

NYRCR **Town of** **Windham**

NY Rising Community
Reconstruction Plan

DECEMBER 2014

**NY RISING
COMMUNITY
RECONSTRUCTION
PROGRAM**



Town of Windham NYRCR Planning Committee

Graham Merk (Co-Chair)

John Quinn (Co-Chair)

Anne Jakubowski

Maureen Anshanslin

Nick Bove

Natasha Shuster

Chip Seamans



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The Consulting Team, led by Tetra Tech, Inc., included:

Susan G. Blickstein, AICP,PP, PhD

The Byne Group

Hudson Valley Planning and Preservation

The McKissak & McKissack Group, Inc.

SCAPE / Landscape Architecture PLLC

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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, within the Governor's Office of Storm Recovery (GOSR), empowers the State's most impacted communities with the technical expertise and funding resources 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

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



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 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 Windham 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 Windham NYRCR Planning Area has been allotted up to \$3 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

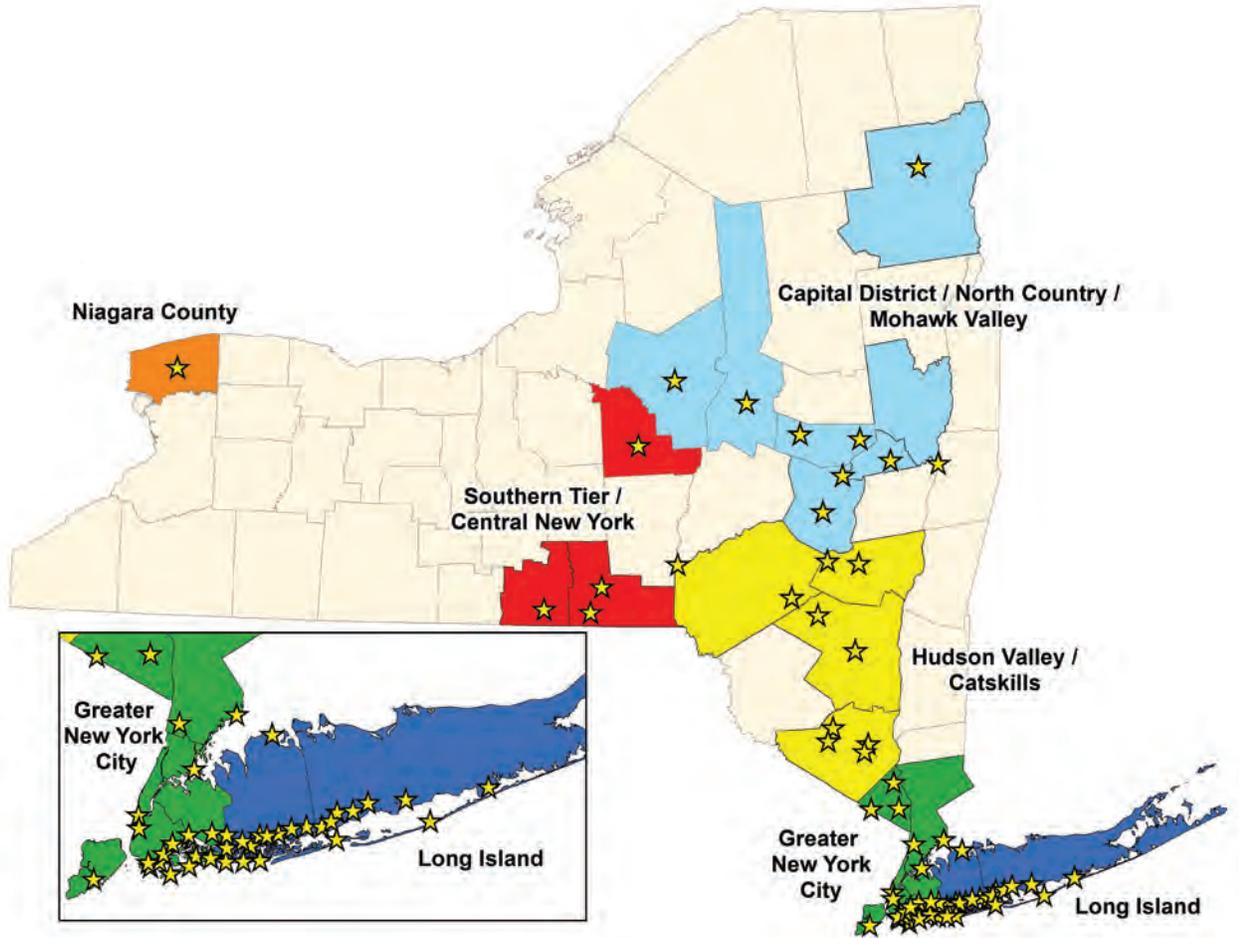
local municipalities and nonprofit organizations, when determining which projects and actions are best positioned for implementation.

