals – Completion of this project supports one of the Town's resiliency strategies, specifically:

- **Strategy 1:** Ensure an efficient, safe, and resilient transportation system

IMPLEMENTATION TIME FRAME

This project can be carried out within one year.

REGULATORY REQUIREMENTS

This project must comply with local and State codes, rules, and regulations, including NYSDEC Article 15 Protection of Waters, which is required for projects impacting protected water bodies.

JURISDICTION

Jurisdiction for this proposed project rests with the Town of Wallkill.

SUMMARY

Ballard Road at East Galleria Drive Flood Mitigation

- Investment: $1,207,599
- Flood level reduction: Improvement of the Ballard Road Culvert can result in a WSE reduction of the 100-year floodplain of nearly 2.5 feet upstream of Ballard Road.
- Assets protected: Critical roadway segments, and access to critical medical facilities and economic engines.
- Repetitive flood properties removed: N/A
- Potential future loss prevented: Damages associated with roadway closures, emergency repairs, and utility failure, as well as risk to life and safety.
- Jobs created: Construction: 8.57; Total Jobs: 10.14
- Strategies accomplished: 1

Interoperable Communications Program

Project Background

To provide immediate and coordinated assistance in response to disasters or emergencies, public safety personnel must be able to communicate with each other effectively, securely, and in real time. The ability of Wallkill's public safety community to provide rapid, coordinated response to routine public safety operations such as fires and criminal activities to catastrophic accidents or natural disasters can mean the difference between life and death.

Recent disasters such as Irene, Lee and Sandy accentuate the importance of a coordinated response among public safety agencies from all disciplines. Without communications interoperability, both life and property are put at significant risk.

Connection to the Disaster

No historic loss details are available at this time. However, delays in response times and uncoordinated response efforts may be attributable to the old paradigm of emergency communications within Wallkill. Furthermore, the lack of a redundant power source at critical communication sites such as the Connor's Road tower site has crippled Wallkill's Police and Fire agencies ability to communicate and created safety issues for emergency responders. Power has been loss at this site during several winter storms and during Hurricane Irene, Tropical Storm Lee and Superstorm Sandy.

Description of Project

The basic problem in the Town of Wallkill is that when different first-responder organizations convene at an incident scene, their radios are incompatible because they operate over different frequencies and use different techniques. This Proposed Project provides emergency services personnel the capability to

Pictured here is an example of a communications tower with repeater, a core component of interoperability. Photo is courtesy of Oswego, NY.

communicate effectively, securely and in real time. It also aims to educate residents and emergency services personnel on the available communications capabilities and assets located within the Town of Wallkill. In order to achieve the objectives above the project would include the following:

- Installation of a UHF repeater at the Connor's Road Tower site. Repeater gateways instantly retransmit signals input from one channel or system to another. The repeater will be a complex device capable of bridging multiple frequency bands. Within minutes of an emergency responder arriving on-scene, a portable gateway can be quickly configured to support the frequencies of participating agency radios.
- Installation of natural-gas or solar back-up power at all communication tower locations. The tower site proposed for installation of the repeater system currently does not have a redundant power source (the Town is currently working towards acquiring a generator). This site typically losses power twice a year. During power outages, Wallkill emergency services personnel rely on battery power to operate the tower until a generator can be located.
- Development of a Tactical Interoperable Communications Plan (TICP) for Wallkill and

surrounding jurisdictions, inclusive of emergency responders, state agencies and closely aligned non-governmental organizations. The TICP is intended to document the interoperable communication resources available to Wallkill and surrounding jurisdictions, identify who controls each resource, and state the operational procedures that exist for the activation and deactivation of each resource.

- Development and implementation of a training and exercise program to validate interoperable equipment and planning.

To advance this project, consideration should be given to the following:

- The repeater system and redundant power source will require regular inspection, maintenance, and testing;
- The planning, training and exercise program associated with the installation of the repeater system shall be administered regularly on a long-term basis;
- Effective emergency preparedness and response for major events requires the coordinated planning and actions of multiple players from multiple first responder disciplines, jurisdictions, and levels of government as well as nongovernmental and private sector entities; and
- Schedules and costs of regular maintenance and updates for the TICP.

Cost Estimate

The total project cost is between $150,000 and $400,000.

This cost estimate has a large potential span, as it involves many elements. The final cost will be dependent upon which elements the Town includes in actual project implementation.

The installation of the repeater, the repeater itself, and other associated costs (i.e., licensing fee and radio re-programming) is estimated to cost $34,408, while a redundant power source could cost up to $200,000. This project also includes the development of a Tactical Interoperable Communications Plan (TICP) for $50,000 and the implementation of a training and exercise program for $50,000 – $100,000, conditional to the level of effort identified by the Town. Please note that administrative costs are not included in the project cost estimates.

Interoperable communications planning ensures emergency services personnel can communicate with other agencies and mutual aid response teams in emergencies. The photo above of emergency radios is courtesy of FEMA.gov.

Project Benefits

FLOOD PROTECTION AND EMERGENCY RESPONSE

Emergency services rely heavily on efficient and effective communications in order to conduct essential services for the resident of Wallkill. During emergency or disaster situations, this need increases. This project focuses on ensuring that emergency response personnel in the Town have the ability to communicate effectively, securely and in real-time. This communications capability increases the overall public safety and emergency response capabilities within Wallkill.

ANTICIPATED REDUCTION OF RISK

This project reduces risk to emergency responders, residents and visitors by ensuring that communications between response agencies continues to operate efficiently before, during and after a disaster. Responders trained on adequate interoperable

The Circleville Fire Company, pictured above, and other emergency service personnel, would benefit from the completion of this project. Photo is courtesy of Eric Thayer.

communications systems can minimize disruptions to emergency response and promote safety for all by ensuring a coordinated response effort.

ECONOMIC BENEFITS

The procurement and installation of a repeater system would allow the Town of Wallkill's emergency services personnel to communicate on a frequency band they are currently using and would not require response agencies to purchase additional radios in order to communicate. New radios are costly and an inefficient way to solve communications problems.

This work will create 1.75 FTE construction and approximately 2 FTE support jobs from labor, materials, equipment, and other supply and support industries.[5] These numbers were adjusted to the $234,408 construction estimate for the installation of the repeater and the redundant power source portions of this project.

ENVIRONMENTAL BENEFITS

No environmental assets were identified as being completely secured, and there are no environmental benefits associated with the installation of the generator or the planning, training, or exercise component of this project. Environment benefits highlighted in the Natural Gas or Solar Back-up Power for Critical Facilities and Infrastructure project will also be applicable to this project, if back-up power is acquired as outlined above.

HEALTH AND SOCIAL BENEFITS

The installation of the UHF repeater would help Wallkill first responders keep their communities safer by solving a dangerous deficiency in the emergency communications capability within the Town. The ability of first responders to communicate seamlessly and effectively on an interoperable network during an emergency helps saves lives and protect critical infrastructure. Miscommunication or a lack of communication over the years has led to tragic loss and has been cited as a need for improvement after numerous disasters.

The 9/11 Commission documented in its historic reports from July 2004 how bungled communication in the disaster zone might have prevented some firefighters from getting a critical message that day: to evacuate the North Tower, after the South Tower had already pancaked in lower Manhattan.

In addition, the Commission stated that a main radio channel used by the firefighters "was simply overwhelmed by the number of units attempting to communicate on it." "As many people tried to speak at once, their transmissions overlapped and often became indecipherable." Other firefighters were simply using the wrong radio channel or lacked functioning radios altogether. The Commission found that these problems were a "contributing factor" in the deaths of an unknown number of firefighters, and that botched communication between the police and fire departments may have also contributed.

5 The FTE construction jobs were estimated based on a methodology developed by the United States Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per $1,000,000 in construction spending.

Our nation's tragic past experience stresses the need for interoperable communications within our first responder communities and the need to train first responders on communications equipment, capacity and etiquette. As previously stated, the fluid flow of communications to all disciplines of emergency services in real time will protect life safety in the Town.

ADDITIONAL BENEFITS

In addition to the benefits described above, completion of this project supports one of the Town's NYRCR Strategies including:

- **Strategy 3:** Improve on existing emergency preparedness, response, and communications, including public outreach and education.

Project Cost-Benefit Analysis

By implementing a system to warn residents of impending danger, the Town will ensure that residents have enough time to protect their property and evacuate from hazard areas, whether on their own or with assistance from the government. Fewer residents in harm's way means less risk of loss of life in the Town, and less risk to emergency responders on duty during a disaster. The financial cost of the project is very low compared to the reduced risk to residents and responders.

IMPLEMENTATION TIME FRAME

This project would be implemented within 6 months.

REGULATORY REQUIREMENTS

Installation and maintenance would need to meet appropriate local building codes and ordinances.

JURISDICTION

Jurisdiction for this proposed project rests with the Town of Wallkill.

SUMMARY

Interoperable Communications Program

- Investment: Between $150,000 and $400,000
- Flood level reduction: N/A
- Assets protected: Socially vulnerable populations, health and safety.
- Repetitive flood properties removed: N/A
- Potential future loss prevented: Effective communications is essential to life safety and the well-being of Wallkill responders and residents.
- Jobs created: Immediate: 1.75; Total Jobs: 2

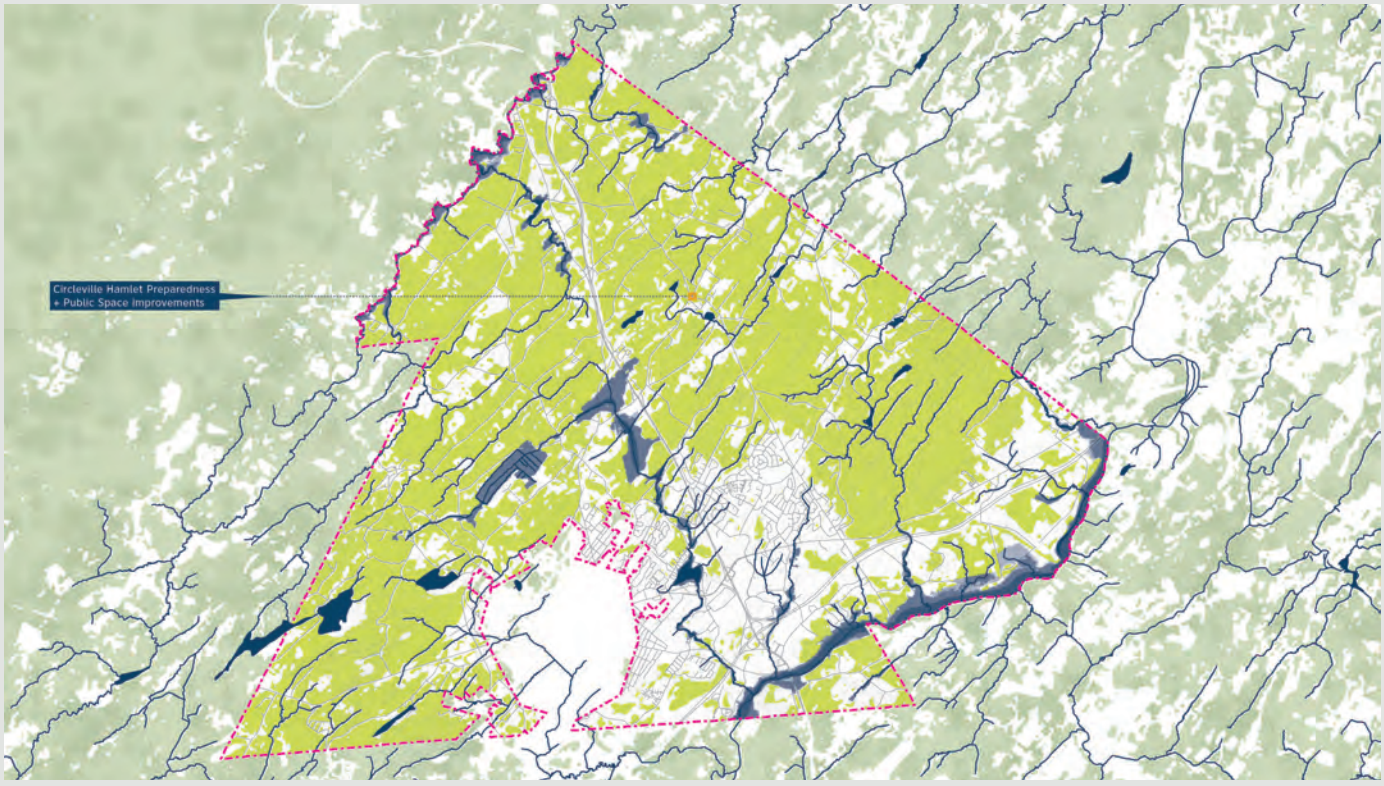
Circleville Hamlet Preparedness and Public Space Improvements

Project Background

Circleville is one of Wallkill's largest historically mixed-use hamlets. The local schools in the community attract families and create the need for businesses that serve the school and residents living in the hamlet. This hamlet is well-known in the Town of Wallkill, and has been identified for its potential to expand economic diversity within the Town with planning techniques associated with place-making, as well as for its suitability to locate a new emergency shelter serving residents of central and northern Wallkill.

Circleville is about a 7-10 minute drive from the Town of Wallkill's central facilities, i.e., the intersection of Routes 211 and 17, making those facilities inaccessible at times when roadway flooding or traffic light power outages create disruptions in the transportation network.

Pictured above, State Route 302 intersects with the Goshen Turnpike at the center of Circleville Hamlet. Photo is courtesy of Eric Thayer.



Graphic of Circleville is courtesy of SCAPE / Landscape Architecture PLLC.

At the same time, when traffic is flowing freely, the Hamlet is conveniently located as a destination for residents throughout the Town. Additionally, the Hamlet is home to important local natural resources including Lake Henneside and the Dwaar Kill, a small waterway that passes under NY RT. 302 just north of the Circleville Volunteer Fire Company – Station 1. Circleville also contains numerous public facilities within a ¼ mile radius of the historic center, including the following:

- Circleville Volunteer Fire Company – Station 1
- Circleville Presbyterian Church
- Walden Savings Bank
- Thompson Park (more commonly referred to as Circleville Park)
- U.S. Post Office

Located within a half mile radius of the historic center are the Circleville Elementary School, Circleville Middle School and Pakanasink Elementary School. The administration offices of the Circleville School district are also located in this hamlet.

Connection to the Disaster

A number of Wallkill residents who participated in an NYRCR Public Engagement Event, survey, or other outreach opportunity indicated a need for local warming stations and emergency shelters close to Wallkill's rural residents during cold-weather power outages, as existing services close to the Town's commercial core near State Route 17 and 211 are often inaccessible during and after storms. Many other public and committee comments focused on a lack of sense of place among Wallkill residents, and the need for a stronger community cohesion to help build economic resiliency town-wide, not just focused on the large-scale retail and industrial operations near the major State and Interstate highways in the south part of town.

This project proposes to retrofit the newly-completed Circleville Recreation Center as an emergency shelter and warming station, as well as construct public space and pedestrian improvements in the heart of the

Numerous public facilities lie within a half-mile radius of this historic Hamlet of Circleville center, including the U.S. Post Office and Circleville Fire District Station No. 1, shown in the images above. Photos are courtesy of Eric Thayer.

Circleville Hamlet. The investments proposed in this project take an all-hazards mitigation and economic development approach to resilience. The project is also designed to benefit all users and residents of the Hamlet of Circleville, including local employees, emergency services personnel, school children, summertime campers, residents visiting the post office, deli, or hair and nail salon, rather than a specific roadway or building, giving it a more comprehensive scope and a greater potential impact to the community. Thus, when considering this project's connection to past disasters, this project considers all recent disasters in the area and the economic impacts of those events in order to develop preparedness and public space improvements that will be most effective towards future resiliency.

Description of Project

This Featured Project seeks to improve overall local disaster preparedness and to incorporate pedestrian-scale green streetscape improvements, particularly in the area surrounding the intersection of State Route 302 and the Goshen Turnpike. The development of this community as an economic resource creates more resiliency in the entire Town as it could allow residents to recover from storm events quicker and closer to home, and be used to create an identity and a way to engage and inform local tourists about the many historical features, beautiful parks, and local farms ready for their patronage in Wallkill.

Because of its location out of severely flooded areas, Circleville has the potential to increase economic prosperity and resiliency of the entire Town of Wallkill.

The main intersection in the Hamlet of Circleville does not currently have sidewalks, prohibiting safe pedestrian access between the many local shops, services, and social, religious, and recreational activity centers within short walking distance of one another. Rendering of proposed sidewalk and crosswalk courtesy of SCAPE / Landscape Architecture PLLC.

FEATURED PROJECTS

The new Circleville Recreation Center, opened in the spring of 2014, has been discussed by the Committee as a potential location for a local emergency public shelter and warming station for people without power or who are displaced by floods in the northern parts of Town. An example emergency evacuation shelter set up in a school gymnasium is shown. Photo courtesy thetimes.co.uk.

This featured project would focus on a wide scope of opportunities to successfully achieve its program goal. The project elements focused on disaster preparedness could include, but would not be limited to:

- Identifying existing and/or designating new Town shelter locations in the Hamlet of Circleville outside the 100 year floodplain: The Committee identified the need to designate a local shelter and emergency warming station for residents in the more rural northern parts of Town. These residents are at a distinct disadvantage and heightened risk when displaced by flooding, or when power outages during cold weather periods force residents to seek emergency shelter.
- Circleville Park in the Town of Wallkill is owned by the Town of Wallkill and located between Decker Lane and Sam Fast Blvd, west of State Route 302, in the heart of the historic Circleville hamlet. Two new buildings at the park were completed in 2014, an office building and a new recreation facility, both ADA accessible, equipped with year-round heating options and access to temperature-controlled restrooms. Furthermore, the new facilities were recently equipped with emergency power supply. The Committee recommends funding the necessary improvements and investment in order to equip these facilities with the necessary upgrades so they may meet the identified need for an emergency shelter in this area.
- Additional needs include a managed stockpile of equipment (e.g. cots, blankets, food, etc.).
- Ensure that public facilities within the Hamlet, including the Circleville Volunteer Fire Company – Station 1 and U.S. Post Office, are protected from flooding.

Public space improvements would focus on green infrastructure and the development of the Hamlet as a sustainable live/work community with characteristics that could attract new housing development and new business to the community. These improvements would help to create identity in the community through design, and increase the livability and desirability of this community.

Streetscape improvements shown here in the Borough of Hawthorne, NJ, are examples of those that could be realized in Circleville. The project may consist of solar street lights, sidewalks, and an upgraded traffic signal with pedestrian signals to improve safety at the intersection or State Route 302 and the Goshen Turnpike. Photo is courtesy of www.hawthornenj.org.

The public improvements would include, but not be limited to:

- Installing solar-powered traffic signals and street lights;
- Installing new sidewalks with the potential to use pervious pavers to improve stormwater infiltration and groundwater recharge;

- Developing and installing historic, interpretive, and/or educational signage; and
- Developing innovative stormwater solutions to allow areas used as stormwater storage to add to the beauty of the hamlet.

To advance this project, consideration should be given to the following:

- Potential for grant and other incentive programs to support implementation of green technology and structures;
- Schedules and costs for regular maintenance of implemented public space improvements; and
- Coordination of the hamlet shelter and disaster preparedness plan with the Town of Wallkill, Orange County, and New York existing plans and regulations.

Project Cost Benefit Analysis

Cost Estimate

The preliminary estimated total project cost for the Circleville public space improvements is $1,220,500.

Preliminary cost estimates for the Circleville Park Shelter total roughly $129,000. This investment would fund improvement needs and costs associated with retrofitting the Circleville Recreation Center into an emergency shelter space. The following itemized improvements are proposed:

Office / Meeting / Restroom Building -
Existing Conditions:

- The first floor meeting room can serve 108 people seated in chairs. The space exit doors are not code complaint.
  - There are two existing unisex restrooms with one shower.
  - There is an existing ADA compliant Men's and Women's restrooms, each with four toilet fixtures.
  - The second floor contains four offices, a small meeting room serving 15 people, two additional restrooms and kitchen space. The floor is served by a single stair and lacks a code required second means of egress.
  - The second floor level is not ADA accessible as required of Title III public buildings. As an existing structure, remediation is not required in a minor renovation.
  - All spaces have heating and emergency back-up power.
- Office / Meeting / Restroom Building - Proposed improvements:
  - Construct a second covered stair means of egress to the second floor to comply with building code requirements for life safety. Cost: $75,000
  - Reverse the door swings from the first floor meeting space to comply with life safety code. Cost $4,000.
  - All spaces have heating and emergency back-up power.
- Recreation Gymnasium Building - Existing Conditions:
  - The building is comprised of three spaces: Mechanical, Storage, and a 6,800 square foot Gymnasium that could shelter 340 people on a short term stay basis.
  - There are no restrooms in this building.
  - The building is ADA accessible.
- Recreation Gymnasium Building – Proposed improvements:
  - Construct an 300 square foot addition to house shelter specific storage. Cost: $166/sq. ft. or $50,000

In addition, this project proposes a number of improvements for Circleville. The total cost for the emergency shelter and streetscape improvements is $1,349,500.

Please note that administrative costs are not included in the project cost estimates.

Project Benefits

ANTICIPATED REDUCTION OF RISK

HEC-RAS modeling was not available for the tributary that is near Circleville, and was not used to evaluate this project.

ECONOMIC BENEFITS

The enhancements to public space in Circleville will create a more defined community and promote long-term economic development. The Town of Wallkill has identified Circleville as a prime opportunity for future development to shape it into a desirable live/work community. The investment in sustainable public space improvements inspires greater confidence in the private investment community to finance investments that spur new growth and opportunity in the community.

Although investment into alternative technology is usually greater than that of traditional technology, the efficiency and sustainable nature of such technology ultimately leads to long-term cost savings. According to the "The Costs and Financial Benefits of Green Buildings," a report produced by the Massachusetts Technology Collaborative for the State of California Sustainable Building Task Force, a minimal increase of 2 percent in upfront costs to support green design result in an average life-cycle savings of 20 percent of total construction costs, at least ten times in savings of the initial investment increase. Green technology can set a standard for development of a community, and become an incentive for other private development projects to follow suit.