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



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 Windham is a charming, historic small town, nestled high amidst the Catskill Mountains in Greene County, with populations and activities that ebb and flow with the changing seasons. Windham is a tight-knit community, a popular second-home destination, and a major contributor to a regional economy based on tourism and recreation. Windham's tourism industry is bolstered by the many outdoor activities and vistas made possible by the peaks, valleys, and natural resources of the surrounding Catskill Mountains.

August 28, 2011, brought Hurricane Irene and nearly 18 inches of rain to the Town of Windham. Runoff rushed down steep slopes, swelling the Batavia Kill, overtopping its banks and inundating the Town. Raging floodwaters enveloped Main Street, uprooting trees and washing away almost everything in its path. Residents in this remote community of New York banded together as best they could, but many were isolated and forced to seek impromptu sheltering, watching in horror as homes, businesses, and roads were washed away and as stranded residents called out for help. The deadly flooding scarred the Town and its residents, but it also emboldened their resolve to see the Town recover and to make their community more resilient during future flooding and disasters.

To address the impacts of regular flooding and to bolster resiliency against future storms, the Town of Windham formed a planning area under the guidance and funding of New York Governor Andrew M. Cuomo's NY Rising Community Reconstruction (NYRCR) Program. The Town of Windham NYRCR Plan aims to address the most critical needs and impacts from major storm events while identifying projects and strategies to encourage future resiliency, increase safety and quality of life, and

serve as incentives for economic growth. This NYRCR Plan presents projects and actions that could become realities with an NYRCR Program allotment of up to \$3 million.

The NYRCR Plan, an intense seven-month effort of community collaboration, public engagement and input, and scientific observation and analysis, reflects the Town's commitment to achievable projects and implementation strategies to rebuild, become more resilient, and guard against future natural disasters.

Critical Issues

During the initial Town of Windham NYRCR Planning Committee Meetings (Committee Meetings), the Town of Windham NYRCR Committee (Committee) identified key challenges, including repetitive flooding and barriers to economic and community development. These challenges were necessary to overcome to create resiliency, develop economic growth, and enhance the quality of life in the Town. These critical issues informed the development of recovery strategies and project identification. Although they are discussed in further detail in the NYRCR Plan, these critical issues include:

Repetitive Flooding

- **Flood-prone Conditions** – The natural conditions of the Batavia Kill watershed have contributed to frequent flooding since the first settlers moved to the area in the late eighteenth century;
- **Property, Infrastructure, and Facility Damage** – The juxtaposition of the Batavia Kill with developed property in the Town not only poses serious safety risks for residents, it also places numerous homes, businesses, and



essential infrastructure systems at significant risk for flood-related damages;

- **Economic Loss** – If resilience efforts are not undertaken, future floods will continue to damage local and regional economies. Business interruption, losses to the local tax base, rebuilding costs, as well as intangible fears, all negatively impact the economic potential of the Town of Windham;
- **Lack of Back-up Power** – Many important local facilities, including Windham Town Hall, the Town’s well water pump stations, the local bus garage, the Centre Church property (that serves as a community center), and the Town Highway Garage, are not equipped with permanent emergency power generation;
- **Isolated Population** – Residents expressed major concern over both physical and communications-related isolation with regards to future health and resiliency. Repetitive flooding, failing infrastructure, and limited access routes can cause significant potential safety risks for local residents during major flood events;
- **Natural System Impacts** – In addition to threatening human life and the built environment, severe flood events have also negatively impacted natural systems, creating stream instability along the Batavia Kill and increasing the rate of erosion; and
- **Stream Project Challenges** – The Town of Windham faces several challenges in strengthening the streambanks of the Batavia Kill. Developing a solution requires a balance among the often competing goals and preferences of the stream’s diverse stakeholders. These stakeholders and priorities include property owners concerned with erosion; outdoor recreation users; public officials concerned with infrastructure safety; and those who use the water supply for snow, irrigation, or drinking water.

Economic and Community Development

- **Seasonal Shifts, Limited Amenities, and Services** – The Town’s hamlets are commercial and tourism hubs that provide shopping, recreation, and cultural opportunities for residents and visitors. These amenities, however, are currently limited in number and diversity, partially due to the seasonal nature of the economy;
- **Underutilized Recreational Challenges** – Despite a thriving recreation and tourism industry, Windham does not yet fully leverage the year-round tourism potential of local and regional assets. While outdoor recreation and enjoyment of local assets is an important part of everyday life for many Windham residents, multiple historically important recreational amenities have been under-utilized in recent years;
- **Insufficient Communication Capability** – Cellular telephone and Internet service in Windham can be unreliable. As cell and high-speed Internet access become increasingly important for business operations and quality of life, the lack of reliable telecommunications and Internet service in the Town can discourage entrepreneurs, business owners, and even tourists;
- **Housing Affordability** – With almost 35% of homes valued at more than \$300,000 and a median rent of \$810 per month, it becomes increasingly difficult for young families and locally employed, first-time homebuyers to afford housing in Windham;
- **Insufficient Workforce** – Currently, multiple interrelated conditions contribute to an insufficient number of qualified and reliable workers to support growth in the local economy. In addition to the housing affordability challenges that deter young families and workers, the ebb and flow of the seasonal economy further exacerbates this issue;



- **Lack of Medical Care and Senior Care Facilities** – With an increasingly aging population, physical isolation, and limited communications capability, the Town of Windham is increasingly in need of access to quality healthcare and senior care facilities; and
- **Development Challenges** – Steep terrain and difficult soils, along with a significant amount of land being owned by New York State and New York City, limits potential development areas in the Town.

A Community-Driven Process

Meeting this planning challenge with the same collaborative spirit that drove response and recovery efforts, the Committee reviewed existing plans and studies, engaged in quantitative and qualitative analyses and risk assessments, and conducted extensive, multimedia public outreach and engagement.

Public input was paramount in every phase of the planning process and was essential to project identification and strategy development. A comprehensive communications strategy deliberately incorporated multiple means and measures to reach residents and homeowners; non-resident property owners; business owners; and educational, community, faith-based, and social service organizations across the public and private sectors.

Specific venues for public involvement and engagement included open weekly or bi-weekly NYRCR Committee Meetings, and community-wide public meetings.

Vision Statement

Through collaborative discussions, stakeholder engagement, reviews of existing plans and studies, and a focused intention towards holistic community recovery, the Committee adopted the following vision to guide the recovery and resiliency effort for the Town of Windham NYRCR Plan.

Vision Statement

“The Town of Windham will protect and leverage rich natural and cultural resources to become a world-class, four-seasons destination, and an unwavering example of community resolve, sustainability, and economic growth.

The Town will increase prosperity, vitality, and long-term growth by addressing critical issues, building strategic alliances, and focusing on improving quality of life, while sustaining Windham’s unique rural and historic character.

Furthermore, we recognize our community’s strength of the human spirit and ongoing neighbor-helping-neighbor capacity, and we are dedicated to protecting the health and welfare of each each of our residents.”

A Blueprint for Implementation

While Hurricane Irene was certainly an extreme event, the damage it wrought on the Town of Windham was only the latest in a series of flood disasters that have impacted and at times, devastated the Town.

The Committee and the public relied on a multi-generational body of knowledge and experience, augmented by anecdotal evidence and scientific analysis, including hydraulic modeling, to identify the Town of Windham’s primary needs, risks, and critical issues, all of which provide a blueprint for project and strategy realization.

The Town of Windham NYRCR Plan aims to bolster the resiliency of existing critical assets and any proposed post-storm new construction projects to future storm events. The Committee first identified and analyzed the Town’s economic, healthcare and social services, housing, infrastructure, and natural and cultural resources to assess the prospective risk if these assets were lost or impaired. The Committee then evaluated overall risk to these assets, focusing on the Batavia Kill and the flood hazard it represents to the Town.



Next, the Committee developed a number of strategies to address the most critical health, safety, resiliency, and quality of life needs identified by the Town of Windham and the Committee. Analysis, ongoing discussions during Committee Meetings, and public feedback served as the basis for these strategies. These strategies reflect the Town’s values, issues, needs, and opportunities. They are the foundation for identifying and categorizing projects that will work towards the comprehensive recovery and resilience of the Town. The strategies became the foundation for projects and actions proposed in this NYRCR Plan.

After months of analysis, Public Engagement Events, and strategizing at Committee Meetings, the Committee developed a finalized project list for the Town of Windham. The projects were classified in three categories. The three-tiered methodology was designed to identify and consider the full range of potential actions and outcomes.

Proposed Projects are those proposed for funding through the Town of Windham’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 the Committee has highlighted but which are not categorized as Proposed or Featured Projects.

Additional Resiliency Recommendations are projects and actions the Committee has highlighted but which are not categorized as Proposed or Featured Projects.