Green technology puts less strain on local power grid and water supply infrastructure, increasing the capacity of these systems. This ultimately benefits the Town, with decreased costs of supplying services and more indirectly, the residents, by preventing a need to increase taxes to cover increased energy costs.

Example above is of solar street lighting designed for a small scale, traditional neighborhood context. Photo is courtesy www.solarlighting.com.

This project would create approximately 9.58 construction jobs, potentially creating employment for local and regional contractors, in addition to 11.34 new support jobs from increased materials and equipment sales for suppliers and support industries.[6]

This injected funding into the regional construction supply line encourages economic growth through additional induced spending. Induced spending occurs as employees and businesses benefitting from the construction work in turn spend money on other goods and services. The potential induced benefit includes additional permanent jobs, increased taxes, and increased expendable income that may be spent on additional local goods and services.

ENVIRONMENTAL BENEFITS

Elements of this project, especially the use of sustainable green infrastructure, will lead to

6 The construction jobs were estimated based on a methodology developed by the United States Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per $1,000,000 in construction spending.

environmental improvements including reduced fossil fuel energy use for electricity and better stormwater pollutant filtration. The project also creates greater efficiencies in the use of land resources by fostering activity on the pedestrian scale, inviting a sustainable live-work community that can increasingly rely on pedestrian links to and from places of work, school, recreation, and shopping.

HEALTH AND SOCIAL BENEFITS

Both aspects of this project, i.e., the disaster preparedness and the public space improvements, present a myriad of health and social benefits to the community. Most immediately, the project would increase Circleville's overall resiliency, lessening future risks to health and safety from disasters.

The preparedness portion of the project would ensure that residents have a safe location for shelter or warming within a shorter distance than has been available in the past, at a location that remains accessible even when roadways throughout town may be closed from flooding or downed trees. Circleville's investment in preparedness and safety measures provides a reassuring resource to Wallkill residents, especially those with increased vulnerability, including children, the elderly, those with functional or access needs, and low-income residents.

Sidewalks and streetlights in the Hamlet would ensure safe walking routes between the local schools and Thompson Park, which hosts numerous after-school programs and activities. Employees of local businesses would benefit from sidewalks, as they would have safe and easy access to the many goods and service providers within walking distance such as the local deli and market, hair salon, U.S. Post Office, Walden Bank, and Circleville Presbyterian Church. During storm events, sidewalks and streetlights help to orient community members to safe places to shelter.

By enhancing Circleville's existing charm through the incorporation of aesthetic and green technology and enhanced designs, the Hamlet of Circleville capitalizes on its identity as a place. Partnered with the Town's plan of creating original and educational signage, the project creates a unique opportunity for the community to promote its deep connection with the history of the development of the region, thereby attracting interest from local and regional visitors.

Lastly, the use of alternative, sustainable technology in the public space improvements provides both health and social benefits to the community. Sustainable urban design promotes community health, as it recognizes the importance that surroundings play on emotional wellbeing. Most sustainable design promotes the preservation of natural environments and promotes walkability, both of which increase recreation and exercise opportunities that promote health and fitness.

In addition, comments from the first and second public engagement meetings included recommendations that are related to enhancing both local disaster preparedness and public spaces. One commenter noted that the Hamlet already has an established community center, and the space's use could be enhanced to create a heating/cooling center for senior citizens and as a shelter for displaced residences in the more rural parts of Town. Others in the community have repeatedly expressed the need to create a stronger community identity in Wallkill. Public improvements in the Hamlet of Circleville would begin to address this need.

ADDITIONAL BENEFITS

Completion of this project supports three of the Town's NYRCR strategies, specifically:

- **Strategy 1:** Ensure an efficient, safe, and resilient transportation system.
- **Strategy 3:** Improve on existing emergency preparedness, response, and communications, including public outreach and education.
- **Strategy 4:** Preserve, protect, and enhance the Town's natural, recreational, and cultural resources and strengthen local sense of place and community.

IMPLEMENTATION TIME FRAME

This project will be implemented within two years.

REGULATORY REQUIREMENTS

Retrofitting of building or improvements to infrastructure will need to comply with local and State regulations. Furthermore, any work on a State Highway within the Town would require a highway work permit.

JURISDICTION

Jurisdiction for this proposed project rests with the Town of Wallkill.

SUMMARY

Circleville Hamlet Preparedness and Public Space Improvements

- Investment: $1,349,500
- Flood level reduction: N/A
- Assets protected: Housing and Infrastructure Systems; Long Term: Potential benefit to other assets (economic and health and social services)
- Repetitive flood properties removed: Immediate: N/A
- Potential future loss prevented: Reduces risk to health and safety for rural residents during future power outages or who are displaced from flood events. Improve traffic safety during future power outages with solar back-up power.
- Jobs created: Immediate: 9.58; Total Jobs: 11.34
- Strategies accomplished: 3

Masonic Creek Watershed Stormwater Storage: Fredrick's Farm Stormwater Storage and Public Park

View of wooden bridge, existing pond, and orchard on one of the sites proposed for conversion into a public amenity with flood storage. Photo is courtesy of Eric Thayer.

Project Background

Preserving open space throughout a watershed or local floodplain is one of the most effective long-term ways of reducing the adverse impacts of the natural flood process. In fact, the two primary goals of floodplain management according to FEMA are (1) reduction of economic losses and threats to public health and safety from flooding, and (2) preservation and restoration of the natural and beneficial functions and resources within floodplains.

Throughout the Town of Wallkill, the Masonic Creek and its tributaries have been a source of livelihood, recreation, and aesthetic amenity for generations. These same generations, however, have contributed to development that has modified the floodplain, leading to new flood risks and hazards.

The Town of Wallkill NYRCR Planning Committee recognizes the need to increase, improve, and preserve the stormwater and flood storage capacity and retention as part of a long-term solution to flood damage reduction. These actions would be implemented throughout the Masonic Creek Watershed that drains many of the Town's residential neighborhoods. Establishing a system of flood and stormwater storage along upstream reaches of the Masonic would be part of a multi-faceted effort to decrease the flood risks for established residential neighborhoods and existing development near the Masonic Creek, and could have long-term impacts in reducing flood damage to private and public infrastructure for years to come.

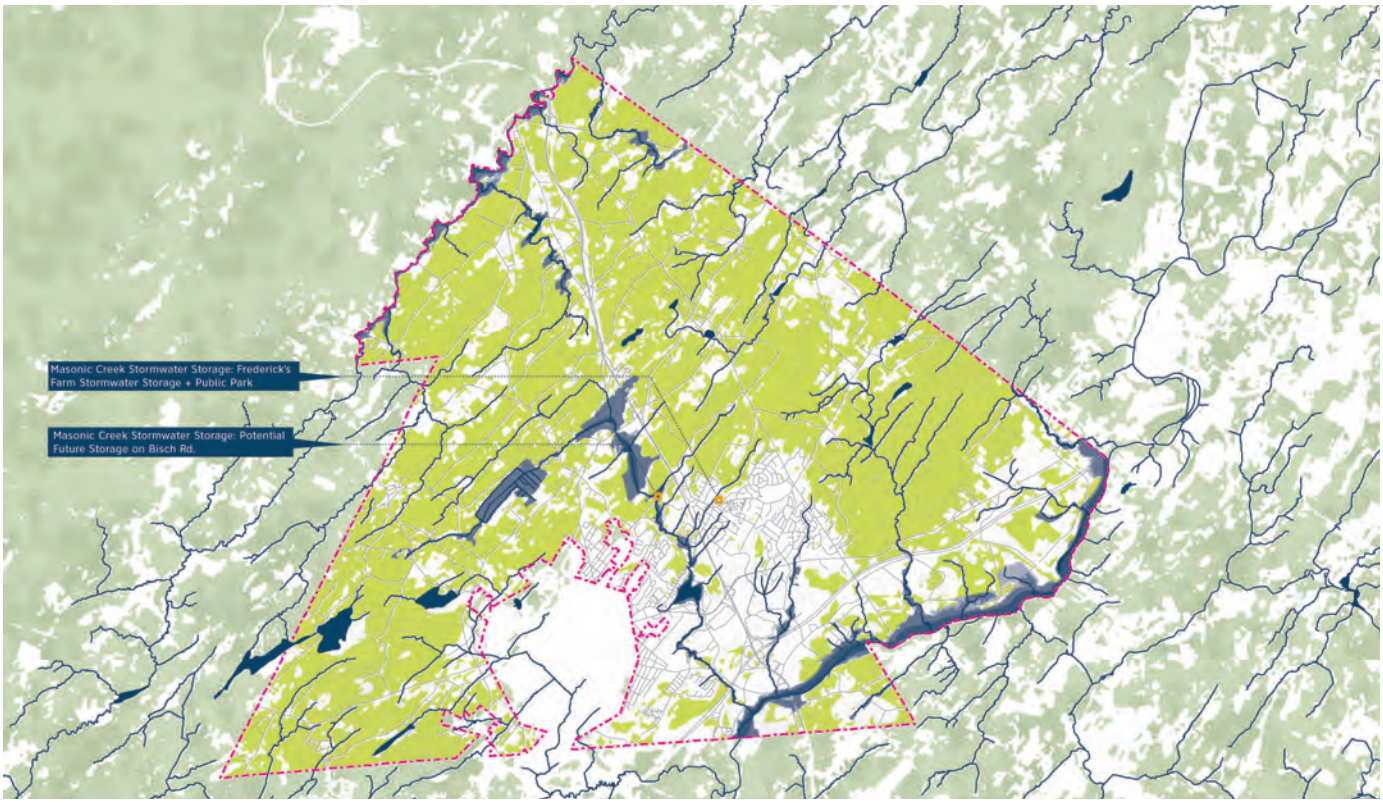
Connection to the Disaster

Numerous damages have been reported throughout the Town of Wallkill in locations along or in close proximity to reaches of the Masonic Creek down stream of one or both of the properties discussed in this project. From north to south, roadway flooding of the main stem Masonic Creek during Hurricane Irene was reported at Mud Mills Road near Cottage Street, and on Cottage Street west of intersecting with Mud Mills Road.

At the Silver Lake Scotchtown Road "Twin Tunnels" west of the end of Mud Mills Road, flooding from Irene brought large debris and material from the surrounding watershed, breaking a guardrail and forcing emergency crews to deploy barricades around the closed section of roadway to prevent further risks to life and safety. Nearby locations were also flooded and closed to traffic, including Bert Crawford Road around Silver Lake, and various Scotchtown neighborhood roads.

Description of Project

Opportunities for flood storage exist along numerous reaches of the Masonic Creek and its tributaries, and two specific locations have been recommended for analysis and consideration as part of this featured project. Phase 1 of the project would improve the first site, labeled here as Fredrick's Farm, which lies along a tributary to the Masonic Creek, and currently provides drainage to various neighborhoods along Anna Court and the Scotchtown neighborhoods west of the Goshen Turnpike and Silver Lake-Scotchtown Road.



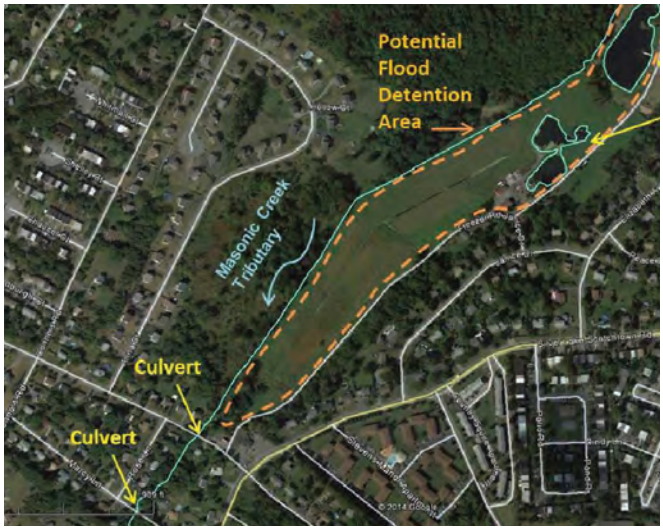
Graphic is courtesy of SCAPE / Landscape Architecture PLLC.

The property owner has expressed interest in transferring permanent ownership of the property to the Town of Wallkill for public use.

The 22-acre property located west of Butternut Lane has been identified by the Community as a potential area to detain water from the Masonic Creek tributary during major storm events and therefore mitigate the flooding conditions downstream. Two existing ponds are already located on the property and much of the remaining area is frequently inundated. The project would expand the amount of flood storage capacity in the area through extensive excavation, grading, and berming, where necessary, to allow for retention on the entire site.

This Featured Project will accomplish multiple goals, including increasing floodwater storage and retention and creating recreational opportunities for the residents of Wallkill, particularly those in the Scotchtown area. The project would be accomplished in two phases.

The first phase would involve a transformation of the roughly 22-acre site into a public park with passive



Shown here, Fredrick farmland property location, courtesy of Tetra Tech, Inc.

recreation, a natural trail system, restored wetlands, edible forests, and interpretive signage about the site's history and the Black Dirt resource. Install a public garden in the park and crate a garden/farming educational program, potentially in cooperation with Cornell Co-op Master Gardeners' program.

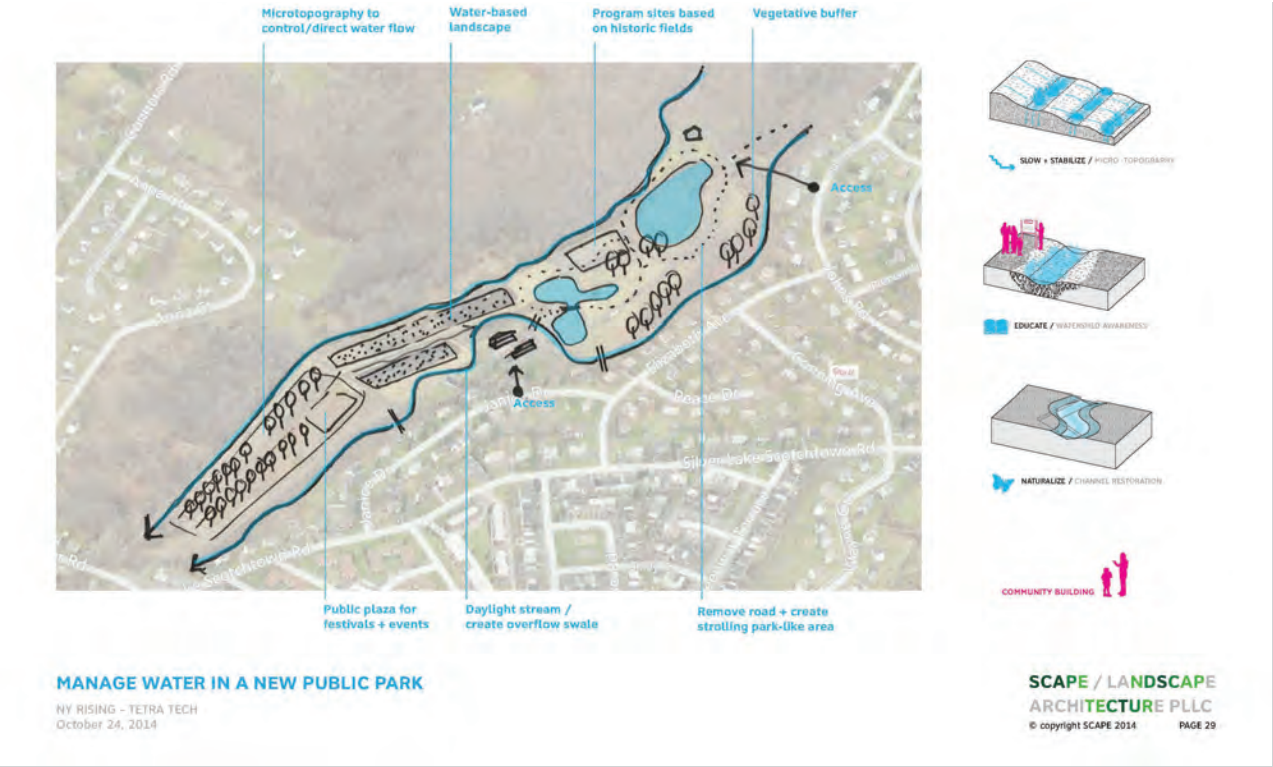
The second phase would consist of a potential opportunity for the Town to implement in the future and is not part of the primary NYRCR project. The second proposed site, located at 79 Bisch Road, northwest from Fredrick's Farm along the main stem of the Masonic Creek, has a larger drainage area and the capacity to store a larger volume of water. The property is currently on the market, listed at $749,000, including a 3,429 sq.ft. single family home along with 88.9 acres of property.

According to Orange County Property Data, the land was assessed in 2014 at $91,400, with a Total Assessment of $180,600. A flood storage site at this location would involve purchasing as much of the 38.9 acres of undeveloped land and 49 acres of residual land as possible on behalf of the Town of Wallkill, and excavating to the extent possible in order to maximize flood storage. Although this property is for sale, it would be a significant investment for the community (more than twice the cost of the Phase 1 proposed project site when considering the cost of land acquisition and creation of flood storage) and would need a more in-depth hydraulic analysis to determine whether the increase in flood reduction benefits validates the cost of the property.

Ultimately, implementation of this project would provide pockets of permanently conserved storage areas along the major waterways in Town, as a long-term flood damage reduction and open space solution.

To advance this project, consideration should be given to the following:

- Further analyses of potential storage sites and design options to achieve the greatest WSE reduction at critical flood areas;
- Cost factors such as property value, grading, excavating, and managing the new sites; and
- Schedules and costs of regular inspection and maintenance of the new public assets.



Schematic design of potential programming for a future park at Fredrick's Farm, courtesy of SCAPE / Landscape Architecture PLLC.

Project Cost Benefit Analysis

Cost Estimate

The total project cost for the Phase 1 Fredrick Farm improvements is $3,602,070. The preliminary cost estimate to make the same level of improvements to the property on Bisch Road as part of Phase 2 of this project is $6,593,082. The largest parts of the cost on Bisch Road are associated with the landscape improvements and wetland development for the entire property, as well as the removal of removal of 75% all excavated materials. Innovative design of these projects which allows more fill to be re-used on site, and which takes an incremental approach towards establishing flood storage and wetlands could significantly lower the costs for the Bisch Road location.

Please note that administrative costs are not included in the project cost estimates.

Project Benefits

ANTICIPATED REDUCTION OF RISK

This option cannot be hydraulically evaluated using the existing HEC-RAS model and would require alternative approaches, for example, the creation of a simplified hydraulic model to calculate the peak discharge reduction along the tributary due to the detention area. This information would be incorporated in the existing HEC-RAS model to determine the floodplain reduction downstream.

An analysis was conducted to relate the amount of potential storage available to the reduction in peak flows for the Frederick Farm property. Frederick Farm's 22 acres represents 3.7% of the total watershed up to that point, using this as flood storage could potentially reduce the 100-year peak flow from 225 cfs to 145 cfs. This would provide benefits immediately downstream but only represents a small percentage of the 100-year peak flow in the Masonic Creek near the junction of the Frederick Farm tributary. The impact on the WSE in Masonic Creek is expected to be small.

View of existing pond on one of the sites proposed for conversion into a public amenity with flood storage. Photo is courtesy of Eric Thayer.

ECONOMIC BENEFITS

Phase 1 of this project would create approximately 25.57 construction jobs, potentially creating employment for local and regional contractors in addition to 30.26 new support jobs from increased materials and equipment sales for suppliers and support industries. Phase 2 would create approximately 46.81 construction jobs, potentially creating employment for local and regional contractors in addition to 55.38 new support jobs from increased materials and equipment sales for suppliers and support industries[7].

This injected funding into the regional construction supply line encourages economic growth through additional induced spending. Induced spending occurs as employees and businesses benefitting from the construction work in turn spend money on other goods and services. The potential induced benefit includes additional permanent jobs, increased taxes, and increased expendable income that may be spent on additional local goods and services.

The project will also reduce the costs associated with response and repair to flood damage events, particularly in the areas around Masonic Creek. Primary targets for reduced flood damage specifically include the "Twin Tunnels" and Bert Crawford Road. This project will ideally reduce the number of necessary road closures, both during flood incidents and immediately

7 The construction jobs were estimated based on a methodology developed by the United States Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per $1,000,000 in construction spending.

after, positively and indirectly encouraging less need for staffing overtime (both police and administrative personnel), fewer supply costs for emergency protective measures (e.g., sand bags and road blocks), and less potential for damage to municipal and personal vehicles.

In addition to the decreased flood damage and response costs, the potential for creation of new public park space will lead to a variety of other indirect economic benefits, including:

- Increased property values
- Increased tax revenues
- Decreased medical costs through increased exercise
- Increased tourism revenue
- Improved attractiveness of communities to homebuyers and businesses

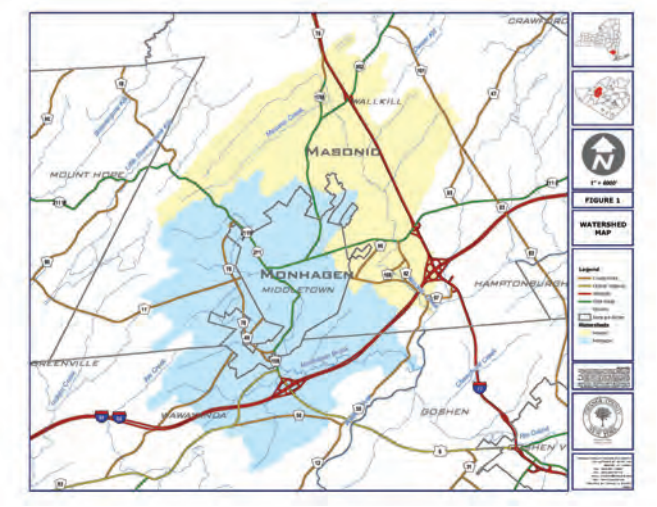
Property values tend to increase near parks because homeowners prefer the aesthetics and increased safety and recreation value of residences near parks, open spaces, and greenery. Parks save residents money by offering them a free or low-cost recreational opportunity. Companies will also choose building sites near parks, as this typically helps them attract and retain high quality employees more easily. According to a study from the Trust for Public Land, property value for houses within 500 feet of a park experience an increase of 5 percent in property value due to the proximity to the green space.

ENVIRONMENTAL BENEFITS

The conversion of the property into wetlands and other retention areas would improve the habitat, increase water quality treatment, and provide passive recreation for the community. Increasing the residence time of floodwaters, the amount of interaction with diverse native vegetation, and the development of anaerobic wetland conditions could improve sediment and nutrient pollutant removal.

HEALTH AND SOCIAL BENEFITS

The most direct health benefit of this project will be the increase in road safety for motorists and residents in the neighborhoods of the Masonic Creek Watershed. This project will not only decrease the number of road closures, thus increasing the ease of access for residents to reach or leave their homes during a flood event, it will also facilitate the ability of emergency medical personnel in being able to provide care to injured people. This aspect is of particular concern to the Town's more vulnerable populations, such as the elderly or those with functional and access needs who may not be able to leave their home readily and who may need increased medical attention.



Map of Masonic Creek Watershed from Orange County Water Authority 2005 report Impervious Cover, Road Density, Land Use, and Population Density in Urban and Rural Areas in Orange and Rockland County, NY.

Additionally, the creation of new public parkland in the Town will significantly benefit the community. Parks provide a myriad of social benefits by offering a free recreational activity and location for friends or neighbors to congregate. This opportunity will increase the overall strength of relationships in nearby neighborhoods, creating a stronger, safer, and more stable area. If Phase 2 of the project were to be implemented, or if other educational programs were to be developed for the park, this benefit would only be strengthened.

Parks also lend to increased productivity and health because they encourage exercise, such as walking, running, and other activities. The green plants in the park absorb air pollutants, including nitrogen dioxide, carbon dioxide, carbon monoxide, and ozone, which increases local residents' and visitors' cardiovascular and respiratory health, especially for those with existing concerns like asthma. Additionally, establishing public space as part of a larger plan for flood storage and natural floodplain restoration will offer a new way for residents to connect with the natural processes of the floodplain, and perhaps be more inclined to do their own part in flood preparedness and safety.

IMPLEMENTATION TIME FRAME

The Fredrick's Farm portion of this project will be implemented within one year. However, further additions to the network of flood storage areas along the Masonic Creek will be made over the course of many years.

REGULATORY REQUIREMENTS

Properties included in this project as potential locations for land acquisition may be eligible State- and/or Federally-regulated Freshwater Wetlands[8]. Enhancements to the Masonic Creek and tributary floodplain will need to meet the standards and regulations of the Town of Wallkill and the State, including NYSDEC Article 15, Protection of Waters, and potential Article 24, Freshwater Wetland. Long-term improvements to and/or provision of flood storage along the Masonic Creek watershed may require a FEMA study or map amendment.

JURISDICTION

Jurisdiction for these proposed projects rests with the Town of Wallkill.

8 According to the National Wetlands Inventory, the primary site for Phase 1 currently includes Federally-designated Freshwater Emergent Wetlands, Freshwater Pond, and Freshwater Forested/Shrub Wetland. http://www.fws.gov/wetlands/data/mapper.HTML

SUMMARY

Masonic Creek Watershed Stormwater Storage

- Investment: Phase 1: $3,602,070; Phase 2: $6,593,082
- Flood level reduction: Unable to assess with existing models
- Assets protected: Housing and Infrastructure Systems; Long Term: Potential benefit to other assets (economic and health and social services)
- Repetitive flood properties removed: N/A
- Potential future loss prevented: Roadway damage and closures
- Jobs created: Phase 1 - Construction: 25.57; Total Jobs: 30.26; Phase 2 - Construction: 46.81; Total Jobs: 55.38
- Strategies accomplished: 2

Channel Daylighting and Riparian Improvements

Project Background

The drainageway between the commercial properties at 280 State Route 211, the ShopRite Plaza, and the Middletown High School running along the municipal boundary between the Town of Wallkill and the City of Middletown has been the centerline of numerous flooding events, causing damage to local property owners and inhibiting access to critical infrastructure.

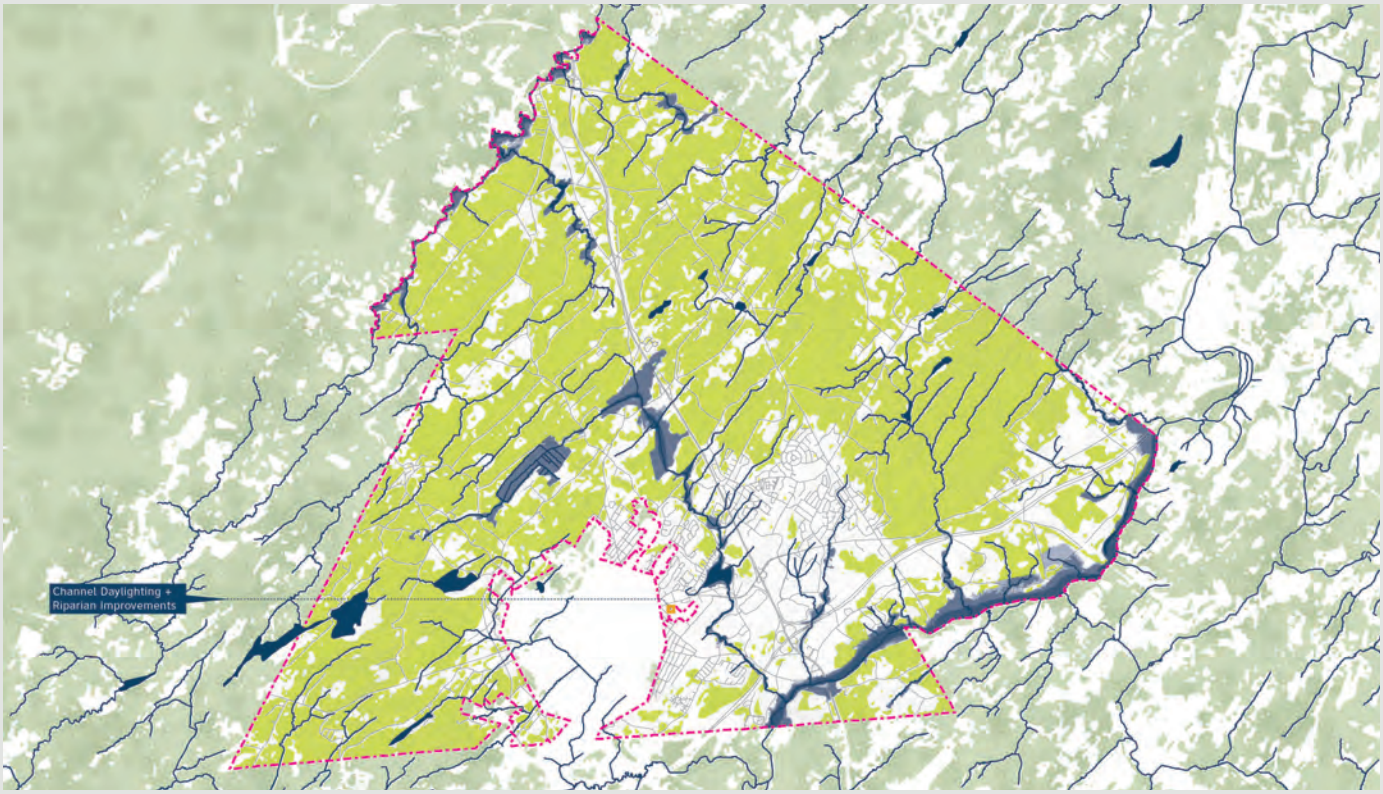
The Community is looking for solutions to reduce flooding at this location that would involve modification to the existing culverts, improvement of the streambed and banks, and/or creation of a flood detention area along the stream.

Connection to the Disaster

Repetitive flooding in the drainageway between the commercial properties at 280 State Route 211, the ShopRite Plaza, and the Middletown High School from past storm events, including Hurricane Irene and Tropical Storm Lee, is a large challenge facing the Town for establishing long-term community health and safety.

The observed drainageway consists of a stream exiting Culvert A and flowing daylight west of the Middletown High School football field until entering Culvert B. The stream receives several influents from the drainage system of the football field and surrounding areas. The area west of the stream contains several commercial buildings and was severely flooded during Hurricane Irene and Tropical Storm Lee with water extending to State Route 211.

In addition, the Town of Wallkill's most recent version of the Hazard Mitigation Plan identifies the project area specifically as a part of the Town more vulnerable to flooding.



Graphic is courtesy of SCAPE / Landscape Architecture PLLC.

Flooding in the shopping center parking lot near 280 State Route 211 East during Tropical Storm Lee. Photo is courtesy of the Town of Wallkill.

Flooding at the Shoprite Plaza from Tropical Storm Lee. Photo is courtesy of the Town of Wallkill.

Pictured above is the ShopRite Plaza parking lot during "blue skies." Photo is courtesy of Tetra Tech, Inc.

"Although not included within the recognized floodplain, the drainageway which runs between the Middletown High School and the ShopRite Plaza in Wallkill has experienced recent flooding problems. This drainageway, which collects runoff from the nearby athletic fields and surrounding areas, feeds into a 6-foot diameter underground pipe running underneath the commercial plaza. This pipe inlet has repeatedly clogged from debris causing back-up flooding of the surrounding properties. Although the Town of Wallkill had made maintenance arrangements for the property owners to keep this passage clear of debris, it continues to be a problem. Field inspections of the channel found that debris had recently been picked up, but had not been removed from site and was instead piled a few feet just to the side of the water, where it would likely clog the system again in the next storm."

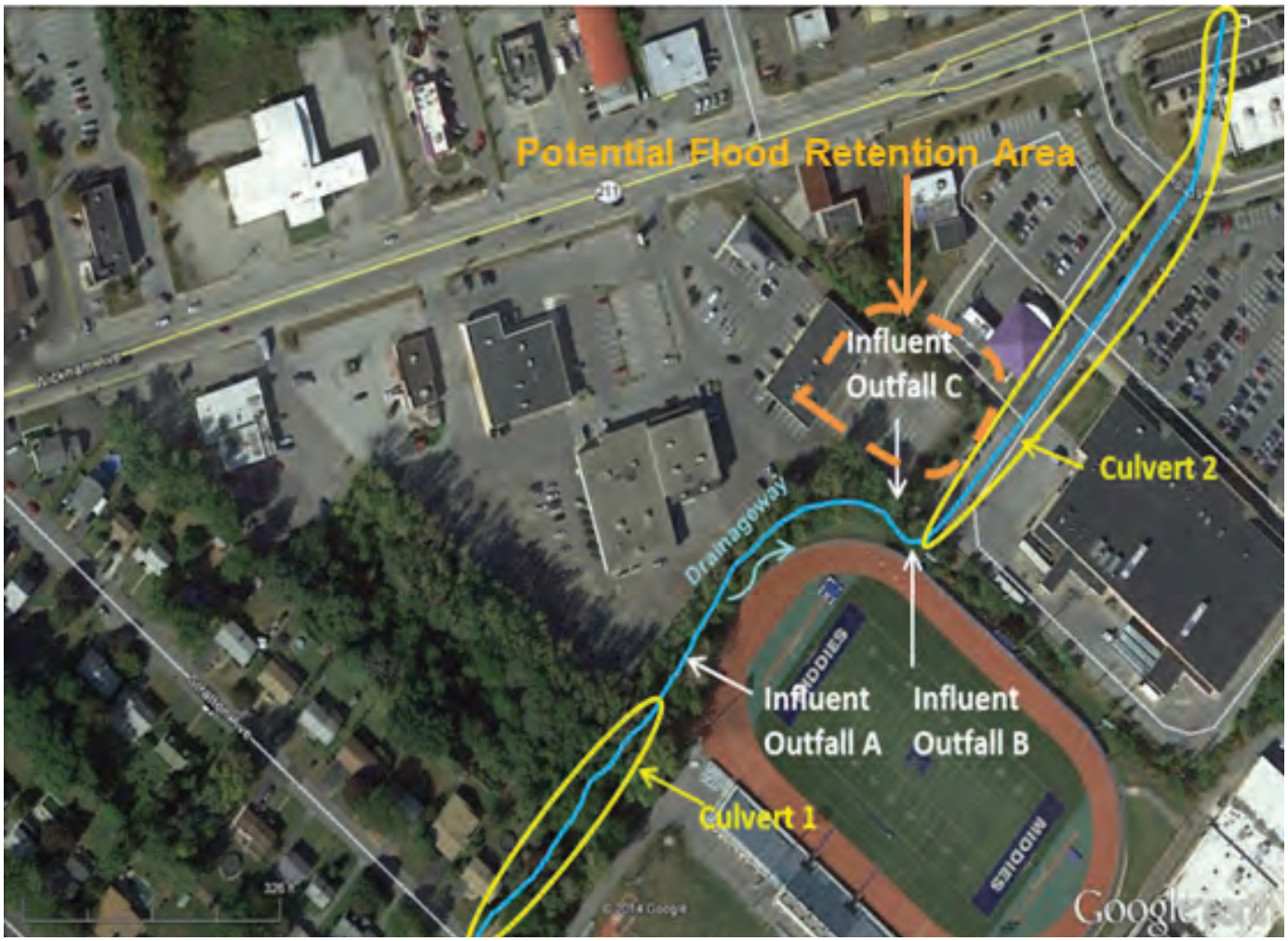
Description of Project

This Featured Project seeks to implement channel daylighting and riparian improvements in the shopping center behind the Pizza Hut, south of State Route 211; southwest of the ShopRite, behind the store's loading bay; and on Dunning Road, behind Wallkill Plaza.

Currently stormwater runoff from the nearby areas is channelized and travels underground, before it daylights again north of State Route 211 before draining into Silver Lake. Flooding in the area near the Pizza Hut is potentially exacerbated by the encroachment of the high school playing fields into the natural floodplain area, forcing a modified channel pattern and inefficient connection to the downstream culvert; and the discharge of runoff from the playing fields, which enters at the location of the downstream culvert.

The Town of Wallkill NYRCR Committee proposes to implement flood mitigation strategies that benefit the surrounding area while not worsening flooding problems downstream.

To improve local conditions without causing negative impacts elsewhere, this project proposes to improve water conveyance through the existing system, e.g.,



Aerial and site diagram of the proposed project area, is courtesy of Tetra Tech, Inc.

Element Identification	Type	Material	Size (Diameter) in Feet	Number of Elements
Culvert 1	Circular	Corrugated Steel	5	1
Influent Outfall A	Circular	Polyvinyl chloride (PVC)	3	1
Influent Outfall B	Circular	Corrugated Steel	2	3
Influent Outfall B	Circular	Corrugated Steel	1	3
Culvert 2	Circular	Concrete	6	1

increase higher flood flow capacity, and provide additional floodplain storage by expanding the accessible riparian area around the ShopRite.

The extent of the project depends on the amount of additional land the Town can acquire from private developers and property owners to increase the riparian area. The minimum goal of the project is to improve the junction of the day-lighted channel behind Pizza Hut, the stormwater outfall from the high school playing fields, and the entrance to the downstream culvert (Culvert 2 on the figure below). An approximately 150-foot long section of Culvert 2 would be removed and the entrance would be located in the potential flood retention area




Pictured above are four images of drainage culverts around the Town of Wallkill. They all play important roles in stormwater management. Photos are courtesy of Tetra Tech, Inc.

designated on the figure below. The existing day-lighted channel would be restored to connect to Culvert 2 in the potential flood retention area. Outfalls from the school property would enter in the potential flood retention area. Additional improvements can be made by daylighting sections of Culvert 1, and expanding the riparian area between the two culverts to increase the flood storage capacity.

The Committee recognizes that obtaining additional land from surrounding property owners to create better flow connections and provide expanded floodplain storage may be a future challenge. This area is already a heavily used commercial corridor and creating space for the riparian zone will take away space from parking and driving lanes, some of which might be critical for the operation of the existing businesses.

To advance this project, consideration should be given to identifying which combination of culvert upgrades and improvements will have the most significant impact, based on the amount of funding available for project improvements.

This is a joint project with the City of Middletown NYRCR Plan, since stormwater runoff from Middletown High School recreation fields would also be mitigated.

Project Cost-Benefit Analysis

Cost Estimate

The total project cost is $615,434. Please note that administrative costs are not included in the project cost estimates.

Project Benefits

ANTICIPATED REDUCTION OF RISK

No existing HEC-RAS models are available for this tributary to the Masonic Creek, so no quantitative assessment can be made to the effect of the riparian and culvert improvements. It is expected that improvements to the culvert entrance and providing additional riparian flood storage would reduce the local water surface elevation and lessen the impact of flooding on the businesses south of State Route 211. Further hydraulic analysis would be needed to determine the extent of the reduction available, and whether any downstream impacts are affecting the water surface elevation in the project area.

ECONOMIC BENEFITS

This project would create approximately 4.37 construction jobs potentially creating work for local and regional contractors and a total of 5.17 new support jobs from increased materials, equipment and other sales for suppliers and support industries[9]. This injected funding into the regional construction supply line encourages economic growth through additional induced spending. Induced spending occurs as employees and businesses benefitting from the construction work in turn spend money on other goods and services. The potential induced benefit includes additional permanent jobs, increased taxes, and increased expendable income that may be spent on additional local goods and services. As the area around the project site is primarily retail and has many local businesses, including restaurants, banks, and shopping, the project site stands to produce multiple benefits to the local area.

In addition to economic growth spurred by construction, improvements that create more resilient transportation infrastructure and resident safety will also create greater confidence for private investors and potential home buyers. As the Town prioritizes and implements infrastructure projects that address lingering flood safety and accessibility issues, these investments illustrate a commitment to the future and will encourage individuals and private businesses to continue to invest in the Town of Wallkill.

Again, as the project site is surrounded by many local businesses, this makes private business investment in the area much more likely than for a project site that is primarily residential or agricultural in use. Additionally, by creating safer more reliable transportation and accessibility, individual property values are also likely to grow over the long term.

Finally, the channel daylighting and riparian improvements south of State Route 211 will have a positive economic effect on future recovery and repair spending. During Tropical Storm Lee, the Town spent $13,746 on townwide repairs, and during Hurricane Irene, the Town spent $57,855 on town-wide road repairs. Reducing any of the repair costs or future maintenance needs associated with flood damage would benefit the Town greatly.

While this project will certainly create economic opportunity, there is however limited direct economic benefits anticipated (permanent jobs, direct additional spending, and direct additional taxes).

9 The construction jobs were estimated based on a methodology developed by the United States Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per $1,000,000 in construction spending.

Daylighting culvert sections and expanding the accessible floodplain are main components of this project. Schematic courtesy of SCAPE / Landscape Architecture PLLC.

ENVIRONMENTAL BENEFITS

Flows in this area are confined to narrow riparian areas or enclosed culverts. This does not allow any water quality benefits that could be realized with flood flows accessing a larger, vegetated riparian area. Daylighting culvert sections and expanding the accessible floodplain would give flood flows a longer residence time with vegetated areas, providing natural water quality improvement functions. Reducing the amount of flood flows that inundate the surrounding commercial area would also limit the opportunity for oils, nutrients, or other pollutants to enter the stream.

HEALTH AND SOCIAL BENEFITS

The channel daylighting and riparian improvement project will ultimately decrease the amount of flood damage to nearby roadways, reducing road failures and washouts, property damage, erosion, and more. Any of these conditions can potentially create dangerous driving conditions, expensive reports for the municipality and/or property owners, costly detours, and damage to the drainage system and to the environment. The Town of Wallkill ranked fifth lowest in median wage in 2012, and personal property damage can be an economic burden on many residents.

In addition to this project reducing the potential of that economic burden, it will also increase overall road safety, allowing residents and visitors to easily and safely travel their normal transportation routes to complete their shopping and other daily needs. An increase in road safety also will lead to a decrease in local road closures, saving both police time and supplies in barricading closed roads and ensuring that emergency access vehicles and medical personnel can reach residents that may be in need of medical assistance. This access is particularly important to the

areas around the project site, which were identified as having Medium-High levels of vulnerability in the Social Vulnerability Index (SOVI) for the Town of Wallkill.

While the project site is located in the Town of Wallkill and the most immediate impacts and benefits to the project concern the Town, this project will also benefit the nearby City of Middletown by offering similar economic and safety benefits. The safety benefits, such as less dangerous driving conditions and increased ability for health and emergency personnel to reach those in medical distress, is particularly important to Middletown as much of the City ranks with a SOVI level of medium or higher. The project site is also located adjacent to the Middletown High School and its benefits will help mitigate flooding from stormwater flowing off of school property, thereby also enhancing the safety of local students and their continued ability to safely walk to school, even after a severe storm event.

ADDITIONAL BENEFITS

Land Use Benefits – This project has a positive impact on neighboring properties and uses by providing reduced flood risk and increased development capacity, which will help protect assets and potentially increase property values. In particular, this project will help local commerce, including a ShopRite, Pizza Hut, Hudson Valley Federal Credit Union, Chase Bank, Mix N Mac, AutoZone, and more.

Strengthen Relationships with Nearby Communities – Although the project site is located behind the ShopRite in the jurisdictional limits of the Town of Wallkill, it will also benefit the nearby City of Middletown. Additionally, residents of other communities routinely use Wallkill transportation corridors to reach jobs, complete their shopping, and conduct other daily business. Because this project has a regional impact and demonstrates Wallkill's willingness to engage in projects that benefit more than just the immediate Town, it will strengthen the Town's relationship with nearby communities, in particular, with Middletown.

Supports Multiple NYRCR Plan Goals – Completion of this project supports two of the Town's NYRCR strategies, specifically:

- **Strategy 1:** Ensure an efficient, safe, and resilient transportation system.
- **Strategy 2:** Improve stormwater management and drainage systems throughout Town to decrease risk for homes, businesses, and residents.

IMPLEMENTATION TIME FRAME

This project will be implemented within two years.