From Strategies to Implementable Projects

The Town of Windham NYRCR Plan is grounded in five strategies that capture the critical needs expressed by the Community and analyzed during the planning process. Strategies yielded proposed

and featured projects, along with additional resiliency recommendations, to collectively remediate, mitigate, rebuild, and incentivize resiliency in the Town of Windham.

Strategies

Strategy 1: Improve communications and emergency response capabilities to ensure the provision of essential services before, during, and after hazardous events; to enhance quality of life; and to promote economic growth.

Strategy 2: Increase the resilience of public infrastructure to improve mobility and safety in times of disaster, and to protect property and infrastructure from future storm damage.

Strategy 3: Reduce risks for residents and visitors by addressing stream conditions that cause or contribute to repetitive flood damage, increasing property protection from future flood damage, and promoting safe and adequate housing for all residents.

Strategy 4: Enhance the local economy and quality of life by expanding outdoor recreational amenities and capitalizing on underutilized assets and four-season tourism opportunities.

Strategy 5: Promote economic growth, emergency preparedness, sense of place, and community cohesion through support for non-profit and community-based organizations, expanded marketing initiatives, and community events to strengthen “neighbor-to-neighbor” support networks, and to foster local arts and entertainment.

Projects

SILVER LAKE PROJECT

This proposed project would create access to new passive and active recreational opportunities, an emergency shelter, and a multi-purpose community facility at Silver Lake and Camp Oh-Neh-Tah. The retrofit of several existing camp buildings will leverage



the significance of this unique asset to serve multiple functions, including improved emergency sheltering, access to recreation, alternative emergency operations center (EOC), and additional resources and flexible space for local organizations, groups, and events.

(Proposed Project)

BACK-UP GENERATORS FOR CRITICAL FACILITIES PROJECT

This project seeks to secure the purchase and installation of fixed back-up generators for local facilities to ensure service and emergency capability during and after disaster events. Locations include one at each of the two Windham well water pump stations, one at Town Hall, and one at the Town Highway Garage.

(Proposed Project)

MAD BROOK RETAINING WALL IMPROVEMENTS

This project involves repairs and improvements to the Mad Brook retaining wall and drainage system to increase structural stabilization and to ensure continued functionality and flood protection. Project work would include repairs to damaged sections of the wall and consideration for extending the length of the wall and gravel harvesting to create better channel capacity.

(Proposed Project)

ROUTE 56 CULVERT UPGRADE

This project involves the upgrade and improvement of an undersized, four-foot corrugated metal pipe culvert on Route 56 with a larger 6-foot-by-6-foot box culvert to expand capacity, improve mobility, ensure access to the dam, and reduce localized flood impacts.

(Proposed Project)

SOUTH STREET STORMWATER COLLECTION SYSTEM

This project is a proposed culvert improvement, wetland treatment system, and passive recreation project along South Street. It includes the creation of a stormwater collection system, wetland area, and retaining pond on a 44-acre New York City Department of Environmental Protection property at west end of South Street in the Hamlet of Windham to provide stormwater treatment, flood storage, recreational use, and economic growth.

(Proposed Project)

NEW TRAILS AND CONNECTIONS

This project would develop new trails and trail connections to expand the existing network; provide support for additional users, e.g., biking, hiking, horses, etc.; and better link local and regional recreational assets. Expanded trail systems will also provide additional mobility options in emergency situations and will create redundant access and evacuation routes.

(Proposed Project)

COMMUNICATIONS IMPROVEMENTS

This project would provide for communications infrastructure upgrades to improve emergency response capabilities. It would also provide personal cellular and broadband Internet service to increase quality of life and to promote economic growth. **(Featured Project)**

MAD BROOK HYDRAULIC FEASIBILITY STUDY

This project would conduct detailed hydrologic, hydraulic, and sediment transport analyses of Mad Brook from Mountain View Road to the confluence with the Batavia Kill. The study would help better define the flooding and channel stability risks of the current channel configuration and would evaluate options to restore channel capacity, improve flood conveyance, and reduce sediment transport while improving water quality and habitat. This study would complement the recently completed Local Flood Analysis to jointly pursue long-term solutions to flood conditions.

(Featured Project)

Note: Proposed and Featured Projects are captured according to their associated strategy in the table that follows.



TOWN OF WINDHAM NYRCR PLAN

Town of Windham NYRCR Projects	Proposed Project	Featured Project	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5
Silver Lake Project	X		X			X	X
Back-Up Generators for Critical Facilities Project	X		X	X			
Mad Brook Retaining Wall Improvements	X			X	X		
Route 56 Culvert Upgrade	X			X	X		
South Street Stormwater Collection System	X			X	X	X	
New Trails and Connections	X					X	
Communications Improvements		X	X			X	X
Mad Brook Hydraulic Feasibility Study		X		X	X		



Photo is courtesy of Raymond Adams.