REGULATORY REQUIREMENTS

Implementing infrastructure upgrades or improvements will be subject to State and local regulations, including NYS DEC Article 15, Protection of Waters.

JURISDICTION

Jurisdiction for this proposed project rests with the Town of Wallkill.

SUMMARY

Channel Daylighting and Riparian Improvements

- Investment: $615,434
- Flood level reduction: Immediate: 0; Long Term: TBD
- Assets protected: Up to 4 commercial buildings; Long Term: Potential benefit to infrastructure systems such as roads, businesses and residences.
- Repetitive flood properties removed: 0
- Potential future loss prevented: Damages to private property and municipal costs of emergency response.
- Jobs created: Construction: 4.37; Total Jobs: 5.17
- Strategies accomplished: 2

Marketing and Outreach Campaign About Life in the Town of Wallkill

Project Background

Among the primary factors that have reportedly affected the Town of Wallkill NY Rising Community Reconstruction (NYRCR) Plan Area's ability to realize an effective Town-wide resiliency strategy is a lack of sense of place or identity among Wallkill residents. This issue has been expressed repeatedly by the Committee members and corroborated by those attending Public Engagement Events.

As previously stated in other project profiles, the Town has recently evolved into a regional shopping destination, employment hub and bedroom community. In the eyes of long-time Town residents this evolution has diminished the historic sense of the Town. Moreover, uncoordinated municipal boundaries and postal ZIP codes plague the Town.

One Wallkill resident stated, "Lots of people who live in the Town of Wallkill don't even know that they live in the Town of Wallkill."

One factor behind this powerful statement is evidenced by the address of the Town's local Government Center building, 99 Tower Drive, Middletown, NY. A large portion of residents within the Town of Wallkill have their mail delivered to a City of Middletown address, which not only confuses new residents, but also has long-term impacts on community pride.

This lack of sense of place directly impacts the Town of Wallkill's ability to attract business and generate local revenues, while retaining an historic sense of place among long-time residents. The Town of Wallkill's proximity to regional employment centers that are within commuting distance or which are serviced by mass transit, such as New York City, also clouds this bedroom community's sense of place. Although many residents of outside jurisdictions come to shop in Wallkill, typically Wallkill residents who work outside the Town are likely to seek retail and entertainment options outside of Wallkill for proximity convenience and familiarity.

Connection to the Disaster

Losses due to a lack of sense of place are challenging to quantify without a specific market study that calibrates vehicular and foot traffic in the Town of Wallkill NYRCR Area Plan, tracking trends in local employment and sales tax revenues, or gauging trends in visitors at area hotels and local events. It requires a psychographic analysis of those in the Town, those who come to the Town for products and services; and those the Town would like to attract. This analysis would assess behaviors, values, opinions, attitudes, interests, and lifestyles; it is often conducted by focus groups, interviews and surveys, and analyzing trends.

Photo of fall trees on a sunny day is courtesy of Eric Thayer.

In the context of this Town of Wallkill NYRCR Plan effort, however, qualitative input and public perception are valid indicators of how people feel about the Town in terms of its role to satisfy all their needs for public and private services, while serving as a visitor's destination for shopping and entertainment to help generate local revenues. Challenges with wayfinding, geopolitical boundary confusion among neighborhoods, postal ZIP code confusion, and a lack of a distinct Wallkill Town Center indicate there may be more opportunities lost than tangible losses, which would be quantified with a dedicated market/psychographic study.

This project could leverage existing local branding initiatives, such as the Town of Wallkill Medical Corridor shown above, or stand alone to reinforce sense of place, highlight local assets, such as the Town Senior Center, shown at bottom, and encourage economic development throughout the Town. Photos are courtesy of Eric Thayer.

Description of Project

The Featured Project offered to address this issue is a Branding/Marketing Strategy and Campaign launched to: engender and solidify a sense of place among long-time residents; build a sense of community among shorter-term residents and commuters who "out-migrate" to work; and create a distinct destination for visitors and residents, alike. Branding is about creating a consistent and sustainable "feeling". It is not about offering an attractive visual brand logo or catchy tagline. The Town's brand definition should describe what the Town offers and how it is different or better than neighboring towns or competing markets. Brand development is grounded in demographic market and psychographic research, and reflects the collaborative vision of a local public-private partnership between local government; community service, non-profit, tourism, historical, and philanthropic organizations; and private businesses of all kinds.

To advance this project, consideration should be given to the following:

- Developing consensus about brand "ownership" and brand vision;
- Securing an adequate sample for testing;
- Potential collaboration issues among private business owners and neighboring governments;
- Adhering in application to the prescribed brand style and use;
- Resisting change; and
- Budgeting for collateral material development and media buys for necessary market penetration and repetition.

Cost Estimate

The total project cost is estimated at $40,000 and includes:

- Meeting with Stakeholders to Identify Purpose, Vision;
- Market and Psychographic Study;
- Development of Marketing/Brand Strategy;
- Emote Graphic Design/Tagline Development;
- Identify and Conduct Focus Group Brand Testing;
- Identify Channels for Market Penetration;
- Multi-Media Test Applications and Recommendations; and
- Style and Use Guide Development.

Any collateral material development and media buys are not included in this cost.

Project Benefits

DEFINED SENSE OF PLACE

A Branding/Marketing Strategy and Campaign can go far to develop and sustain a sense of place for the Town of Wallkill as a distinct destination for retail, tourism, and entertainment (for instance). This brand can be pervasively incorporated into and can complement public- and private-sector events, messaging, and marketing efforts. Wayfinding can be incorporated into all signage and kiosks in high-traffic areas, especially at the Town's borders with other municipalities, distinguishable landmarks, community gathering places, and mass transit locations. This defined sense of place can strengthen the community, spur investment, and better the environment, thus providing overall improvements for Wallkill and its residents.

Economic and Social Benefits

Coordinated efforts to collectively market the Town of Wallkill's brand have the very real potential of increasing economic activity in the Town. Increased wayfinding, collaboration with regional economic development and tourism agencies, and partnerships with local stakeholder groups (education, businesses, retailers, entertainment venues, tourism, and cultural groups) can be helpful ways to channel messaging affordably and uniformly.

Local festivals, fairs, and other events, particularly when used in conjunction with the branding campaign, can increase foot traffic (and subsequently, revenues) at local shopping, eateries, and entertainment venues. Cooperative advertising among restaurateurs and joint marketing efforts among clustered retailers can help to generate sales and employment tax revenues, and can lead to job creation based on increased demand for products and services.

ENVIRONMENTAL BENEFITS

Although no environmental assets were identified as being completely secured, there are environmental benefits associated with this project. On a small scale a sense of place can encourage community events, such as neighborhood/park/road clean-ups. On a larger scale a sense of place can lead to more sustainable communities. A sense of place leads to a connection of caring that imparts a will to act for the betterment of one's community and environment. Cultivating ones sense of place involves being active in the community by trying to affect positive change.

ADDITIONAL BENEFITS

In addition to the benefits described above, completion of this project supports one of the Town's NYRCR Strategies including:

- **Strategy 4:** Preserve, protect, and enhance the Town's natural, recreational, and cultural resources and strengthen local sense of place and community.

Project Cost-Benefit Analysis

A locally developed, regionally marketed branding campaign for the Town of Wallkill has the potential of solidifying a sense of place, generating more sales and income tax revenues with increased visitor spending, and increasing tourism opportunities. Collaboration among the public and private sectors is key to launching and maintaining this effort.

IMPLEMENTATION TIME FRAME

A campaign/strategy kick-off would be conducted within the first year of the project, with regular outreach and marketing conducted on an ongoing basis.

REGULATORY REQUIREMENTS

There are no regulatory requirements for this project.

JURISDICTION

Jurisdiction for this proposed project rests with the Town of Wallkill.

SUMMARY

Marketing and Outreach Campaign about Life in the Town of Wallkill

- Investment: $ $40,000
- Jobs created: N/A
- Strategies accomplished: 1

Sump Pump Backflow Prevention and Cross-Connection Control

Project Background

While floods are best known for causing stormwater damage to homes and businesses, they can also cause sewage from sanitary sewer lines to back up into houses through drain pipes. These back-ups not only cause damage that is difficult and expensive to repair, they also create health hazards. Most homeowner and business insurance policies do not cover sewer back-up unless specific sewer back-up coverage is added to the policy.

Currently, the Town of Wallkill building code does not permit sump pumps to be hooked into the sanitary sewer system, and new homes are inspected to verify that pumps drain outside, where the water can find its way into stormwater drainage systems, which are now required to be separate from the sanitary, or sewer, treatment system. However, there is no mechanism in place to inspect inappropriately connected sump pumps in existing homes. Homeowners are often not aware of the requirement, the benefits of the regulation, or how to spot deficiencies in their basement drainage systems.

Connection to the Disaster

The Town of Wallkill has experienced numerous flooding events which have led to utility outages and damage to water and sewer systems. During Hurricane Irene, the countless number of residential sump pumps inappropriately hooked up to the sanitary sewer system in the Town of Wallkill increased the output of the sewer system from its normal capacity of 4MGD to over 6MGD, exceeding the maximum capacity of the plant. The Town was forced to run additional pumps to handle the load, adding electricity costs and disrupting the environmental treatment process, which may have led to untreated plant effluent entering the Wallkill River.

These types of system failures can have a negative impact on flora and fauna as far away as the Hudson River, where the Wallkill River eventually flows. Backflow from the sewer system can also lead to raw sewage in basements, bathrooms, and kitchens in homes, causing a health hazard to many residents in the Town.

To prevent sanitary sewer backflow, this project aims to educate residents about the dangers of pumping stormwater into the sanitary system, and the resources available to fix improper connections. Image of bubbling water backflow courtesy of TreckLLC.com.

During just the events of Hurricane Irene and Tropical Storm Lee, the Town submitted seven PWs to FEMA for utility-related repairs. These worksheets demonstrate the additional stress imposed on the municipal sanitary sewer system because of the need to treat fresh water coming into the system from improperly connected sump pumps.

Description of Project

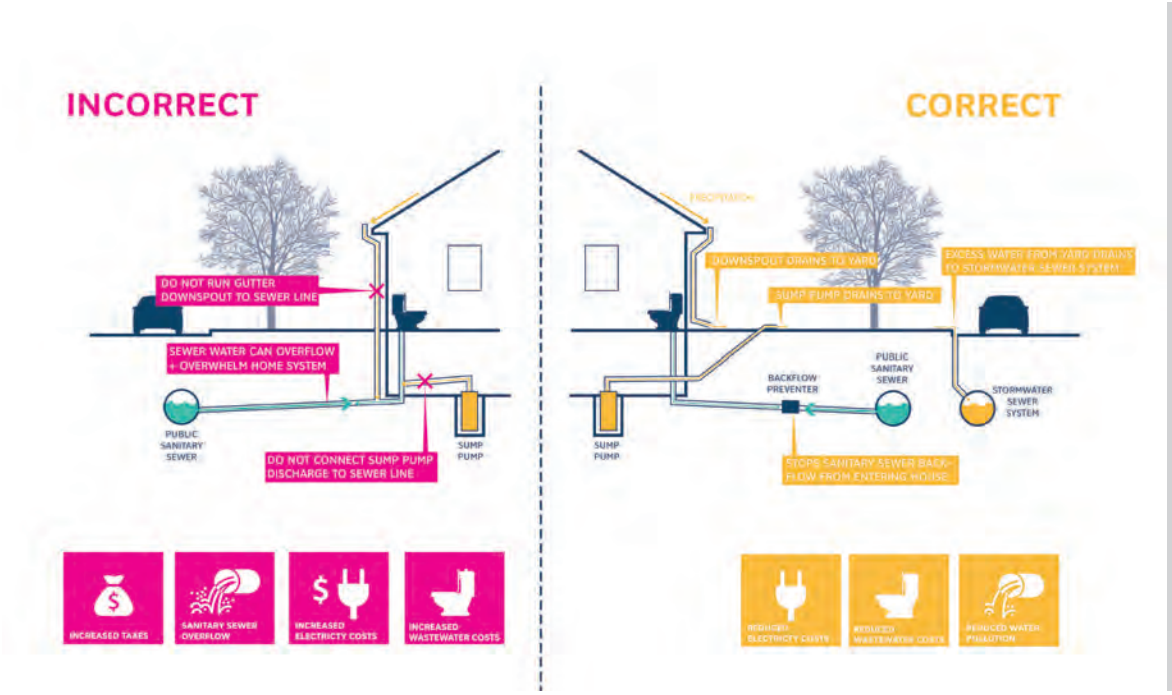
This Featured Project aims to reduce unnecessary and inappropriate load on the municipal sanitary system during flood events by minimizing the number of sump pump connections to the municipal sanitary sewer system. Additionally, this project looks to prevent the costly and hazardous effects of basement sewage backflow by increasing the number of residences equipped with back-flow preventers that meet current standards. This project would consist of an education and outreach program with voluntary back-flow installation and connection repair program.

An education and outreach campaign in the form of a mailer/brochure would teach homeowners about the importance of pumping floodwaters outside of the structure/home instead of into the sanitary system. The brochure would contain tips under a headings, such as "How to Disconnect Your Downspout-Sump Pump Connection," and would explain the existing requirements in the Town of Wallkill regarding sump pump outflows. This information would also be provided to the real estate community (i.e., realtors, home inspectors, and real estate attorneys), educating them on the value of passing along the existing regulation and the benefits of proper sump pump connections and backflow preventer upgrades to their clients.

Property owners would be invited through the brochures and public outreach to participate in one or both of the following voluntary programs at no charge:

- **Basement Backflow Prevention Program:** This program offers technical assistance to customers of the Wallkill Sewer District who have experienced a sewer-related back-up in their basement or who live in an area with a history of wet weather basement back-ups. A backflow or backwater valve is a fixture installed into a sewer line, or sometimes into a drain line, in the basement of a home or business to prevent sewer backflows. A properly installed and maintained backwater valve allows sewage to go out of the home into the main sewer connection but not flow into the system at the point of the valve.
- **Sump Pump/Downspout Disconnection Program:** This program offers technical assistance to sewer district customers to remove improper connections from the sewer system, a process known as "daylighting" the outflow of the sump pump, where it can be received by the stormwater retention system during storms.

Over time, the program would reduce the number of sump pump to sanitary sewer connections throughout Town. Instructional materials would be provided to the homeowners, containing the laws and recommendations on how to amend the violation of hook-ups to the sanitary system and how to bring backflow preventers up to current standards.



The diagram above shows how to identify if your connection is safe. A backwater valve (or sewer backflow preventer) stops water from coming back up residential pipes and into the home. Graphic is courtesy of SCAPE / Landscape Architecture PLLC.

Later optional phases could require a modification of the locally-adopted ordinances to allow the Town's Building Department the right to inspect homes for improperly connected sump pumps and backflow protectors. Another consideration would be to adopt an ordinance requiring such an inspection on all residential sales. In addition the Town could apply for grants or offer financial assistance to homeowners to incentivize conversion.

In advancing this project, consideration should be given to the following:

- Providing educational materials in multiple formats and languages to ensure the greatest reach possible;
- Translating technical knowledge about sump pump connections and the Plumbing Modification Program to plain language;
- Ensuring full understanding from residents regarding current legislation of affecting sump pump connections and backflow preventers in the Town of Wallkill;
- Ensuring that the educational program has adequately reached all the targeted neighborhoods; and
- Accurately tracking the number of residences with sump pumps that are not yet in compliance with current sewage and building codes.

New homes in the Town are likely to have the correct connection installed, but older buildings may have sump pumps that are improperly connected to the sanitary sewer system. Photo of houses is courtesy of Eric Thayer.

Project Cost-Benefit Analysis

Cost Estimate

The estimated project cost for this project is $30,000. The project assumes that the cost of modification to backflow preventers and sump pump connections would be borne by the individual property owners. Please note administrative costs are not included in the project cost estimates.

Project Benefits

ANTICIPATED REDUCTION OF RISK

HEC-RAS modeling is not effective in evaluating the impact of the risk reduction associated with this project. This is because the project purpose would be to preserve the capacity of an asset (the sewer treatment plant) by reducing sanitary load, thereby increasing capacity of the system and reducing the risk of future residential back-flow.

ECONOMIC BENEFITS

The Backflow Prevention and Cross Connection Control project will have two distinct economic benefits to the Town of Wallkill. The most notable savings will be to those residents who no longer need to worry about the cost of repairing their basements after experiencing sewage backflows.

Most insurance companies do not cover this expense without a specific add-on policy being incorporated, and residents can spend up to thousands of dollars trying to deal with the damage. Additionally, the houses with improper sump pump connections may

not be the houses to experience the backflows, so any house could be vulnerable to this type of damage.

Installing backflow valves can be expensive for residents that are already living in tight financial circumstances. According to the 2008-2012 American Community Survey, the Town of Wallkill has an unemployment rate of over 10%, greater than the unemployment rates for both the County and the State. Additionally, while only 6.6% of the Town is considered part of the poverty level, the median household income for the Town ranks as the fifth lowest in median income in 2012 out of all Orange County municipalities.

These figures demonstrate that many residents already have difficulty in securing adequate housing without being financially burdened; adding unexpected sewage/ basement repair costs would provide a severe economic strain. By implementing this project, residents will be better protected against potential repair costs and damage to their homes.

Implementation of this program also ultimately benefits the residents of the Town of Wallkill by ensuring their taxes are not increased for reasons related to utilities. The Town's two largest electricity consumers are the pumps and the wastewater treatment plant. During storm events, when flooding and improper sump pump connections increase the demand on the pumps and the plant, there is a corresponding increase in the demand for electricity. The increased costs of operating the system are ultimately passed on to the users.

Major utility failures increase the need for overtime emergency personnel and utility response teams to correct problems with the system. A campaign to prevent unnecessary stormwater flow into the sanitary system will save the Town many of the secondary costs from treating the clean water entering the system, benefiting residents by preventing subsequent increases in both energy bills and taxes that would result from having to build in additional capacity to the overall system.

Lastly, the project has the potential of creating more reliable utility resources during and immediately following storm events and making the system more resistant to future storm damage. As a result, this project ensures that the Town will become more resilient against future storms and is prepared to serve future residents and businesses without interruption.

ENVIRONMENTAL BENEFITS

The Wallkill River and the many streams in the Plan Area are part of a larger system that connects with the Hudson River, which eventually flows into the Atlantic Ocean. Raw sewage can have a profound impact on wildlife – killing fish, increasing algae bloom, and upsetting the natural cycles of the ecosystem for many years after a spill event.

In addition, waters that have been affected with sewage overflows often become unavailable to local residents to safely use for recreation and fishing. The environmental benefit of implementing this project would be a decreased risk of raw sewage entering the natural watercourse system, thereby protecting valuable water resources from degradation that could affect the environment on a local and broad scale.

HEALTH AND SOCIAL BENEFITS

Over time, as backflow preventers are added and sump pumps outflows are directed to the stormwater system, the reduction of flow in to the sewer system would benefit the public by maintaining service in a storm and preventing raw sewage from entering homes during any storm event that causes water to seep into basements. The project also has the potential to enhance emergency response by reducing the unnecessary strain on the municipal sanitary system during flood events related to basement sewage backflows.

In extreme cases where storms cause widespread flooding, control of sewage flow during storm events is important to the maintenance of clean municipal water.

Gases from raw sewage and bacteria in homes can require evacuation until clean-up is finished, creating the need for sheltering.

Contaminated water can contain bacteria and viruses, pesticides, residuals from pharmaceutical drugs, and fungus, all of which lead to potential short-term, long-term, or fatal health problems for residents. Some of the most common bacteria in sewage include E. Coli, Acanthomoeba, Salmonella, Heliobacter Pylpri, Hepatitis, and Leptospirosis. This project will successfully reduce the health hazards to residents and prevent a potential secondary public health concern after a flooding event.

ADDITIONAL BENEFITS

Supports NYRCR Plan Goals – Completion of this project supports three of the Town's resiliency strategies, specifically:

- **Strategy 3:** Improve upon existing emergency preparedness, response, and communications, including public outreach and education. This project would reduce the need for emergency units that are called to residences during storm events because of sewage backflows and would reduce the need for evacuation during flooding disaster events.
- **Strategy 4:** Preserve, protect, and enhance the Town's natural, recreational, and cultural resources and strengthen local sense of place and community. With the implementation of this project, the chance of raw sewage being introduced to the watercourses is reduced, thereby helping to preserve water assets in the Town.
- **Strategy 5:** Promote Sustainability and Resilience through local planning mechanisms and regulation/code enforcement. The project helps build resilience in the sewer treatment and water treatment systems, making them available to residents during storm events, and increasing the ability of these residents to weather out storms in their homes without damage caused by sewer backflows or loss of service.

IMPLEMENTATION TIME FRAME

This project will be implemented within six months.

REGULATORY REQUIREMENTS

Improvements to sump pumps would need to comply with local regulations. The outreach component has no regulatory requirements.

JURISDICTION

Jurisdiction for this proposed project rests with the Town of Wallkill.

SUMMARY

Sump Pump Backflow Prevention and Cross-Connection Control

- Investment: $30,000
- Flood level reduction: N/A
- Assets protected: Immediate: Wastewater Treatment System; Long Term: Potential benefit to almost all assets (economic, health and social services, housing, and infrastructure systems) and to an indeterminate number of residential houses. Natural systems related to the conveyance and absorption of storm and floodwater are also protected from impacts of raw sewage overflows.
- Repetitive flood properties removed: N/A
- Potential future loss prevented: Costs associated with residential sewage backflows, emergency repairs and assistance to sanitary utility system infrastructure, potential costs of environmental cleanup related to a future sanitary system failure, and increased electricity and taxes.
- Jobs created: N/A
- Strategies accomplished: 3

Vulnerable Populations and Community Emergency Alert, Education, and Support

Project Background

The Citizen Corps National Survey (2009) indicates that 29% of Americans have not prepared for a disaster, because they think that emergency responders will assist them if needed. Results also indicate that over 60% expect to rely on emergency responders in the first 72 hours following a disaster. While local, state, and Federal government agencies will execute their emergency response functions, communications to the public need to convey a more realistic understanding of the emergency response capacity and capability in the Town of Wallkill and need to emphasize the importance of an individual citizen's self-reliance.