Section 1

Community Overview



Photo is courtesy of Raymond Adams.



Section 1: Community Overview

A Double-Edged Sword

High amidst the scenic beauty and natural abundance of the Catskill Mountains, the Town of Windham is a charming, historic small town, with populations and activities that ebb and flow with the changing seasons. Windham is a tight-knit community, a popular second-home destination, and a major contributor to a regional economy based on tourism and recreation. Windham's tourism industry is bolstered by the many outdoor activities and vistas made possible by the peaks, valleys, and natural resources of the surrounding Catskill Mountains.

The mountainous terrain and natural resources that drive the local economy and make the Town of Windham (Town) an attractive place to live and visit are also likely the single greatest threat to the Town's way of life, rural charm, and prosperity. Located adjacent to the Batavia Kill and beneath steep slopes, the Town of Windham has endured varying degrees of flooding since the first settlers arrived in the late eighteenth century. While flooding represents a constant threat, the damage and danger experienced during Hurricane Irene in the summer of 2011 surpassed nearly all prior events, and clearly underscored the Town's precarious relationship with the natural world.

Over a 12-hour period between August 27-28, 2011, nearly 18 inches of rain fell on the Town of Windham, rushing down steep slopes, swelling the Batavia Kill until overtopping its banks, and inundating the Town. Raging floodwaters coursed through Main Street, uprooting trees and washing away almost anything in its path. Residents in this remote community of New York banded together as best they could, but many were isolated and forced to seek impromptu



Pictured here is an iconic post-hurricane sign of triumph. Photo is courtesy of Jeff Luckey.

sheltering, watching in horror as homes, businesses, and roads were washed away and stranded residents called out for help. According to the Windham Journal, a local newspaper, the power of the storm was such that "bridges and roads and sidewalks were ripped up like toys." Waters rose so fast and so high that by the morning of August 28, school buses floated adrift in the east end of Town, and law enforcement and fire department personnel were already unable to rescue residents on Main Street.

The situation could not have been more intensely terrifying had it been a scene from a summer blockbuster. Residents described the eerie creaking sounds of buildings straining against their foundations, while floating debris knocked down power lines and residents clamored to safety on rooftops. One woman narrowly escaped death, as firefighters and volunteers bravely formed a human chain and rescued her, as she clung to a tree dangling above swift-moving water. Then, the rain slowed.

When the water finally receded, the damage was considerable. Along State Route 23 and throughout the Town, between four to six feet of floodwater had taken its toll, claiming the life of one person; completely destroying four homes and three businesses, with many more severely damaged; washing out numerous



road; and leaving the Town in the dark, with the loss of power for up to two weeks in some areas. Millions of dollars in damages to community infrastructure made roads impassable and left residents and businesses without power.

The Town was devastated, but by all accounts, the community immediately looked to rebound and rebuild. Community bonds and rural determination fueled admirable recovery efforts immediately following the storms. Local volunteers performed remarkably. Neighbors helped neighbors, and community and agency partnerships emerged to utilize all available resources. Despite these efforts, however, recovery needs remain more than three years after flood waters have receded. While the Town survived Hurricane Irene, a long road remains toward full recovery and greater future resilience.

Recovery and resiliency efforts should address lingering damage and needs, while preparing for future floods on the horizon. There are opportunities to capitalize on the Town's charm and natural features, while simultaneously protecting people, property, and the local economy against the potential danger natural features can pose during major storm events.

Community Profile

The Town of Windham is one of 19 jurisdictions (14 towns and five villages) located in Greene County. Situated in the mid-eastern part of New York State within the northern end of the Catskill Mountains, Greene County has three distinctly characterized areas: river towns, valley towns, and mountain towns. Windham is located in the west-central part of Greene County, on the northern boundary of the Catskill Park, and as such, is one of the mountain towns of Greene County.



Windham is known by long-time residents and visitors as a charming place to live, shop, and recreate. Photo of downtown shops and church is courtesy of Raymond Adams.

Formed in 1798, the Town of Windham was initially part of Ulster County, but became one of the original townships created when Greene County formed in 1800. Following the creation of Greene County and throughout the first half of the nineteenth century, the Town was divided multiple times to create the Towns of Ashland, Halcott, Hunter, Jewett, Lexington, and Prattsville. Today, Windham includes three Hamlets—Windham, Hensonville, and Maplecrest—and its population of 1,703 residents are spread over an area of 45.4 square miles.