Connection to the Disaster

During periods of disaster, people may end up isolated from external assistance. They may also have limited or no access to normal community and societal resources and functions for several days. Wallkill is comprised of both rural and suburban communities. Rural environments, such as the Circleville community may have limited access to emergency response resources and information during times of disasters. Under these circumstances, protective measures and stored resources (e.g., moving to higher ground, boarding up windows, stored food and water, a household emergency plan) taken by individuals can reduce the risk of damage and injury.

Some damages and losses from previous disasters may be attributed to the old paradigm of emergency communication and preparedness efforts within Wallkill. However, as a community preparedness and outreach program implementation project, this initiative has no specific associated historic losses. Nevertheless, providing safe, reliable and rapid emergency communications as well as stressing the shared responsibility of preparedness is vital to Wallkill's response to and recovery from disasters.

Photo of an elderly woman shaking hands with a younger woman is courtesy of Tetra Tech, Inc.

Description of Project

This featured community preparedness and outreach program would disseminate information to foster emergency awareness and drive action to better prepare the Town of Wallkill NYRCR Plan Area for all-hazards emergencies and disasters.

This Featured Project would strengthen whole community partnerships around emergency preparedness by utilizing various approaches to engage the public and private sectors, families and individuals, those with functional needs and Vulnerable Populations, and low to moderate income populations who do not have reliable access to the Internet.

This program reinforces and supports existing preparedness outreach efforts by Federal, State, and county government agencies; private sector businesses; non-profits; and community/faith-based organizations.

The Committee understands outreach for this project stretches across many different communities, including five school districts between the City of Middletown and Town of Wallkill. The communities involved in this project would include Middletown, Pine Bush, Goshen, Minisink, and Valley Central. School districts would rely on one another's systems to disseminate emergency information to ensure all people are reached during

Students living in the Town of Wallkill may attend one of many school districts, all of which include students who live in other, neighboring municipalities. School districts would rely on one another's emergency alert systems to disseminate emergency information to ensure all people are reached during emergency situations. Photo of house and school bus is courtesy of Eric Thayer.

emergency situations. The Committee identified the following specific pieces of information as priorities for information dissemination:

Be Informed: Citizens should learn what protective measure to take before, during, and after an emergency.

- **Wallkill Emergency Alert Program: Public** safety officials use reliable systems to alert the public and local facilities in the event of natural or human-caused disasters (via reverse 911, social media, NY-Alert, New York 211, etc.). The dissemination of timely and accurate information during a disaster particularly benefits communities with access limitations. The Town should disseminate public information through several methods and not solely rely on modes dependent on electricity (e.g., social media, text messages, and TV announcements).
  - **Public Safety and Preparedness Information:** The Town will publish and make easily accessible materials to ensure the preparedness and safety of Town citizens. Specific populations targeted by the materials include:
    - General Public
    - Pet Owners
    - Seniors
    - Children
    - People with Access and Functional Needs (PAFN)
  - **Local Community and Other Plans:** The Committee considers it important for the public to be well informed on their community's plans. The Community will make the following information readily available to all citizens:
    - What hazards are most likely in Wallkill?
    - How will citizens get alerts and warnings?
    - What advice and/or plans does the Town have for sheltering and evacuation during hazard incidents that may impact Wallkill?
    - What are the emergency contact numbers citizens should have for different situations?
    - What opportunities are there in Wallkill for preparedness education and training?

Be Prepared: Being prepared for a disaster or emergency involves educating oneself, making a plan to act, and testing that plan.

- **Make an emergency plan:** Disasters can strike at any point. Information should be readily available to the public to help them prepare an emergency plan for their home, vehicle, and workplace.
- **Build an emergency kit:** A disaster supplies kit consists of a collection of basic items a household may need to be self-reliant for the first 72 hours post-disaster. A recommended supplies list should be available to the citizens of Wallkill.
- **Develop a business continuity plan:** Like individuals, every business should have a plan to prepare for, respond to, and recover from a disaster. Information on and/or a template for a business continuity plan should be made readily available to businesses operating within Wallkill

Get Involved: The formula to ensure a safer and more prepared Plan Area consists of volunteers, a trained and informed public, and increased support of emergency response agencies during disasters. The Town should develop and share information on how members of the public can get involved before a disaster. Some organizations for involvement include Citizen Corps,

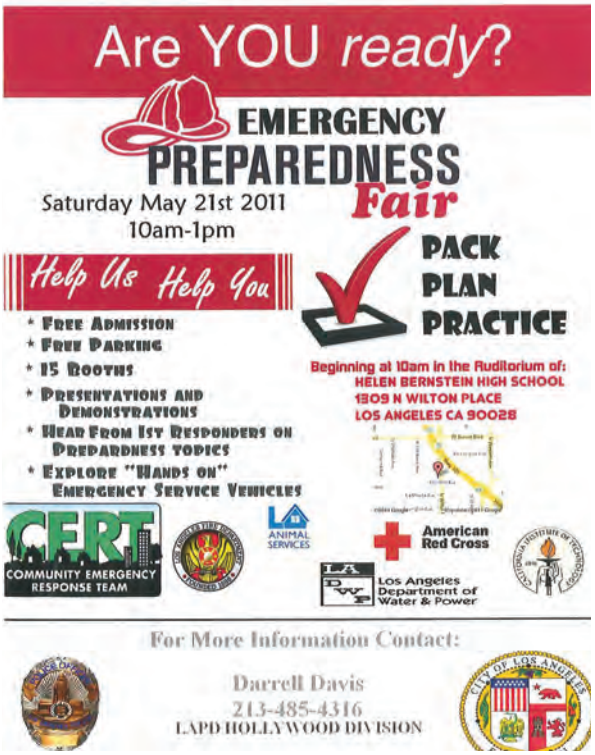
the American Red Cross, and Voluntary Organizations Active in Disaster (VOAD).

In advancing this project, administration of the community preparedness and outreach program, and continuing the engagement of community members and public agencies, will be considered.

A local volunteer may fill the role of coordinator to help with the implementation and maintenance of the community preparedness and outreach program. Alternatively, the Town could initiate the implementation of a Community Emergency Response Team (CERT).

CERT volunteers not only can assist with community outreach but can be trained to be emergency shelter workers (e.g. general population, special medical needs, animals, etc.), conducting personal emergency preparedness workshops, traffic control for special events, volunteers for special events (parades and fairs) and damage assessment teams etc.; and

- Even with community preparedness and outreach programs in place, research on personal preparedness indicates that individuals who believe they are prepared for disasters often are not as prepared as they think and some do not plan to prepare at all[10].
  - Potential solution: Conduct emergency exercises where the public is invited to participate or host workshops, special events, etc. to allow the public to validate their emergency plans.



Shown here is an example emergency preparedness flyer, provided by the City of Los Angeles.

Cost Estimate

The total project cost is estimated at $20,000, which includes the development, print and dissemination of all public outreach material, outreach efforts to register residents for Wallkill's emergency communication system and the development of a website/social media site (e.g., Facebook) to store outreach material electronically and post safe, reliable and rapid emergency communications. Please note administrative costs are not included in the project cost estimates.

10 FEMA Community Preparedness http://www.ready.gov/community-preparedness

Project Benefits

FLOOD PROTECTION AND EMERGENCY RESPONSE

Emergency services rely heavily on prepared citizens in order to conduct essential services for those most in need. During emergency situations, this need increases. This project focuses on the civic responsibility to be more self-reliant during times of disaster to not only protect one's household but the entire community in which one lives. Having citizens and businesses fully prepared to be self-sufficient for 72 hours post disaster increases the overall public safety and emergency response capabilities within Wallkill.

ANTICIPATED REDUCTION OF RISK

This project takes an all-hazards approach to preparing the citizens and businesses of Wallkill to be more self-reliant during times of disaster. This reduces risk in the following areas:

- Personal preparedness for disasters can significantly mitigate or reduce the impact a disaster can have on one's household and overall community.
- Being prepared can reduce fear, anxiety and losses that accompany disasters.
- Rapid emergency communication with clear guidance and disaster information has been proven to save lives during an emergency event.
- The actions of individual citizens are critical to supporting disaster response efforts. Evidence from past disasters suggests that most vital rescue work, including the immediate provision of first aid, transportation of causalities to hospitals for treatment, and the provision of food and shelter is done by friends and neighbors who are themselves victims of disaster.
- According to the Insurance Information Institute, 15-40 percent of businesses fail following a natural or human-caused disaster. In addition, FEMA states that 40 percent of businesses struck by a disaster never reopen, and of those that do reopen, 25 percent close within two years. Research has shown that businesses with a business continuity plan in place can drastically reduce the disasters impact and return to normal work operations faster than those who do not invest in effective preparedness planning.

ECONOMIC BENEFITS

While there are few anticipated direct economic benefits (i.e., permanent jobs secured or added; potential increase in economic activity) as a result of this proposed project, there is great potential for this project to decrease the impact on already taxed emergency services budgets by decreasing the overall number of responses made before, during and after a disaster. In addition, encouraging the development and implementation of business continuity plans for businesses operating within the Town of Wallkill promotes a quicker return to normal business operations and stimulates the economy. Past disasters have proven that companies that proactively plan for disasters are the first to get back to business, often at the expense of competitors.

ENVIRONMENTAL BENEFITS

The environmental benefits of the project were analyzed using available project data and assumptions, or an assessment of the potential impacts on the following:

- Type and quantity of environmental assets secured by the action.
- Type and quantity of clean up accomplished by the action.
- Open space created by the action.
- Importance of the action for high-priority habitat, threatened and endangered species, migration or habitat connectivity.

Although no environmental assets were identified as being completely secured, there are environmental benefits associated with this project. The project will result in the following environmental benefits:

- Environmental stewardship may be promoted through this community preparedness and outreach program by highlighting the impact of human activity on the environment. As a result, increased pro-social behavior, both at the household and community level may occur. In the past, citizen education has also influenced policy controls on hazardous materials, safe and renewable energy, recycling and water conservation.

HEALTH AND SOCIAL BENEFITS

The health and social aspects of this project regarding protection of life safety pose the greatest benefit to Wallkill. Emergency services rely heavily on prepared citizens in order to conduct essential services for those most in need. During emergency situations, this need increases.

This project focuses on the civic responsibility to be more self-reliant during times of disaster to not only protect one's household but the entire community in which one lives. Having citizens and businesses fully prepared to be self-sufficient for 72 hours post disaster increasing the overall public safety and emergency response capabilities within Wallkill.

Being able to concentrate efforts on the most vulnerable and in-need populations will allow the Town to successfully respond to rescue, evacuation, and other types of emergency services that are conducted to directly protect the life and safety of Wallkill residents.

ADDITIONAL BENEFITS

In addition to the benefits described above, completion of this project supports one of the Town's NYRCR Strategies including:

- **Strategy 3:** Improve on existing emergency preparedness, response, and communications, including public outreach and education.

Project Cost-Benefit Analysis

By implementing a system to warn residents of impending danger, the Town will ensure that residents have enough time to protect their property and evacuate from hazard areas, whether on their own or with assistance from the government. Fewer residents in harm's way yields less risk of loss of life in the Town, and less risk to emergency responders on duty during a disaster. The financial cost of the project is very low compared to the reduced risk to residents and responders.

IMPLEMENTATION TIME FRAME

Initial outreach would be conducted within the first year of the project, with regular outreach conducted on an ongoing basis.

REGULATORY REQUIREMENTS

There are no regulatory requirements for this project.

JURISDICTION

Jurisdiction for this proposed project rests with the Town of Wallkill.

SUMMARY

Vulnerable Populations and Commmunity Emergency Alert, Education, and Support

- Investment: $20,000
- Flood level reduction: N/A
- Assets protected: Potential benefit to all assets (economic, health and social services, housing, infrastructure systems, and natural and cultural resources)
- Repetitive flood properties removed: N/A (However, educational awareness and outreach will be provided to all property owners in areas with repetitive flood loss damage)
- Potential future loss prevented: Immediate: 0; Long-term: TBD
- Jobs created: Immediate: 0; Long term: TBD
- Strategies accomplished: 1

Photo is courtesy of Eric Thayer.

Section 5

Additional Materials

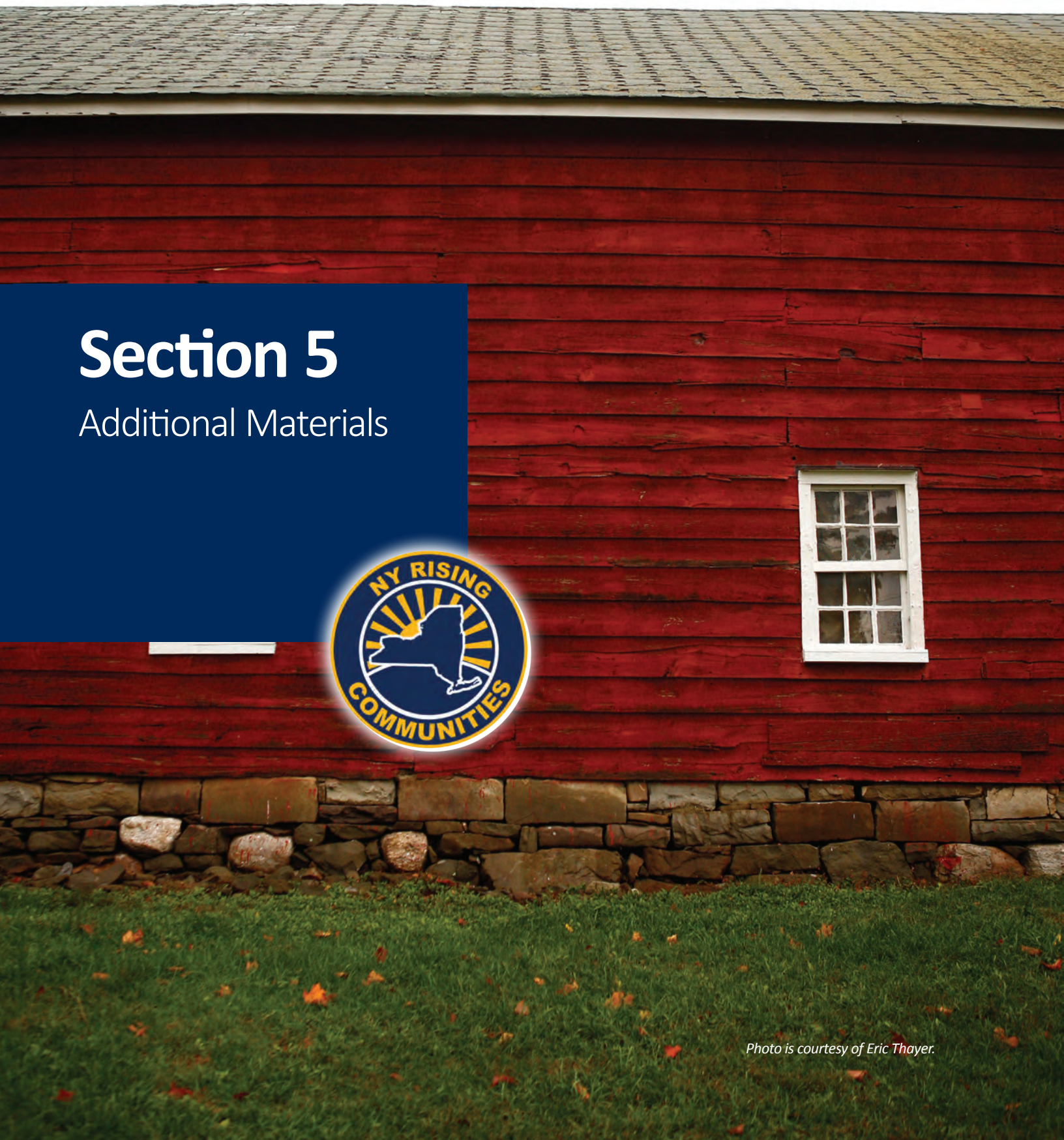


Photo is courtesy of Eric Thayer.

Section 5: Additional Materials

Additional Resiliency Recommendations

TABLE 5.1 – ADDITIONAL RESILIENCY RECOMMENDATIONS

Strategy	Project Name	Short Description	Estimated Cost	Regional Project (Y/N)
Strategy 1: Ensure an efficient, safe, and resilient transportation system.; and Strategy 3: Improve on existing emergency preparedness, response, and communications, including public outreach and education.	Additional Transportation Network Improvements	Address failures on local roadways segments and transportation elements throughout the Town to make the overall transportation network more resilient to future storms.	>$3,000,000	N
Strategy 4: Preserve, protect, and enhance the Town's natural, recreational, and cultural resources, and strengthen local sense of place and community.	Create "Taste of Wallkill" Event	The "Taste of Wallkill" program would feature a new vendor every month or every two weeks to draw attention to local resources. Vendors would include local businesses, farms, and restaurants. In support of the marketing/branding campaign project, the "Taste of Wallkill" would serve as an additional way to foster a sense of community and increase civic pride in the area. The event would promote a variety of goals, including Highlighting existing farms and restaurants, stimulating small business growth, and expanding local existing businesses.	$20,000	N
Strategy 2: Improve stormwater management and drainage systems throughout the Town to decrease risk for homes, businesses, and residents.	Dorothea Dix Drive Flood Retention/ Wetland Construction/ Restoration Project	Develop an unused parking lot into flood storage and public park space directly adjacent to a proposed new recreation center serving Middletown and Wallkill residents. As a regionally coordinated effort, the project would offer education and recreation opportunities through the installation of a trail with interpretive signage across the flood retention area.	>$3,000,000	Y

TABLE 5.1 – ADDITIONAL RESILIENCY RECOMMENDATIONS (CONT'D)

Strategy	Project Name	Short Description	Estimated Cost	Regional Project (Y/N)
Strategy 4: Preserve, protect, and enhance the Town's natural, recreational, and cultural resources, and strengthen local sense of place and community.	Heritage Recreation Trail Extension	Construct pedestrian and bicycle facilities to extend the Heritage Trail along the abandoned Erie Railroad from North Street in the City of Middletown to Ingrassia Road in the Town of Wallkill. Re-enforce the trail to accommodate light trucks and light emergency vehicles to increase accessibility and evacuation opportunities in the Town of Wallkill. This project will be part of the Heritage Trail Extension Segments 2 & 3 which have currently been funded and are pending approval for planned 2015 construction.	$110,000	Y
Strategy 3: Improve on existing emergency preparedness, response, and communications, including public outreach and education.	New Emergency Shelter Facility Serving the Town of Wallkill's Rural Residents	Designate new shelter locations to serve Wallkill residents with limited access to the Town's center. The shelter would be equipped with backup power and ice machines, and could serve as a warming station and information resource center for residents in the central and northern parts of Town.	> $3,000,000	Y
Strategy 4: Preserve, protect, and enhance the Town's natural, recreational, and cultural resources, and strengthen local sense of place and community.	Public Access to the Wallkill River	Create at least one public access point to the Wallkill River, in order to increase public awareness and stewardship of the river, and expand recreational opportunities for the Town of Wallkill residents.	$20,000	N
Strategy 5: Promote sustainability and resilience through local planning mechanisms and regulation/code enforcement; Strategy 3. Improve on existing emergency preparedness, response, and communications, including public outreach and education.	Update Community Plans, Codes, and Ordinances	Comprehensive review of Town zoning and subdivision regulations to identify areas of improvement to allow better protection of the floodplain and enhance Wallkill's ability to be more resilient to future storm events.	$50,000 -$80,000	N
Strategy 3: Improve on existing emergency preparedness, response, and communications, including public outreach and education.	Update the Comprehensive Emergency Management Plan (CEMP)	The CEMP is the master operations document for the Town of Wallkill and provides the framework for handling emergencies and disasters. It defines the responsibilities of government, private, volunteer and non-governmental organizations. Along with the basic body of the plan, this project is looking to develop multi-jurisdictional (in conjunction with neighboring jurisdictions) hazard and operational specific annexes.	$300,000	N

TABLE 5.2 – MASTER TABLE OF PROJECTS (NOT PRIORITIZED)