The hamlets of Windham are filled with charming rural character and are populated with locally owned shops and restaurants. These small, largely family owned, businesses are complemented by a mix of historic and new residential areas that consist of single-family homes, condominiums, and mixed-use structures. Surrounding the hamlets are miles of forests and open space, punctuated by low-density homes, farms, and the Catskill State Park.



While it was settled for its agricultural and industrial potential, particularly the promise of hemlock trees for tanning animal hides, Windham’s economy today is clearly centered on the tourism industry, with Windham Mountain as the primary draw. One of several major ski resorts in the region, Windham Mountain offers numerous outdoor recreational and employment opportunities for the Town, and affects nearly all aspects of local economics and community development.



The rugged landscape across Windham also provides numerous outdoor recreational offerings, including skiing. Pictured here are pre-season slopes. Photo is courtesy of Raymond Adams.



The Batavia Kill is a significant waterway in the region and in the Town of Windham. Photo of bridge is courtesy of Raymond Adams.

Hydrology Overview

The Schoharie Creek watershed extends into seven different counties, with the majority of the watershed residing in Greene County and including large sections of the Towns of Hunter, Lexington, Jewett, Windham, Ashland, and Prattsville, along with the Villages of Hunter and Tannersville. This watershed has a total drainage area of 930 square miles and over hundreds of miles of streams on 13 different bodies of water, including the Batavia Kill, a tributary to the Schoharie Creek that runs through all three of Windham’s hamlets and ties them together.

The Batavia Kill originates in the Big Hollow area of the Town of Windham, on the south slopes of some of the highest peaks in the Catskill Mountains. The stream then flows 21 miles through the Towns of Windham, Ashland, and Prattsville to its confluence with the Schoharie Creek, near the Hamlet of Prattsville.



The Batavia Kill has five primary tributaries in the Town of Windham, including Mad Brook, Lewis Creek, Sutton Hollow, Lake Heloise tributary and West Hollow Brook.

The Batavia Kill watershed is a sub-basin of the Schoharie Creek, which is the northernmost reservoir in the Catskill/Delaware water supply system. The Catskill system is one of three that provides approximately 40% of the average water supply demand to the New York City West-of-Hudson water supply system.

Collectively, the stream network in the Town of Windham creates numerous benefits to local and regional quality of life by providing recreation and tourism opportunities, an ample and high quality drinking water supply for the local community, and aesthetic appeal, all of which contribute to local economic growth. These streams also provide important habitat for many aquatic species, including catfish; rainbow, brown and brook trout; small-mouth bass; and perch, among others. These species help to protect ecological health and balance in the stream network, while supporting recreational activities and tourism.

The People of Windham

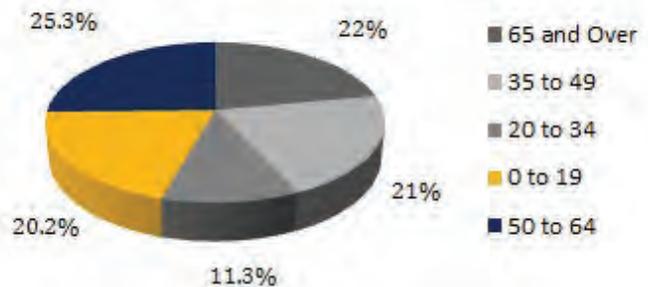
The full- and part-time residents of the Town of Windham are the foundation of the community, and their safety and quality of life are the ultimate focus of this planning process. The following community snapshot identifies community strengths and vulnerabilities that were considered in the development of this Town of Windham NY Rising Community Reconstruction (NYRCR) Plan.

POPULATION AND AGE

As of 2010, a total of 1,703 full-time residents residing in 773 individual households made the Town of Windham their home. With a population increase of only 2.6% from 2000-2010, and only 21 more residents than in 1990, the population of the Town has been relatively stable for many years. The Town experienced one period of relatively extreme growth during the 1970s, however, as the population swelled by 39.7% over that decade.

These population figures, however, fail to capture the entire universe of Town residents due to Windham’s popularity as a vacation or second home community. According to the 2010 Census, there are 1,487 seasonal-use homes in Town, approximately twice the number of homes with full-time occupants. The significant number of part-time residents and visitors who occupy these homes varies with the season, presenting both unique opportunities and challenges to the town.

FIGURE 1.1 – POPULATION AGE TOWN OF WINDHAM



Source: U.S. Census, 2012

TABLE 1.1 – POPULATIONS: 2000 – 2010

Municipality	Census 2010 Pop.	Census 2000 Pop	2010 Pop. Over 65	2010 Median Age
Town of Windham	1,703	1,660	375	48.5

Source: U.S. Census, 2010

TABLE 1.2 – POPULATION TRENDS, 1960 TO 2010

Year	Population	Change In Population	Percent (%) Change Population
Town of Windham			
1960	1,289	-	-
1970	1,190	-99	-7.7%
1980	1,663	+473	39.7%
1990	1,682	+19	1.1%
2000	1,660	-22	-1.3%
2010	1,703	+43	2.6%

Source: U.S. Census Bureau and Town of Windham Comprehensive Plan (2000)

The full-time residents of the Town of Windham are moderately older than the rest of New York State’s population, with a median age of 48.5 years, compared to a median age of 38 years for New York State. Data suggest that this may be an emerging trend for the Town, as the average age has increased from 44.3 years in 2000. Additionally, as of 2010, 22% of the population is now over the age of 65, and the single-largest age cohort locally is 50-54 year olds, making up 9% of the population.

Currently, a relatively sizable percentage of the full-time population is of traditional working age (32.3% are aged between 20-50 years). However, if the aging trend continues, it could exacerbate multiple existing local issues, including an already-limited local workforce and lack of medical and senior living facilities.

Figure 1.1 depicts population age information as of the 2010 U.S. Census. Tables 1.1 and 1.2 show population trends from 2000 to 2010, and 1960 to 2010, respectively.

EDUCATIONAL ATTAINMENT

As of the 2010 U.S. Census, 89% of Windham’s residents over the age of 25 graduated from high school or had a higher level of education and training, and 25.9% completed a bachelor’s degree or higher level of education and training. These factors indicate that the workforce in the Town of Windham is slightly more educated than the population in the rest of Greene County, wherein 85.3% have graduated from high school

or had a higher level of education and training, and 19.1% completed a bachelor’s degree or higher level of education and training.

Housing



Windham is largely characterized by single-family homes in a rural residential setting. Photo of home is courtesy of Tetra Tech, Inc.

The Town of Windham is a predominantly single-family home community and a second-home destination. The 2,457 total housing units in Windham consist largely of single-family, detached residential structures that account for 82.7% of the housing stock in the Town. The Town also contains a substantial number of multi-family units (3-19 unit developments) constituting 12.7% of the total housing units. These multi-family units are typically condominium developments associated with the recreational economy and specifically, with Windham Mountain. A large majority of the occupied single-family and multi-family housing units are owner-occupied (70.5%), according to the 2010 U.S. Census. The remaining 29.5% of housing units are renter-occupied homes, a trend that has remained relatively static during the prior 10 years.



The majority of housing stock in the Town of Windham is single-family, detached homes. Photo of home is courtesy of Raymond Adams.

According to the U.S. Census American Community Survey for 2012, the housing stock in Windham is neither particularly historic (22.7% of homes were built prior to 1939) nor particularly contemporary, as the largest number of units were built between 1970 and 1989 (51.6% of total units), and only 14.5% have been built since 1990. The age of the housing stock likely reflects the highest period of population growth in Windham, which occurred during the 1970s, as residents increased by 39.7%.

Older housing stock may present an opportunity for structural upgrades and retrofit improvements to capitalize on modern building techniques, floodplain restrictions, and increased safety and resilience.

The scenic beauty, peaceful surroundings, and recreational focus of the Catskill Mountains have helped to establish the Town of Windham as a popular second-home destination, with 1,487 seasonal-use homes representing an incredible 60.5% of the total housing stock. Such a significant presence of vacation homes contributes to several unique housing conditions for the Town.

Based on a quick glance at available data, the Town would appear to suffer from an extremely high vacancy



Condominiums, such as those pictured here in Windham, are among the attractive second-home options for many homeowners. Photo is courtesy of Raymond Adams.

rate of 68.5%, compared to 9.7% for New York State. This extremely high figure, however, fails to account for the Town’s strong popularity as a vacation and second-home destination. Because U.S. Census data does not consider second homes as “occupied,” these homes appear as “vacant” on the records. The U.S. Census, however, indicates that of the 1,684 vacant units, at least 1,487 or 88.3% of vacancies are for seasonal/vacation use.

Popularity as a recreational destination and second-home location has impacted local property values. While demand and resulting property value increases can have potential benefits for local tax revenue, it also can create serious affordability issues for residents. With a median home value of \$240,000, compared to only \$179,700 for Greene County, the community faces challenges in its ability to attract young families, first-time homebuyers, and a sufficient workforce.