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Strategy 1: Ensure an efficient, safe, and resilient transportation system. Strategy 2: Improve stormwater management and drainage systems throughout the Town to decrease risk for homes, businesses, and residents.	Ballard Road at East Galleria Drive Flood Mitigation	Replace an undersized culvert to improve flood-level flow capacity, increase floodwater conveyance, and access available floodplain downstream. The roadway and shoulder sustained costly flood damages during Hurricane Irene and Superstorm Sandy, resulting in temporary road closure and sustained lane closure. The intersection is a High traffic area for both regional and local motorists and serves as a critical node for traffic headed from the south, accessing the Metro-North Middletown train station; or from State Route 17 and Interstate 84, heading to the Regional Medical Center or the Galleria Mall at Crystal Run. Industrial traffic also relies on this segment to access nearby facilities at all hours of the night.	Proposed	$1,207,599	N
Strategy 3: Improve on existing emergency preparedness, response, and communications, including public outreach and education.	Interoperable Communications Program	Develop and implement an interoperable communications program to support effective and strategic emergency management activities. Interoperable communications refers to the ability of emergency responders to communicate and share voice and data information. These communications will then ultimately lead to more efficient disaster response and recovery.	Proposed	$150,000 - $400,000	Y
Strategy 1: Ensure an efficient, safe, and resilient transportation system. Strategy 3: Improve on existing emergency preparedness, response, and communications, including public outreach and education.	Natural Gas or Solar Backup Power for Critical Facilities and Infrastructure	Install permanent natural gas or solar back-up power sources for critical facilities and infrastructure in the Town, including: traffic signals near Route 211 and Route 17 intersection; Wallkill Senior Housing, 88 Senior Way; and Senior Horizons, 141 Bert Crawford Road. Power sources would be obtained for specific facilities that service functional needs and vulnerable populations. This project would reduce the need to rely on emergency services and responders to meet basic health and safety needs during large-scale power outages. This project would also include an evaluation of existing shelter and other critical facilities needs for redundant power generation. Use of solar or green energy will be considered, where feasible.	Proposed	Traffic signals: $220,000; Wallkill Senior Citizens: $69,660; Senior Horizons: $69,660	N
Strategy 2: Improve stormwater management and drainage systems throughout the Town to decrease risk for homes, businesses, and residents. Strategy 4: Preserve, protect, and enhance the Town's natural, recreational, and cultural resources, and strengthen local sense of place and community.	Silver Lake Dam Modifications and Emergency Operations Agreement	Mitigate future flood damages at repetitively damaged roadways in the area, including the Silver Lake-Scotchtown Road and "Twin Bridges," along Bert Crawford Road near the inlet for Silver Lake; at the intersection of Fitzgerald Drive and Neely Street; and at State Route 211 East near Wallkill Plaza. Part 1 of the project would improve the Silver Lake outlet structure to enable timely WSE reduction in Silver Lake to increase flood storage capacity and reduce localized flooding. Part 2 of the project calls for coordination with the owners of the Silver Lake Dam to secure access for Town officials and the authority to lower the water level prior to a storm event.	Proposed	$100,000	N
Strategy 3: Improve on existing emergency preparedness, response, and communications, including public outreach and education.	Water and Sewer Treatment Plant Flood Damage Mitigation Measures	Implement strategic flood-proofing and operational mitigation activities to reduce further service interruptions and costly damage repairs. The project proposes upgrades to the Kosuga, Braeside, Crystal Run, and Rykowski Well Roads; the Braeside and Kosuga Water Treatment Plants; the Braeside Sewer Treatment Plant; and the Northern Woods and Woodland Acres Sewer Pump Stations.	Proposed	$998,704	N
Strategy 1: Ensure an efficient, safe, and resilient transportation system. Strategy 2: Improve stormwater management and drainage systems throughout the Town to decrease risk for homes, businesses, and residents.	Winding Brook Floodplain Improvements	Mitigate future flood damages throughout the Winding Brook floodplain in the Scotchtown neighborhoods. The project will focus on the Ben Lomond Drive culvert, as its current state threatens several buried Town utilities. The current culvert will be replaced with an upgraded structure. The project will also reactivate two capped ends of the water main pipe under Ben Lomond Drive, which was broken during Tropical Storm Lee due to roadway collapse around the Ben Lomond culvert.	Proposed	$537,798	N
Strategy 2: Improve stormwater management and drainage systems throughout the Town to decrease risk for homes, businesses, and residents.	Channel Daylighting and Riparian Improvements	Implement channel daylighting and riparian improvements along the drainageway between the commercial properties at 280 State Route 211, the Shoprite Plaza and the Middletown High School to reduce local flooding. The extent of this project is dependent on the amount of additional land the Town can acquire from private property owners to increase the riparian area.	Featured	$615,434	Y
Strategy 4: Preserve, protect, and enhance the Town's natural, recreational, and cultural resources, and strengthen local sense of place and community.	Circleville Hamlet Preparedness and Public Space Improvements	Improve disaster preparedness for rural residents of central and northern Wallkill, and transform the historic hamlet center surrounding the intersection of State Route 302 and the Goshen Turnpike to increase pedestrian access. Preparedness project elements would include equipping the Circleville Park Recreation Center as an emergency shelter. Public improvements include sidewalks and streetlights installation to provide safe walking routes between the schools, the park, and the many goods and service providers in the Hamlet. Solar-powered traffic signals and streetlights are recommended to reduce vulnerability to future power outages.	Featured	$129,000 for Circleville Park Shelter; $1,220,500 for Circleville Public Space Improvements	N
Strategy 4: Preserve, protect, and enhance the Town's natural, recreational, and cultural resources, and strengthen local sense of place and community.	Marketing and Outreach Campaign About Life in the Town of Wallkill	Develop and produce materials to strengthen the sense of place for the Town of Wallkill residents, including the creation of an informational pamphlet for prospective buyers to convey the dynamic of the Town of Wallkill, the various communities in Town, and where Town boundaries are located.	Featured	$40,000	N

TABLE 5.2 – MASTER TABLE OF PROJECTS (NOT PRIORITIZED) (CONT'D)

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Strategy 2: Improve stormwater management and drainage systems throughout the Town to decrease risk for homes, businesses, and residents.	Masonic Creek Watershed Stormwater Storage: Fredrick's Farm Stormwater Storage and Public Park	Increase, improve, and preserve stormwater storage capacity and retention along a tributary to Masonic Creek. This project would accomplish multiple goals, including increasing floodwater storage and retention and creating recreational opportunities. The project would be completed in two phases. The first phase would include transforming the roughly 22-acre Fredrick's Farm site into a public park with passive recreation, a natural trail system, restored wetlands, edible forests, and interpretive signage about the site's history and the black dirt resource. Phase 2 would consist of additional acquisition of suitable land for flood storage along the Masonic Creek and improving those sites for maximum flood storage. Phase 2 is not part of the Featured NYRCR project.	Featured	Phase 1: $3,602,070; Phase 2: $6,593,082	N
Strategy 3: Improve on existing emergency preparedness, response, and communications, including public outreach and education.	Sump Pump Backflow Prevention and Cross-Connection Control	Education and outreach program to minimize the occurrences of improper sump pump connections to the municipal sanitary sewer system and increase the overall number of residences equipped with backflow preventers that meet current standards. This project aims to reduce unnecessary and inappropriate load on the municipal sanitary system during flood events and to prevent basement sewage backflow with voluntary backflow installation and improper connection repair programs.	Featured	$30,000	N
Strategy 3: Improve on existing emergency preparedness, response, and communications, including public outreach and education.	Vulnerable Populations and Community Emergency Alert, Education, and Support	Implement and disseminate public education materials regarding disaster readiness. These materials will be designed for public and private sectors, families and individuals, and functional needs and vulnerable populations. The materials will be designed to benefit Low and moderate income populations without reliable access to Internet.	Featured	$20,000	N

**See all Additional Resiliency Recommendations in Table 5.1.*

Messages with Meaning: the Importance of Public Engagement

The importance of public engagement throughout the development of the Town of Wallkill NYRCR Plan is evidenced by the quantity of information gathered and the quality of project ideas offered. At every stage of NYRCR Plan development, public input was encouraged, culled, and reflected in actions and recommendations for resiliency measures.

From immediate post-disaster activities to identifying and implementing projects that guard against future devastation from storms, public input was essential to developing community-driven resiliency initiatives. The communications and public outreach strategy formed at the beginning of the Town of NYRCR Wallkill Plan process targeted the most effective ways to message residents, homeowners, non-resident property owners, business owners, and community and social service organizations across both the public and private sectors. These messages and the channels through which they were distributed, served as the local blueprint for public engagement and education.

Information gathering through grassroots input and information sharing through multi-media messaging were at the heart of public engagement.

The means and methods by which people send and receive messages serve as a direct reflection of their geographic locations and demographic characteristics. Where and how people live provides a predictable gauge to understanding how they acquire and share information about community happenings.

As a result, a multi-faceted outreach campaign in the Town of Wallkill was predicated on a communications strategy that considered community demographics (age, education, and socio-economic factors), accessibility of public venues, as well as the opportunity to capitalize on established channels of local municipal government constituent communications.

Grassroots Information Gathering

The Committee solicited information and public opinions about community needs and opportunities relative to storm recovery and building resiliency through Committee Meetings, Public Engagement Events, and hard-copy and online surveys. Public input about these needs and opportunities, in light of existing and non-existing community resources, critical assets, and essential redundancies, was instrumental to the development of proposed and featured projects, and additional resilience recommendations.

REGULAR PLANNING COMMITTEE MEETINGS

The Committee, composed of local residents, businesspeople, and community organizational stakeholders, has met every other week since the Town of Wallkill NYRCR Program inception in June 2014 to discuss issues, areas of critical need, and prospective projects. The meetings also served as a forum to advance the vetting and outreach processes.

Guided by formal meeting agendas and Robert's Rules of Order, each meeting included time for public comment in an open, inviting environment, with meeting notes recorded. Once reviewed by the Committee, meeting notes were made available to the public on the NYRCR Program website. Meetings were held at the Town of Wallkill Town Hall Building A, located at 99 Tower Drive, from 5:00 p.m. to 7:00 p.m. The Committee selected this time frame to encourage the greatest amount of attendance possible and so that meetings did not interfere with ordinary business hours.

Also, a Gmail e-mail account was set up exclusively for the Community members to send their comments to if they were unable to attend a meeting or wanted to share ideas between regularly scheduled meetings.

In addition to public participation during regular Committee Meetings, municipal employees, such as the commissioner or deputy commissioner of public works, often provided invaluable local knowledge about past damages, existing conditions, and other site-specific details.

This type of local information gathering was vital to the Town of Wallkill NYRCR Plan development and project prioritization.

SURVEYS, INTERVIEWS, VOTING EXERCISE

Aside from input gathered at Committee Meetings and Public Engagement Events, surveys, interviews, and voting exercises were used to cull public opinion about needs and opportunities related to storm impacts and resiliency measures.

SURVEYS

Public and community stakeholder organization surveys were developed, distributed, and publicized by the Committee via e-mail. The survey was also available online via Survey Monkey. The purpose of the surveys was to gather input regarding the impacts of storm events, and to help match needs and opportunities to prospective projects. The surveys documented both quantitative and qualitative information, and enabled participants to rank the importance of the six recovery support functions (RSF) defined by the NYRCR Program. Top concerns noted in the surveys included lengthy utility service interruption and impassible roads. Inability to access essential services and inadequate information about how to access recovery services and assistance also received sizable attention. These survey results were compiled between July and October 2014.

Agency Interviews

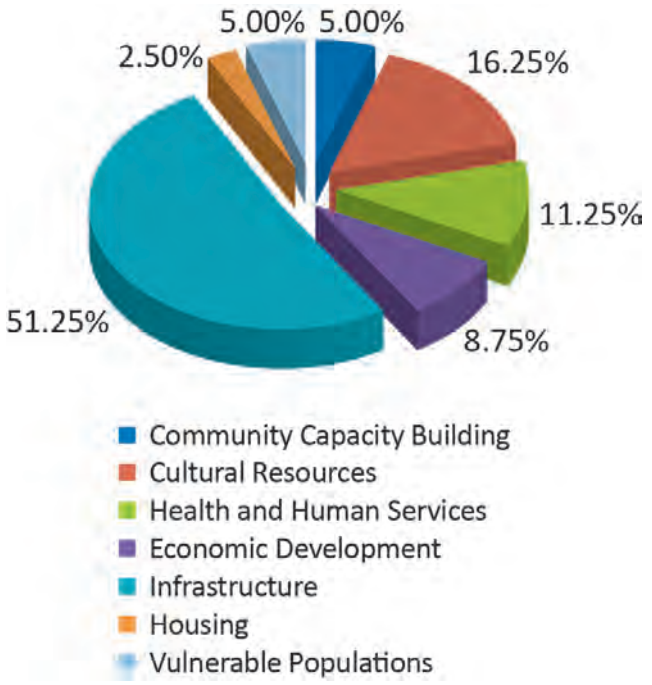
Committee members and the Consultant Team met with key community stakeholders, including municipal representatives and emergency services personnel, to gather information related to the impacts from flooding events, and to identify projects that might bolster resiliency. These interviews inquired about the ability to provide essential and rescue services to vulnerable populations who often have difficulty with self-evacuation and post-event recovery activities.

The Consultant Team also conducted telephone interviews with regional stakeholders, including representatives from Orange County Planning and Emergency Services, who did not participate in the online survey. These interviews enabled more in-depth discussions that yielded valuable input relative to prospective needs and project opportunities.

VOTING EXERCISE

Attendees at the first Public Engagement Event, held in late July 2014, indicated via a voting exercise which projects should be alloted money through the NYRCR Program. Given "Wallkill Money," each attendee dropped makeshift dollars into ballot boxes labeled by the six RSFs. Results from these exercises, shown in Figure 5.1, are consistent with findings from other forms of opinion-gathering; infrastructure was voted the top priority for project type, with cultural resources, and health and human services also ranking as important topics.

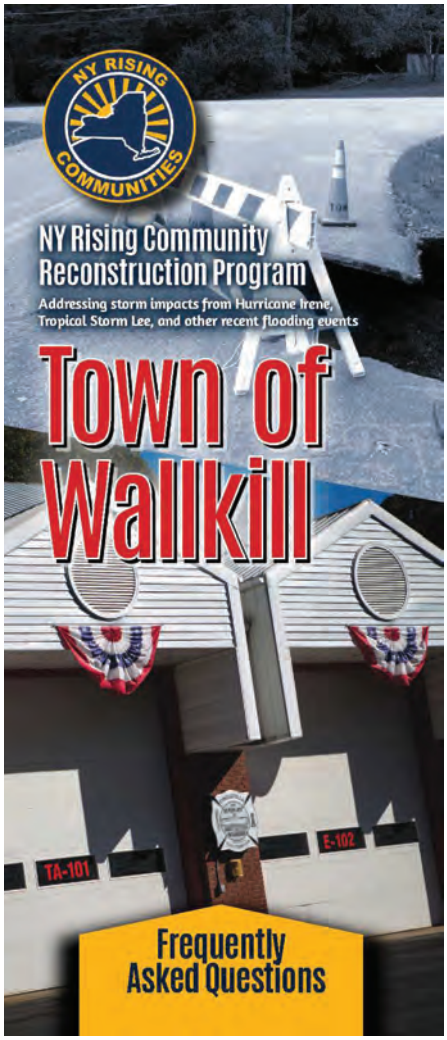
FIGURE 5.1 – RESULTS OF NYRCR WALLKILL VOTING EXERCISE



Getting the Word Out

All Committee Meetings and four Public Engagement Events were advertised on the NYRCR Program website, and with the Town of Wallkill's multiple channels of e-mail and its public access channel. Committee members with a particular interest in outreach were instrumental in the development of content for Public Engagement Event meeting notices. The materials developed for the events also encouraged residents to sign up for emergency alerts through the Town's newsletter and website.

Four Public Engagement Events were strategically held at key junctures in the NYRCR Plan's development, so vital public input could be gathered and scientific data could be shared with the public.



Pictured here is the Town's Frequently Asked Questions brochure. Brochure is courtesy of Tetra Tech, Inc.

Understanding Audiences

The demographic profile of the Town of Wallkill showed that target audiences for messaging about Public Engagement Events include a sizeable working age populations, some of whom may be out-migrating to work. Public outreach efforts incorporated the following multi-media messages and materials:

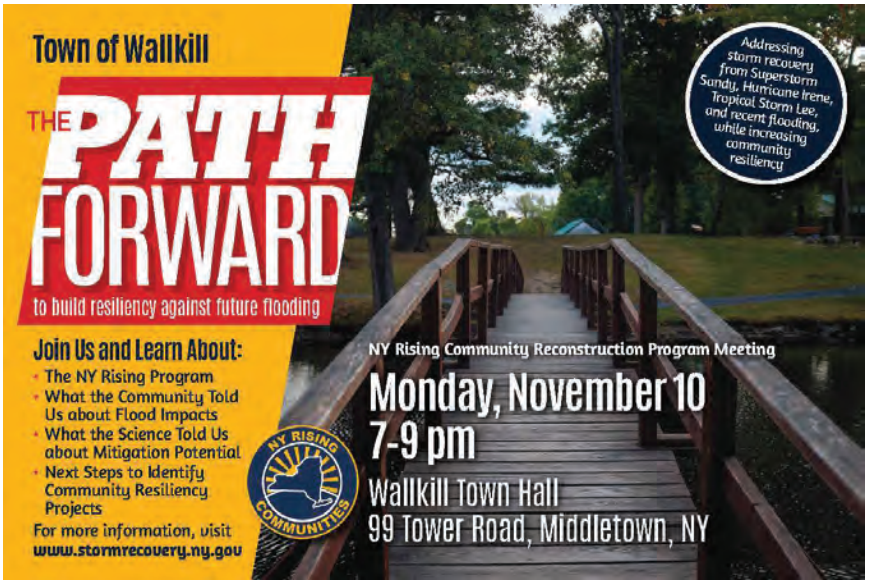
- Media alerts;
- Emergency alert notifications from the Town of Wallkill;
- Newspaper ads (print and online);
- Frequently Asked Questions brochure;
- Website notifications (including NYRCR Program and the Town of Wallkill);
- Yard signs;
- Posters;
- Social media;
- Public access channel via Channel 23/20-3; and
- Postcards placed in mailboxes.

Public Engagement Events

Four Public Engagement Events were conducted between July 2014 and January 2015 to: provide education about the NYRCR Program; obtain input from the Town's residents, property owners, and business owners; review the draft plan; and review projects based on public input, intelligence gathering, and scientific analysis.

Public Engagement Events were held at the Town of Wallkill's Town Hall A. At these events, attendees learned about the NYRCR Program and its goals, Plan development, and were encouraged to offer opinions about the greatest needs and opportunities related to storm impacts and potential project resolutions to build resiliency.

As a courtesy to those who could not attend the Public Engagement Events, broadcasts of these events were subsequently aired on the local public access channel, and were available for replay on the Town's website. Additionally, meeting materials were made available for download from the NYRCR Program website.



Pictured here is a flyer for the third Public Engagement Event. Image is courtesy of Tetra Tech, Inc.

Public Engagement Event #1

At the first Public Engagement Event, held in late July 2014, the Committee, representatives from the New York State Department of State (NYS DOS), New York State Governor's Office of Storm Recovery (NYS GOSR), and the Consultant Team were introduced. Additionally, the goals and objectives of the NYRCR Program were described, along with the planning process and milestones in plan development. The voting exercise, described earlier, was also conducted.

Attendees reviewed the Town of Wallkill NYRCR Vision Statement, affected neighborhoods, and flood hazard areas (FHA) within the Town. Participants placed stickers on a damages map to indicate where they personally experienced damage and/or where an opportunity for flood mitigation may exist. Major topics trending through these discussions included flood damage from insufficient stormwater drainage systems, the need for uninterrupted provision of power, property acquisition to use land as flood storage, and flood issues concerning specific roadway segments serving both local and regional motorists.

Public Engagement Event #2

Public Engagement Event #2, held in September 2014, introduced the Hydrologic Engineering Centers-River Analysis System (HEC-RAS) modeling. This tool was used to determine the impact projects will have on water levels once implemented. Initial HEC-RAS results, along with those of the risk assessment that was conducted, were shared with the public.

Public Engagement Event #3

At Public Engagement Event #3, held in early November 2014, Proposed Projects and Featured Projects, along with Additional Resiliency Recommendations, were summarized and presented to the attending public. The public expressed much interest in the proposed actions, asking questions on numerous projects, and commending the Committee for proposing a broad range of resiliency recommendations.

Public Engagement Event #4

The capstone of the second round of the NYRCR Program, Public Engagement Event #4, was held in January 2015. This Public Engagement Event was the forum where the final Town of Wallkill NYRCR Plan was unveiled, replete with all the research, information and opinion gathering, and scientific and data analysis. Prospective projects were identified for potential implementation and funding.

Risk Assessment Methodology

The following section outlines the initial risk assessment for assets within the Town of Wallkill. The analysis incorporated the baseline methodology, enhanced by specific assumptions at the request of the Committee. The baseline methodology included four major components of the analysis: Risk Area, Hazard Factor, Exposure Score, and Vulnerability Score.

Data Sources Used

NYS DOS-provided data included:

- Environmental Systems Research Institute (ESRI) (2010);
- Federal Communications Commission (2012);
- Federal Communications Commission (FCC);
- Insurance Services Office, Inc.;
- National Oceanic and Atmospheric Administration (NOAA);
- National Park Service (2011);
- National Pipeline Mapping System (2003);
- NYS Department of Environmental Conservation (NYS DEC) (2009);
- NYS Department of Health;
- NYS Department of Transportation;
- NYS Division of Homeland Security and Emergency Services;
- NYS Education Department (2000);
- NYS Office for People With Developmental Disabilities;
- NYS Office of General Services; and
- NYS Office of Mental Health.

Local data and datasets from Orange County included:

- Building Data;
- Buy-out Properties;
- Critical facilities;
- Damaged Roadways;
- Depth Grids;
- Flood Hazard Areas (FHA);
- Infrastructure;
- Land Use;
- Natural Resources;
- Parcels;
- Soils;
- Tax Data; and
- Zoning.

Community Value

The Committee worked with the Consultant Team to assign community values for the identified assets. Assigning a community value allowed the Committee to get a geographic picture of where important community assets were located and allowed the Committee to weigh potential project impacts on the Town in an informed manner. It did not factor into the risk score of individual assets.

Description of Methodology

The risk assessment for assets in the Town incorporated NYRCR baseline methodology, enhanced by specific assumptions at the request of the Committee. The baseline methodology included four major components of the analysis: Risk Area, Hazard Factor, Exposure Score, and Vulnerability Score.

Risk area classifications (extreme, High, or moderate) were determined by the asset's location relative to mapped risk areas.

The hazard score of 3 was assigned for the hazard factor in the tool (100-year flood water level occurring within a 100-year planning time frame).

The exposure score was determined by the sum of a base score (derived from the risk area in which the asset is located) plus 0.5 point for each of the six landscape feature conditions described in Table 5.3 below, if present. A base score was assigned for exposure to each asset, depending on Highest-class risk area (Extreme = 2, High = 1, and Moderate = 0.5) in which a significant portion of the asset is located.

VULNERABILITY SCORE:

Table 5.4 outlines the methodology, which accounts for an asset with a known length of time for a service disruption or complete loss of service.

TABLE 5.3 – LANDSCAPE ATTRIBUTE VULNERABILITY ASSUMPTIONS

Feature Type	Feature Definition
Defensive Flood Protection Measures	These measures are absent, below base flood elevation (BFE), in poor condition, or lack maintenance commitment.
Elevation	The asset site is below the Base Flood Elevation (BFE).
Freeboard	Elevation of the habitable or occupied portion of the asset is less than 2 feet above BFE.
Point of Confluence	Asset is within an area subject to increased flood risk (based on Consultant Team's judgment or Committee guidance) because o a confluence of merging streams.
Stormwater Discharge	Asset is within an area subject to increased flood risk (based on Consultant Team's judgment or Committee guidance) because of stormwater system discharge.
Vegetated Streambank Buffers	Asset is within the floodway fringe (based on FEMA definition).
Vegetated Streambank Buffers	Asset is within the floodway fringe (based on FEMA definition).

TABLE 5.4 – VULNERABILITY BASED ON IMPACT ON SERVICE OR FUNCTION OF COMMUNITY ASSETS

Impact	Insignificant 1	Minor 2	Moderate 3	Significant 4	Major 5
Economic Assets	Limited interruption in service or short-term reduced service	Service loss for up to one week or longer-term reduced services	Service loss for more than one week up to one month or longer-term reduced service	Service loss for more than one month or permanent reduced capacity	Permanent loss of service of the economic asset
Health and Social Services Assets	Limited interruption in service or short-term reduced services; Services under more than usual stress but manageable	Service loss of up to one week or longer-term reduced services; Services under more than usual stress on several fronts	Service loss for more than one week up to one month or longer-term reduced service; Services under severe pressure	Service loss for more than one month or permanent reduced capacity	Permanent loss of service of any one of the essential services listed
Housing Assets	Limited inconvenience	Out of use for up to one week	Out of use for more than one week up to one month	Out of use for up to six months (OR) permanent loss of 15% or less of housing in a group asset	Out of use for more than six months (OR) permanent loss of more than 15% of the housing in a group asset
Infrastructure System Assets	Limited interruption in service or short-term reduced service	Service loss for up to one week or longer-term reduced services	Out of use for more than one week up to one month or longer-term reduced service	Service loss for more than one month or permanent reduced capacity	Permanent loss of service of any one of the facilities listed
Natural and Cultural Resources Assets	Limited interruption in service or short-term reduced service (OR) Limited loss of access, habitat, or use	Service loss for up to one week or longer term reduced services; Minimal natural habitat impacts, temporary loss of public access, temporary loss of open space/ tourism assets	Out of use for more than one week up to one month (OR) Moderate impacts on natural habitats, sustained loss of public access, long-term loss of private open space	Service loss greater than one month (OR) Permanently diminished capacity of natural resources; substantial damages of important natural habitat.	Permanent loss of service of the cultural asset (OR) Complete loss of important natural habitats
Assets Providing Services for Socially Vulnerable Populations	Limited service interruption	Service loss for up to one week	Out of use for more than one week up to one month	Permanent service interruption of more than one and less than six months	Service interruption of six or more months

The Town worked toward developing a methodology for assessing risk, which considered the unique situation and individual dynamics of areas at risk. To assess true vulnerability, the Committee determined which asset locations required consideration, and concluded that because asset-specific information on facility recovery times (after impact by a flooding event) was not available for all assets, standard assumptions based on similar facilities should be used.

The Committee worked together to develop a tiered-factor approach to assess risk, generating risk scores that accurately reflected vulnerabilities and overall risk within the Community.

The factor is adjusted based on similar facility types in a descending five-point scale that is reduced by one point, determined by its risk area location. For example, as noted in the vulnerability section that follows, all buildings were assumed to be "5" and all garages and storage buildings were assumed to be "4". Assumptions were reviewed and approved by the Committee. When specific vulnerability information was available, the standard methodology was applied; however, if information was not available, the following assumptions were applied.

Risk Area Assumptions

RISK AREAS

Extreme risk areas: areas within the 100-year FHA that are within 1,000 feet of a Repetitive Loss Property.

High risk areas: areas within the 100-year FHA.

Moderate risk areas: areas within the 500-year Flood Hazard Area (FHA).

"Not Applicable (N/A)" risk areas: areas outside of an identified FHA (all assets not located in an Extreme, High or Moderate Risk Area were identified as N/A, and do not produce a risk score. Assets in this category are given a risk score of "False" in the risk assessment tool).

SOCIALLY VULNERABLE POPULATIONS

Social Vulnerability Index (SOVI) measures the social vulnerability of populations to environmental hazards. Assets with a SOVI score of "Medium" or Higher were identified as "Yes" in the risk tool.

Landscape Attribute Vulnerability Assumptions

Defensive Flood Protection Measures: all assets were assumed "Yes" if absent, below BFE, in poor condition, or lacking maintenance commitment.

Elevation: all assets outside the extreme, High, or moderate risk area were assumed "No," and all assets in the High and Moderate Hazard Zone were assumed "Yes" if the asset site is below BFE.

Freeboard: all assets outside the extreme, High, or moderate risk area were assumed "No," and all building, structure, and bridge assets in the extreme, High, and moderate risk areas were assumed "Yes" if elevation of the habitable or occupied portion of the asset is less than two feet above BFE.

Point of Confluence (POC): all assets within 1,500 feet downstream of a major POC (this is a HMP dataset with all streams with 4,300 cubic feet per second [CFS] or more during a 100-year storm event) and within the extreme, High, or moderate risk areas are "Yes"; all others are "No."

Stormwater Discharge: all assets within 1,000 feet of a major culvert (HMP dataset) and within the extreme, High, or moderate risk areas are "Yes."

Vegetated Stream Buffers: all assets within the floodway are assumed "Yes;" all others "No."

ASSETS IN "EXTREME" AND "HIGH" RISK AREAS

Vulnerability:

1. All buildings were assumed to be 5.
2. All garages storage buildings were assumed to be 4.
3. All transportation infrastructure and water treatment facilities were assumed to be 3.
4. All wells and springs were assumed to be 2.
5. All natural and cultural resources other than buildings were assumed to be 2.
6. All natural resources were assumed to be 1.

ASSETS IN THE "MODERATE" RISK AREAS

Vulnerability:

1. All buildings were assumed to be 4.
2. All garages storage buildings were assumed to be 3.
3. All transportation infrastructure and water treatment facilities were assumed to be 2.
4. All wells and springs were assumed to be 1.
5. All natural and cultural resources other than buildings were assumed to be 2.
6. All natural resources were assumed to be 1.

Landscape Attributes:

- **Point of Confluence: "**Yes" if the asset is subject to increased flooding due to an upstream point of confluence, and "No" if the asset is not affected. Comments justifying impact were provided where available.
- **Stormwater Discharge:** "Yes" if the asset is affected by stormwater discharge and "No" if the asset is not affected. Comments justifying impact were provided where available.

While the risk scores differ between the two events as a result of using different hazard scores, the basis for how assets are categorized into the severe, High, moderate, or residual risk levels is the same for the two events, as shown by the similarly colored regions in Figure 2.8. For example, a risk score of 60 in the 100-year event evaluation is shown as 80 in the 500-year event evaluation; however, both scores are classified as severe risk.

TABLE 5.5 – RISK SCORE RANGES

100-YEAR EVENT	500-YEAR EVENT
Severe (Risk Score >53)	**Severe (Risk Score >70)**
Risk scores in the "Severe" category occur only if one of the two factors, exposure or vulnerability, is rated 5, and the other is 4 or higher, which could indicate that the asset is in a dangerous situation. Both exposure and vulnerability should be reduced, if possible. Consider relocation a priority option for these assets.	
High (Risk Score 24 - 53)	**High (Risk Score 32 - 70)**
Risk scores in the "High" category are indicative of conditions that could lead to significant negative outcomes from a storm. Using the risk scoring system, a total of 24 (or 32 for the 500-year event) can be achieved only if the vulnerability is 4 and exposure is 2, or vice versa. A vulnerability of 4 indicates likely loss of service of an asset for an extended period of time. For many assets, this loss may be unacceptable. Actions should be taken to reduce vulnerability, such as elevating or flood-proofing the asset to help avoid a long-term loss of function. A score of 4 for exposure indicates most of the local landscape attributes that help reduce storm damages are absent. Actions to restore landscape attributes may be appropriate. All other risk scores higher than 24 (or 32 for the 500-year event) indicate either the exposure or the vulnerability (or both) are higher than the conditions discussed above, lending more weight to need to take actions that reduce risk. Relocation may be necessary in the future if other means of adaptation or management actions are not effective.	
Moderate (Risk Score 6 - 23)	**Moderate (Risk Score 8 - 31)**
Risk scores in the "Moderate" category pose moderate to serious consequences, but adaptation may be of lower priority based on one factor, exposure, or because vulnerability remains relatively low. Use a combination of measures to reduce exposure and vulnerability.	
Residual (Risk Score <6)	**Residual (Risk Score <8)**
Risk scores in the "Residual" category occur when both exposure and vulnerability are relatively low. This situation suggests floods would pose minor or infrequent consequences. However, a vulnerability score of 3 may not be acceptable for critical facilities or assets of high community value, because the community cannot afford to be without these services, even infrequently. Note that risk is never completely eliminated. Some residual risk still remains even after management measures have been implemented. It is recommended that the community monitors conditions and adapts as necessary.	

Source: NYS DOS, 2013

Risk Reduction Analysis

A risk reduction analysis was completed for those Community Development Block Grant Disaster Recovery (CDBG-DR) Proposed and Featured Projects that are intended to reduce the risk of flood damage to assets. This analysis was limited by the data and information available and the inundation and extents of the data. The analysis was based on the point location of an asset as identified by the City. The Risk Areas are based on the available Digital Flood Insurance Rate Maps (DFIRMs); however, the Hydrologic Engineering Center – River Analysis System (HEC-RAS) baseline inundation extents do not always align and therefore, slight differences may be seen in the analysis.

This analysis identified the number of assets secured as a result of the impact of the CDBG-DR Proposed and Featured Projects. Assets were considered secured if the project impacts result in an elimination of risk, indicated by a risk score of "0". The term "secured" is only applicable to this analysis and may not necessarily represent a real-world elimination of flooding impacts.

Please note the quantitative analysis was limited to the data available, and all discussions regarding quantitative reduction in risk were meant to estimate projected impacts to the asset(s). For projects where data or other factors limited quantitative assessment, a qualitative risk reduction analysis was performed. Anecdotal evidence, site visits, best practices, and technical expertise all contributed to a qualitative discussion of risk reduction that would result from each project. The analysis may not reflect the project's post-construction conditions or the resulting impacts of a measure, once implemented.

Details of the Analysis

Risk Area: A change to this entry (by one category) was made if the HEC-RAS analysis estimates a change in inundation extent and the asset is no longer located in the floodplain.

Risk Area estimates are determined by landscape attributes and vulnerability, which are described below:

1. **Landscape Attributes:** Changes to these entries will be made if the hydraulic analyses indicated an improvement to these landscape attributes:
   a. **Defensive Flood Protection Measure:** A change to this attribute was made if defensive flood protection measures are proposed to the asset(s), or if the proposed measure provides improved flood defenses in the area.
   b. **Elevation:** A change to this attribute was made if the HEC-RAS analysis indicates a reduction in water surface elevation on the assets site.
   c. **Freeboard:** A change to this attribute was made for elevation projects where the measure increases freeboard to or above the standard.
   d. **Point of Confluence:** A change to this attribute was made if there is a reduction in flow due to an upstream mitigation measure, or the asset is moved from its original location further from the point of confluence.
   e. **Stormwater Discharge:** A change to this attribute was made if the proposed project increases stormwater conveyance for those assets currently indicated as "Yes" and are within 1,000 feet downstream of a culvert/ stormwater specific project.
   f. **Vegetated Streambank Buffer:** If the asset is no longer in the floodway, a change to this entry will be made.
2. **Vulnerability:** The methodology used to originally assess the Vulnerability score for the assets is included in Table 5.6 below. In accordance with this methodology, if the proposed project changes the Risk Area of an asset, the vulnerability score was changed in accordance with the vulnerability methodology, based on the new Risk Area. The risk score will also change if there is an improvement in the capacity of the asset to recover from an event, as the vulnerability score was reduced by one category.

TABLE 5.6 – RISK ASSESSMENT TOOL

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Ocl Analytical Services	N/A	Economic	Large Business	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Lesko, John Jr & Mayer, Sidney	Extreme	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	Yes	Yes	No	No	Yes	2	3	4.00	2	24	4	4.00	5	80
Wawarsing, Town of- Highway Dept	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Wawayanda, Town of	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Danza Group XIV LLC	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Anthony III Gravel LLC	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
C M & Sons Trucking Inc.	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
E Tetz & Sons Inc.	N/A	Economic	Industrial, Warehousing and Manufacturing	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Scott Aggregates Inc.	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Marlborough Sand & Gravel Inc.	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Fischer, Rita	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Chester Industrial Park Assoc LP	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Dutchess Quarry & Supply Co Inc.	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Crawford, Town of - Highway Dept	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Scopteuolo Farms	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Carroll Manufacturing & Development Corp	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Smiley, William	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Mckee Brothers Inc.	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Dirossi, Fredrick & Michelle	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Forest Glen Construction Co	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Town Of Wallkill Volunteer Ambulance Corps, Inc.	N/A	Health and Social Services	Emergency Operations/Response	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Mobil On The Run	N/A	Infrastructure Systems	Liquid Fuels	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
East Coast Speed	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Blueberry Mountain Ice Cream	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Highland Lake	N/A	Natural and Cultural Resources	Water Bodies	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Jays Lake	Extreme	Natural and Cultural Resources	Water Bodies	No	No	Low	Yes	Yes	No	No	No	Yes	1.5	3	3.50	2	21	4	3.50	2	28
Lake Pocatello	N/A	Natural and Cultural Resources	Water Bodies	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Monhagen Lake	N/A	Natural and Cultural Resources	Water Bodies	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Lake Henneside	N/A	Natural and Cultural Resources	Water Bodies	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Silver Lake	Extreme	Natural and Cultural Resources	Water Bodies	No	No, Locally Significant	High	Yes	Yes	No	No	No	Yes	1.5	3	3.50	2	21	4	3.50	2	28
Midland Lake	Extreme	Natural and Cultural Resources	Water Bodies	Yes	No	Low	Yes	Yes	No	Yes	No	Yes	2	3	4.00	2	24	4	4.00	2	32
Circleville Elementary School	N/A	Health and Social Services	Schools	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Circleville Middle School	N/A	Health and Social Services	Schools	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Harmony Christian School	N/A	Health and Social Services	Schools	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Mechanicstown Elemenary School	N/A	Health and Social Services	Schools	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Orange County Golf Course	N/A	Natural and Cultural Resources	Parks and Recreation	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	1	0	4	FALSE	1	0
Orange County Fairground	N/A	Natural and Cultural Resources	Museums, Performing Arts Centers, Stadiums	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Pakanasink Elementary School	N/A	Health and Social Services	Schools	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Randall Airport	N/A	Infrastructure Systems	Transportation	No	No, Locally Significant	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Wallkill Cemetery	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	1	0	4	FALSE	1	0
Nature Conservancy	N/A	Natural and Cultural Resources	Natural Protective Features	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Bloomingburg Cemetery	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Circleville Fire Dept	N/A	Health and Social Services	Emergency Operations/Response	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Circleville Fire Dept	N/A	Health and Social Services	Emergency Operations/Response	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Howells Fire	N/A	Health and Social Services	Emergency Operations/Response	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Maple Hill Elementary School	N/A	Health and Social Services	Schools	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Regional Ems	N/A	Health and Social Services	Emergency Operations/Response	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Wallkill Town Hall	N/A	Health and Social Services	Government and Administrative Services	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Silver Lake Fire Dept	N/A	Health and Social Services	Emergency Operations/Response	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Mechanicstown Fire	N/A	Health and Social Services	Emergency Operations/Response	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Washington Heights Fire Dept	N/A	Health and Social Services	Emergency Operations/Response	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Curious Cubs Daycare	N/A	Health and Social Services	Daycare and Eldercare	No	Yes, FEMA	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Hannafords	N/A	Economic	Grocery/Food Suppliers	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Price Chopper	N/A	Economic	Grocery/Food Suppliers	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
DPW Wallkill	N/A	Health and Social Services	Public Works Facilities	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Dunkin Donuts	Moderate	Economic	Restaurants	No	No	Medium	Yes	No	No	No	No	No	0.5	3	1.00	4	12	4	1.00	4	16
Circleville Presbyterian Church	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Country Squire Apts	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Stevens Manor Apts	N/A	Housing	Multi-Family Residence	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Church Of Jesus Christ Of Latter Day Saints	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Scotchtown Presbyterian Church	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Walden Savings Bank	N/A	Economic	Banks and Financial Services	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Home Depot	N/A	Economic	Large Business	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Shoprite	N/A	Economic	Grocery/Food Suppliers	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Wallkill Plaza	N/A	Economic	Large Business	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Mcdonalds	N/A	Economic	Restaurants	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Applebees	N/A	Economic	Restaurants	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Kohls	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Walmart	N/A	Economic	Large Business	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Olive Garden	N/A	Economic	Restaurants	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Sams Club	N/A	Economic	Large Business	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Best Buy	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Mechanicstown Fire	Moderate	Health and Social Services	Emergency Operations/Response	Yes	Yes, FEMA	High	Yes	Yes	No	No	No	No	1	3	1.50	4	18	4	1.50	4	24
Wakefern Food Corporation	N/A	Economic	Small Business	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Country View Manor	N/A	Housing	Multi-Family Residence	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Crestwood Apts	N/A	Housing	Multi-Family Residence	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Silver Lake Gardens	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Middletown Village Apts	N/A	Housing	Multi-Family Residence	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Tilo Apartments	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Kensington Manor	N/A	Housing	Multi-Family Residence	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
AHRC	N/A	Health and Social Services	Higher Education Institutions	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
AHRC Robinson Center	N/A	Health and Social Services	Healthcare Facilities	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
American Legion	N/A	Natural and Cultural Resources	Community Centers	Yes	No, Locally Significant	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Sasron Restaurant	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Middletown Veterinary Hospital	N/A	Economic	Small Business	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Middletown Alliance	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Monhagen Middle School	N/A	Health and Social Services	Schools	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
St Johns Lutheran Church	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Kingdom Hall	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Schmidt Building	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Tuckerman Hall	N/A	Health and Social Services	Healthcare Facilities	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
St Alberts Campus	N/A	Health and Social Services	Schools	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Revere Smelting & Refining	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Metro North Railroad	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Orange Plaza	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Citgo	N/A	Infrastructure Systems	Liquid Fuels	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Citgo	N/A	Infrastructure Systems	Liquid Fuels	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Mobil	N/A	Infrastructure Systems	Liquid Fuels	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Citgo	N/A	Infrastructure Systems	Liquid Fuels	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Citgo	N/A	Infrastructure Systems	Liquid Fuels	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Middletown Motel	N/A	Economic	Lodging	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Howard Johnson Motel	N/A	Economic	Lodging	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Marriott Hotel	N/A	Economic	Lodging	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Staples	N/A	Economic	Large Business	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Townley Hall Club	N/A	Natural and Cultural Resources	Community Centers	No	No, Locally Significant	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Chuck E Cheese	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Friendlys Ice Cream	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Silver Lake Gardens	N/A	Housing	Multi-Family Residence	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Trinity Assembly Of God	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Harmony Baptist Church	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Tesa Tape Inc	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Middletown Park Manor	N/A	Health and Social Services	Daycare and Eldercare	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Cornerstone Baptist	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Wallkill Living Center	N/A	Housing	Multi-Family Residence	Yes	No	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Orange County Fairground	N/A	Natural and Cultural Resources	Museums, Performing Arts Centers, Stadiums	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Greek Orthodox Church	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Hampton Inn	N/A	Economic	Lodging	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Holiday Inn	N/A	Economic	Lodging	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Empire Blue Cross	N/A	Health and Social Services	Healthcare Facilities	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Playtogs Phase 2	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Silver Lake Gardens	N/A	Housing	Multi-Family Residence	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Gulf	N/A	Infrastructure Systems	Liquid Fuels	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Citgo	N/A	Infrastructure Systems	Liquid Fuels	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Gulf	N/A	Infrastructure Systems	Liquid Fuels	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Stewarts Shops	N/A	Infrastructure Systems	Liquid Fuels	Yes	Yes, FEMA	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Mobil	N/A	Infrastructure Systems	Liquid Fuels	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Pizza Hut	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Burger King	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Patrick Campbell Apt	N/A	Housing	Multi-Family Residence	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Senior Horizons	Moderate	Housing	Multi-Family Residence	No	No	Medium	Yes	Yes	No	No	No	No	1	3	1.5	4	18	4	1.5	4	24
Post Office Howells	N/A	Health and Social Services	Government and Administrative Services	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Gander Mountain	N/A	Economic	Small Business	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Imperial Ridge	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Hillside Village Apt	N/A	Housing	Multi-Family Residence	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Inwood Hills Apts	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Sherwood Forest Apts	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Sherwood Forest Apts	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Oak Hill Manor Apts	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Horizon Hill Apts	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Horizon Hill Apts	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Horizon Hill Apts	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Horizon Hill Apts	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Horizon Hill Apts	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Cambridge Manor Apts	N/A	Housing	Multi-Family Residence	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Cambridge Manor Apts	N/A	Housing	Multi-Family Residence	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Petco	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Rest Area 84W Wallkill	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Outback Steakhouse	N/A	Economic	Restaurants	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
TGI Fridays	N/A	Economic	Restaurants	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Cosimos Restaurant	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Scotchtown Deli	N/A	Economic	Restaurants	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Chilis Restaurant	N/A	Economic	Restaurants	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Wendys Restaurant	N/A	Economic	Restaurants	No	No	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Taco Bell	N/A	Economic	Restaurants	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Aldi Supermarket	N/A	Economic	Grocery/Food Suppliers	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Rite Aid Drugstore	N/A	Health and Social Services	Healthcare Facilities	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Post Office Circleville	N/A	Health and Social Services	Government and Administrative Services	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Orange County Trust	N/A	Economic	Banks and Financial Services	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Red Lobster	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Provident Bank	N/A	Economic	Banks and Financial Services	Yes	No	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Provident Bank	N/A	Economic	Banks and Financial Services	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Bank Of New York	N/A	Economic	Banks and Financial Services	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
M And T Bank	N/A	Economic	Banks and Financial Services	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
De Cola Kennels	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Dennys Restaurant	N/A	Economic	Restaurants	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Last Chance Bar And Grill	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Hana Restaurant	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
You You Restaurant	N/A	Economic	Restaurants	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Brians Backyard BBQ	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Ruby Tuesday	N/A	Economic	Restaurants	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Desperados	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Brookside Manor	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Kentucky Fried Chicken	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
EYP Mission Critical	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Microtel	N/A	Economic	Lodging	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Vitamin Shoppe	N/A	Economic	Large Business	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Whispers	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Fairoaks Drive In Theater	N/A	Natural and Cultural Resources	Museums, Performing Arts Centers, Stadiums	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Ashley Furniture	N/A	Economic	Large Business	Yes	No	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Radiance Tanning	N/A	Economic	Small Business	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Manhattan Comedy Club	N/A	Natural and Cultural Resources	Museums, Performing Arts Centers, Stadiums	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Dollar Store	N/A	Economic	Large Business	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Little Scoops	N/A	Economic	Small Business	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Jenny Craig	N/A	Economic	Small Business	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
New King Buffet	N/A	Economic	Restaurants	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Rte 9 Lamp And Light And Futon Store	N/A	Economic	Large Business	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
211 Liquor	N/A	Economic	Large Business	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Colortyme And Rac	N/A	Economic	Large Business	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
United Check Cashing	N/A	Economic	Large Business	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Postal Annex	N/A	Health and Social Services	Government and Administrative Services	Yes	No	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Top Nails	N/A	Economic	Large Business	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
The Hair Connection	N/A	Economic	Small Business	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Allstate Insurance	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Boston Market	N/A	Economic	Restaurants	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Aspen Dental	N/A	Health and Social Services	Healthcare Facilities	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Verizon Wireless	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Starbucks	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Burlington Coat Factory	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Casual Male	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Ulta	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Payless Shoes	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
H And R Block	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Panera Bread	N/A	Economic	Restaurants	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Bed Bath And Beyond	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Spirit Hall	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Marshalls	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Gold Land Jeweler	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
After Hours	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Joyce Leslie	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Bath And Body Works	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
The Avenue	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Famous Footwear	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Fashion Bug	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Sleepys	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Modells	N/A	Economic	Small Business	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
EB Gameworld	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Catherines	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Franks Pizza	N/A	Economic	Restaurants	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Jumbo Buffet	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Blimpie	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Jennifer Convertibles	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
99 Cent Power	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Davids Bridal	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Christmas Tree Shop	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Economy Inn	N/A	Economic	Lodging	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Crotty Rd LLC	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Orange Regional Medical Center Horton Pavilion	N/A	Health and Social Services	Primary/Regional Hospitals	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Crystal Run Health Care	N/A	Health and Social Services	Healthcare Facilities	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Crystal Run Family Practice	N/A	Health and Social Services	Healthcare Facilities	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Sonnys Pub	N/A	Economic	Restaurants	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Hudson Heritage Federal Credit Union	N/A	Economic	Banks and Financial Services	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Golds Gym	N/A	Economic	Large Business	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Americana Diner And Restaurant	N/A	Economic	Restaurants	Yes	No	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
John Harvest Inn	N/A	Economic	Lodging	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Circleville Radio Tower	N/A	Infrastructure Systems	Telecommunications	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Planet Fitness	N/A	Natural and Cultural Resources	Parks and Recreation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Autozone	N/A	Economic	Small Business	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Hudson Valley Federal Credit Union	N/A	Economic	Banks and Financial Services	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Seven Eleven	N/A	Economic	Large Business	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Uncle Bobs Self Storage	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Wallkill Town Court	N/A	Health and Social Services	Government and Administrative Services	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Big Lots	N/A	Economic	Large Business	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Chase Bank	N/A	Economic	Banks and Financial Services	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Quickway Diner	N/A	Economic	Restaurants	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
84 Lumber	N/A	Economic	Small Business	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Turbine Airfoil Coating	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Orange County Animal Emergency	N/A	Economic	Small Business	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Perkins Restaurant	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
El Bandito Restaurant	N/A	Economic	Restaurants	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Sunshine Studio	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Michaels Appliances	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Time Warner NY Cable	N/A	Economic	Small Business	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Labcorp	N/A	Health and Social Services	Healthcare Facilities	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Valley View Mobile Home Park	N/A	Housing	Single-Family Residence	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Provident Bank	N/A	Economic	Banks and Financial Services	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Safelite Auto Glass	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
County Dental	N/A	Health and Social Services	Healthcare Facilities	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Silverlake Scotchtown Deli	N/A	Economic	Restaurants	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Advanced Coating Technologies	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Beam Residence	N/A	Housing	Single-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Catskill Hudson Bank	N/A	Economic	Banks and Financial Services	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
El Mejicano	N/A	Economic	Restaurants	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
211 Spa	N/A	Economic	Small Business	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Catskill Cleaners	N/A	Economic	Small Business	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Citi Financial	N/A	Economic	Banks and Financial Services	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Post Office Scotchtown	N/A	Health and Social Services	Government and Administrative Services	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
China Star	N/A	Economic	Restaurants	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Middle Stop Food Mart	N/A	Economic	Large Business	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Turbine Airfoil Coating	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Wallkill Police Dept	N/A	Health and Social Services	Emergency Operations/Response	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
State Police Middletown	N/A	Health and Social Services	Emergency Operations/Response	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Wallkill Little League Field	N/A	Natural and Cultural Resources	Parks and Recreation	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Metro North Milemarker 7000	N/A	Infrastructure Systems	Transportation	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Metro North Milemarker 6900	N/A	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Metro North Milemarker 7600	N/A	Infrastructure Systems	Transportation	No	No	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	2	0	4	FALSE	2	0
Metro North Milemarker 7500	N/A	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Metro North Milemarker 7400	N/A	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Metro North Milemarker 7300	N/A	Infrastructure Systems	Transportation	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	2	0	4	FALSE	2	0
Metro North Milemarker 7200	N/A	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Metro North Milemarker 7100	N/A	Infrastructure Systems	Transportation	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	2	0	4	FALSE	2	0
Metro North Milemarker 7000	N/A	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Metro North Milemarker 6900	N/A	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Metro North Milemarker 6800	N/A	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Sleepys	N/A	Economic	Large Business	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Papa Johns Pizza	N/A	Economic	Restaurants	Yes	No	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
MNJ Milemarker 0095	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Orange County Fair Speedway	N/A	Natural and Cultural Resources	Museums, Performing Arts Centers, Stadiums	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Revere Smelting & Refining Warehouse	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	2	0	4	FALSE	2	0
Jiffy Lube	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
American Red Cross	N/A	Health and Social Services	Emergency Operations/Response	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
TD Bank	N/A	Economic	Banks and Financial Services	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
TD Bank	N/A	Economic	Banks and Financial Services	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
20 Twenty	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Bills East Main St Pub	N/A	Economic	Restaurants	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Choocks Pub And Grill	N/A	Economic	Restaurants	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Dunkin Donuts	N/A	Economic	Restaurants	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Country Manor Apts	N/A	Housing	Multi-Family Residence	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
The Laundry Room	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Mid Hudson Valley Federal Credit Union	N/A	Economic	Banks and Financial Services	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Kjs Restaurant	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Texas Roadhouse	N/A	Economic	Restaurants	Yes	No	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Orange Regional Medical Center	N/A	Health and Social Services	Emergency Operations/Response	Yes	Yes, FEMA	High	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Chase Bank	N/A	Economic	Banks and Financial Services	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Weinerts Recycling	N/A	Infrastructure Systems	Hazardous Materials, Solid Waste, and Recycling	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Quick Check	N/A	Infrastructure Systems	Liquid Fuels	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Cove Clam Bar	N/A	Economic	Restaurants	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Bank Of America	N/A	Economic	Banks and Financial Services	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Dunkin Donuts	N/A	Economic	Restaurants	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Rite Aid Drugstore	N/A	Health and Social Services	Healthcare Facilities	No	No	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Lukoil	N/A	Infrastructure Systems	Liquid Fuels	Yes	Yes, FEMA	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Appliance City	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Lowes Home Center	N/A	Economic	Large Business	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Middletown Honda	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Ball Metal Beverage Container Corporation	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Pier 1 Imports	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Super 8 Motel	N/A	Economic	Lodging	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Mead Seal Coating	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Mt Carmel Priory	N/A	Economic	Large Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Mt Carmel Church	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Our Lady Of Mt Carmel School	N/A	Health and Social Services	Schools	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Pocatello Fire	N/A	Health and Social Services	Emergency Operations/Response	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
NYS Psych Center	N/A	Health and Social Services	Government and Administrative Services	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Wallkill Golf Club	N/A	Natural and Cultural Resources	Parks and Recreation	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Golf Ridge Estates	N/A	Housing	Single-Family Residence	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Storage Town	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Greater Hudson Bank	N/A	Economic	Banks and Financial Services	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Wallkill Ambulance	N/A	Health and Social Services	Emergency Operations/Response	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
D And J Auto Parts	N/A	Economic	Small Business	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Imperial Gardens	N/A	Housing	Multi-Family Residence	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Quick Check	N/A	Infrastructure Systems	Liquid Fuels	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Five Guys Burgers	N/A	Economic	Restaurants	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
AHRC	N/A	Health and Social Services	Higher Education Institutions	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
AHRC	N/A	Health and Social Services	Higher Education Institutions	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
AHRC	N/A	Health and Social Services	Higher Education Institutions	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
AHRC	N/A	Health and Social Services	Higher Education Institutions	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
AHRC	N/A	Health and Social Services	Higher Education Institutions	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Buffalo Wild Wings	N/A	Economic	Restaurants	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Commuter Parking Lot	N/A	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
A C Howell Propane	N/A	Economic	Small Business	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Circleville Park	N/A	Natural and Cultural Resources	Parks and Recreation	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Arden Hill Hosp/ Horton Medical Ctr@Horton Family Prog For Alcoholism	N/A	Health and Social Services	Healthcare Facilities	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Orange Regional Med Ctr Middletown@ Horton Medical Pavilion	N/A	Health and Social Services	Healthcare Facilities	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Arden Hill Hosp/ Horton Medical Ctr@Clinical Rehab Extension Clinic	N/A	Health and Social Services	Healthcare Facilities	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Arden Hill Hosp/ Horton Medical Ctr@Horton Ct Scan At Maltese Drive	N/A	Health and Social Services	Healthcare Facilities	No	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
NYSP Middletown Helipad	N/A	Health and Social Services	Emergency Operations/Response	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
NYSP Troop F Headquarters	N/A	Health and Social Services	Emergency Operations/Response	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Middletown Community Clinic	N/A	Health and Social Services	Healthcare Facilities	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
People With Developmental Disabilities - Hostel 11924	N/A	Housing	Supportive Housing	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
People With Developmental Disabilities - Wallkill Hostel #10724	N/A	Housing	Supportive Housing	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Dept Children And Family Services - Middletown Residential Center	N/A	Housing	Supportive Housing	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
People With Developmental Disabilities - Wallkill Hostel #9766	N/A	Housing	Supportive Housing	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
People With Developmental Disabilities - Middletown Hostel #2117	N/A	Housing	Supportive Housing	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
People With Developmental Disabilities - Middletown Hostel #1861	N/A	Housing	Supportive Housing	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
People With Developmental Disabilities - Middletown Hostel #9029	N/A	Housing	Supportive Housing	No	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Randall Airport Runway	N/A	Infrastructure Systems	Transportation	No	No, Locally Significant	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
84I 84I83011198	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Mnrr Pj Line	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Harvey Roe Brook	Extreme	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	Yes	No	No	Yes	1.5	3	3.5	3	31.5	4	3.5	3	42
Mnrr Pj Line	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Mnrr Pj Line	N/A	Infrastructure Systems	Transportation	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Mnrr Pj Line	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Mnrr Pj Line	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Mnrr Pj Line	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Wallkill River	Extreme	Infrastructure Systems	Transportation	No	No, Locally Significant	High	Yes	Yes	Yes	No	No	Yes	2	3	4	3	36	4	4	3	48
84I 84I83011192	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
84I 84I83011198	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
84I 84I83011208	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Harvey Roe Brook	Extreme	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	Yes	No	No	Yes	1.5	3	3.5	3	31.5	4	3.5	3	42
Harvey Roe Brook	Extreme	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	Yes	No	No	Yes	1.5	3	3.5	3	31.5	4	3.5	3	42
Mnrr Pj Line	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Mnrr Pj Line	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Cr 53-Ohaire Road	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Cr53- Ohaire Road	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
84I 84I83011243	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Masonic Creek	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Mnrr Pj Line/Nsrr	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Unnamed Stream	N/A	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Masonic Creek	N/A	Infrastructure Systems	Transportation	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
84I 84I83011186	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
17K	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
17 17 83101041	N/A	Infrastructure Systems	Transportation	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
17 17 83101047	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
211 211 83013015	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
MNRR PJ Line/ NSRR	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
17 17 83101087	N/A	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Shawangunk Kill	Extreme	Infrastructure Systems	Transportation	Yes	No	Low	Yes	Yes	Yes	No	No	Yes	2	3	4	3	36	4	4	3	48
MNRR PJ Line/ NSRR	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Slv Lk Scthtwn Rd	Moderate	Infrastructure Systems	Transportation	No	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	1.5	2	9	4	1.5	3	18
Masonic Creek	Extreme	Infrastructure Systems	Transportation	No	No, Locally Significant	High	Yes	No	Yes	No	No	Yes	1.5	3	3.5	3	31.5	4	3.5	3	42
Masonic Creek	Extreme	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	Yes	No	No	Yes	1.5	3	3.5	3	31.5	4	3.5	3	42
Masonic Creek	Extreme	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	Yes	Yes	No	Yes	2	3	4	3	36	4	4	3	48
Trib Wallkill Riv	High	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	1.5	3	13.5	4	1.5	3	18
Trib Wallkill Riv	Extreme	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	Yes	Yes	No	Yes	2	3	4	3	36	4	4	3	48
Wallkill River	Extreme	Infrastructure Systems	Transportation	No	No, Locally Significant	High	Yes	No	Yes	Yes	No	Yes	2	3	4	3	36	4	4	3	48
Masonic Creek	Extreme	Infrastructure Systems	Transportation	No	No, Locally Significant	High	Yes	No	Yes	No	No	Yes	1.5	3	3.5	3	31.5	4	3.5	3	42
Mall Road	N/A	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
17 17 83101027	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Norfolk Southern	N/A	Infrastructure Systems	Transportation	No	No	Medium	Yes	Yes	No	No	No	No	1	3	FALSE	2	0	4	FALSE	2	0
17 17 83101065	N/A	Infrastructure Systems	Transportation	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Trib.shawangunk K	Extreme	Infrastructure Systems	Transportation	Yes	No	Low	Yes	No	Yes	No	No	Yes	1.5	3	3.5	3	31.5	4	3.5	3	42
Tti - Crotty Road - State Superfund Program	N/A	Infrastructure Systems	Hazardous Materials, Solid Waste, and Recycling	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Wallkill Town Landfill - State Superfund Program	N/A	Infrastructure Systems	Hazardous Materials, Solid Waste, and Recycling	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Lubricant Packaging Co. - State Superfund Program	N/A	Infrastructure Systems	Hazardous Materials, Solid Waste, and Recycling	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	2	0	4	FALSE	2	0
Revere Smelting And Refining - State Superfund Program	N/A	Infrastructure Systems	Hazardous Materials, Solid Waste, and Recycling	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
Orange Plaza Shopping Center - Voluntary Cleanup Program	N/A	Infrastructure Systems	Hazardous Materials, Solid Waste, and Recycling	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
American Cleaners Inc. - Voluntary Cleanup Program	N/A	Infrastructure Systems	Hazardous Materials, Solid Waste, and Recycling	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Wallkill WWTP	High	Health and Social Services	Public Works Facilities	Yes	Yes, FEMA	High	Yes	Yes	No	Yes	No	No	1.5	3	2.5	5	37.5	4	2.5	5	50
Valley View Park WWTP	N/A	Health and Social Services	Public Works Facilities	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0
Shawangunk Kill	Extreme	Natural and Cultural Resources	Water Bodies	Yes	No	Low	Yes	No	No	No	No	Yes	1	3	3	2	18	4	3	2	24
Little Shawangunk Kill	Moderate	Natural and Cultural Resources	Water Bodies	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	1	2	6	4	1	2	8
Dwaar Kill	N/A	Natural and Cultural Resources	Water Bodies	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Wallkill River	Extreme	Natural and Cultural Resources	Water Bodies	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	Yes	1.5	3	3.5	2	21	4	3.5	2	28
Monhagen Bk	N/A	Natural and Cultural Resources	Water Bodies	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Mannayunk Kill	Extreme	Natural and Cultural Resources	Water Bodies	Yes	No	Low	Yes	Yes	No	Yes	No	Yes	2	3	4	2	24	4	4	2	32

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Indigot Cr	N/A	Natural and Cultural Resources	Water Bodies	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
S Br Pakanasink Cr	N/A	Natural and Cultural Resources	Water Bodies	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Pakanasink Cr	N/A	Natural and Cultural Resources	Water Bodies	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
0	Extreme	Natural and Cultural Resources	Water Bodies	No	No	Low	Yes	Yes	No	No	No	Yes	1.5	3	3.5	2	21	4	3.5	2	28
Lake Henneside	N/A	Natural and Cultural Resources	Water Bodies	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Diolosa Lake	N/A	Natural and Cultural Resources	Water Bodies	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Unnamed Lake In Highland Lake State Park	N/A	Natural and Cultural Resources	Water Bodies	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Unnamed Lake	Extreme	Natural and Cultural Resources	Water Bodies	No	No	Low	Yes	Yes	No	No	No	Yes	1.5	3	3.5	2	21	4	3.5	2	28
Silver Lake	Extreme	Natural and Cultural Resources	Water Bodies	No	No, Locally Significant	High	Yes	Yes	No	No	No	Yes	1.5	3	3.5	2	21	4	3.5	2	28
Monhagen Lake	N/A	Natural and Cultural Resources	Water Bodies	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Highland Lake	N/A	Natural and Cultural Resources	Water Bodies	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Shawangunk Lake	N/A	Natural and Cultural Resources	Water Bodies	No	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Lake Pocatello	N/A	Natural and Cultural Resources	Water Bodies	No	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Highland Lakes State Park	N/A	Natural and Cultural Resources	Parks and Recreation	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0

TABLE 5.6 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.6 - Risk Assessment Tool (Cont'd) Optional: Risk Assessment (500-year event)			
Asset	*Risk Area*	*Asset Class*	*Asset Sub-Category*	*Socially Vulnerable Populations*	*Critical Facility*	*Community Value*	*Defensive Flood Protection Measures*	*Elevation*	*Freeboard*	*Point of Confluence*	*Stormwater Discharge*	*Vegetated Streambank Buffers*	*Landscape Attribute Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*	*Hazard Score*	*Exposure Score*	*Vulnerability Score*	*Risk Score*
Wetlands Ward 1	Extreme	Natural and Cultural Resources	Wetlands and Marshes	Yes	No	Medium	Yes	Yes	No	No	No	Yes	1.5	3	3.5	2	21	4	3.5	2	28
Wetlands Ward 2	High	Natural and Cultural Resources	Wetlands and Marshes	Yes	No	Medium	Yes	Yes	No	No	No	No	1	3	2	2	12	4	2	2	16
Wetlands Ward 3	N/A	Natural and Cultural Resources	Wetlands and Marshes	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	FALSE	1	0	4	FALSE	1	0
Wetlands Ward 4	High	Natural and Cultural Resources	Wetlands and Marshes	Yes	No	Medium	Yes	Yes	No	No	No	No	1	3	2	2	12	4	2	2	16
Galleria At Crystal Run Mall	N/A	Economic	0	Yes	No, Locally Significant	Low	Yes	Yes	No	No	No	No	1	3	FALSE	3	0	4	FALSE	3	0
88 Dunnings Road Area	N/A	Economic	0	Yes	No	Low	Yes	No	No	No	No	No	0.5	3	FALSE	3	0	4	FALSE	3	0

GLOSSARY

ALS	Advanced Life Support
BFE	Base Flood Elevation
CCHA	County Community Health Assessment
CDBG	Community Development Block Grant
CDBG-DR	Community Development Block Grant Disaster Recovery
CEMP	Comprehensive Emergency Management Plan
cfs	Cubic Feet Per Second
CMP	Corrugated Metal Pipe
Committee	Town of Wallkill NYRCR Planning Committee
Community	Town of Wallkill NYRCR Community
Consultant Team	Tetra Tech, Inc.
CRS	Community Ratings System
DPW	Department of Public Works
EMS	Emergency Medical Service
EOC	Emergency Operations Center
ESD	Empire State Development
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FHA	Flood Hazard Area
FTE	Full Time Equivalent
GIS	Geographic Information Systems
GOSA	Governor's Office of Storm Recovery
gpd	Gallons Of Water Per Day
HAZUS-MH	Hazards Us-Multi-Hazard Risk Assessment Model
HEC-RAS	Hydrologic Engineering Center - River Analysis System
HMGP	Hazard Mitigation Grant Program
HMP	2014 Town of Wallkill and City of Middletown Hazard Mitigation Plan
IA	Individual Assistance
I&I	Inflow & Infiltration
MGD	Millions ouhyf Gallons Per Day
MHz	Megahertz
MTA	Metropolitan Transit Authority
NCDC	National Climatic Data Center

GLOSSARY (CONT'D)

NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NYRCR	NY Rising Community Reconstruction
NYS	New York State
NYSCA	New York State Council on the Arts
NYS DEC	New York State Department of Environmental Conservation
NYS DEP	New York State Department of Environmental Protection
NYS DOS	New York Department of State
ORMC	Orange Regional Medical Center
PA	Public Assistance
PDM	Pre-Disaster Mitigation
PLANNING AREA	Town of Wallkill NYRCR Planning Area
POC	Point of Confluence
PVC	Polyvinyl Chloride
RL	Repetitive Loss
SART	State Agency Review Team
SRL	Severe Repetitive Loss
SWOT	Strength, Weaknesses, Opportunities And Threats
TICP	Tactical Interoperable Communications Plan
TWCP	Town of Wallkill Comprehensive Plan
WSE	Water Surface Elevation
WWTP	Wastewater Treatment Plan

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