This extreme popularity with second homeowners creates a unique local dynamic that was considered during this planning process. Particular issues stemming from significant second-home ownership, including rising property values and project coordination challenges, are discussed in greater detail in the Critical Issues section of this NYRCR Plan.



Land Use Planning and Development

Historic and contemporary development in the Town of Windham has followed a traditional village type of growth pattern. Residential, commercial, and mixed-use structures are grouped in moderate density around main thoroughfares that pass through hamlet centers, and are surrounded by rural landscapes that are populated with low-density homes, farms, and open spaces. Mountainous terrain and wilderness areas of the region have generally dictated development of the relatively few places that are feasible and suitable for building. Figure 1.3 provides an overview of land uses within the Town of Windham.

Most residential developments are distributed along the major transportation corridors, with higher densities along Route 23 in the downtowns and lower densities along Route 21, with the addition of several condominium developments in proximity of Windham Mountain.

Very low-density residential parcels, farmland, and conservation/open-space land dominate the Town of Windham outside of the three hamlets. Much of the surrounding open space, particularly in the southern part of Town, is within the Catskill State Park and Catskill Forest Preserve. This open space includes approximately 300,000 acres of State-owned land that must remain forever as wilderness areas not to be leased, sold, or exchanged, according to the New York State Constitution.

The significant presence of State- and City-owned wilderness areas have had a profound impact on the location, type, and intensity of development that has been allowed to occur in the Town of Windham. Within the Town, 19% of the total land is owned by the New York State (NYS) Department of Environmental Conservation (DEC), the majority of which is located in the Catskill Forest Preserve in the southeast corner of the Town.



The Town's built environment has focused on areas that exhibit a combination of buildable slopes, available land, and the presence of public infrastructure and amenities. Photo of downtown shops is courtesy of Raymond Adams.

The forests and natural areas of the Catskill watershed also play an important role in providing clean drinking water for New York City. As such, development in the Town of Windham is regulated to encourage practices that do not negatively impact water quality.

The two primary historic areas within the Town are located along Main Street in the Hamlet of Hensonville, and along Main Street in the Hamlet of Windham. Within these two areas, 13 sites are listed on the Greene County Historic Register, and one site is listed on the New York State and Federal Registers of Historic Places.

Historic local sites include Center Church, Jenne's Notch, Thomas Cole Mountain, the Stimson/Ives House, and the Paul Alle Memorial Bridge. These sites, in addition to many historic homes, are key community assets that help to establish unique local character and



bolster the small-town charm and tourism potential for Windham. These resources are protected by Windham's Architectural Review Board to ensure they are available for the enjoyment and education of future generations.

Despite the success of the tourist trade, there is limited diversity in shopping, hotels, retail, and restaurant amenities in the Town of Windham.

Without additional commercial development, Windham struggles to capitalize on the full potential of recreation assets. This can discourage a year-round tourism economy and thus, can negatively impact quality of life, particularly for full-time residents.

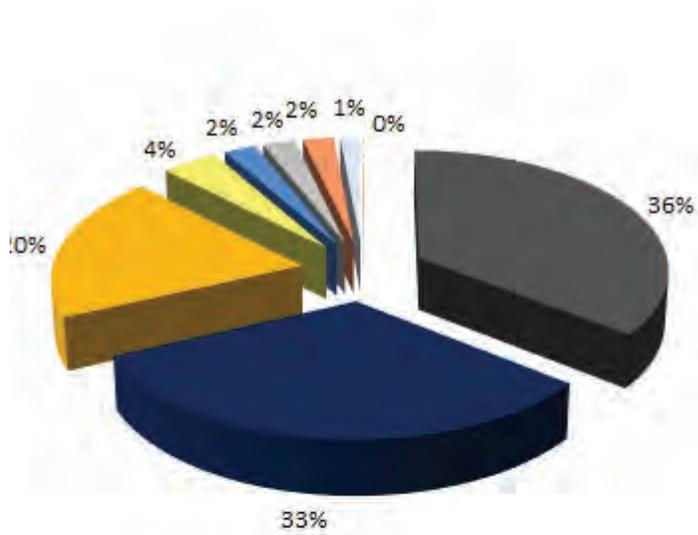
The Town of Windham currently lacks a local zoning ordinance; however, development is regulated through a combination of other ordinances, including a building code, subdivision ordinance, plan review requirements, and a stormwater management ordinance.



Pictured above is the Catskill Mountain Lodge. Photo is courtesy of Raymond Adams. Pictured below is one of several golf courses in Windham. Both attract tourist traffic. Photos are courtesy of Raymond Adams.



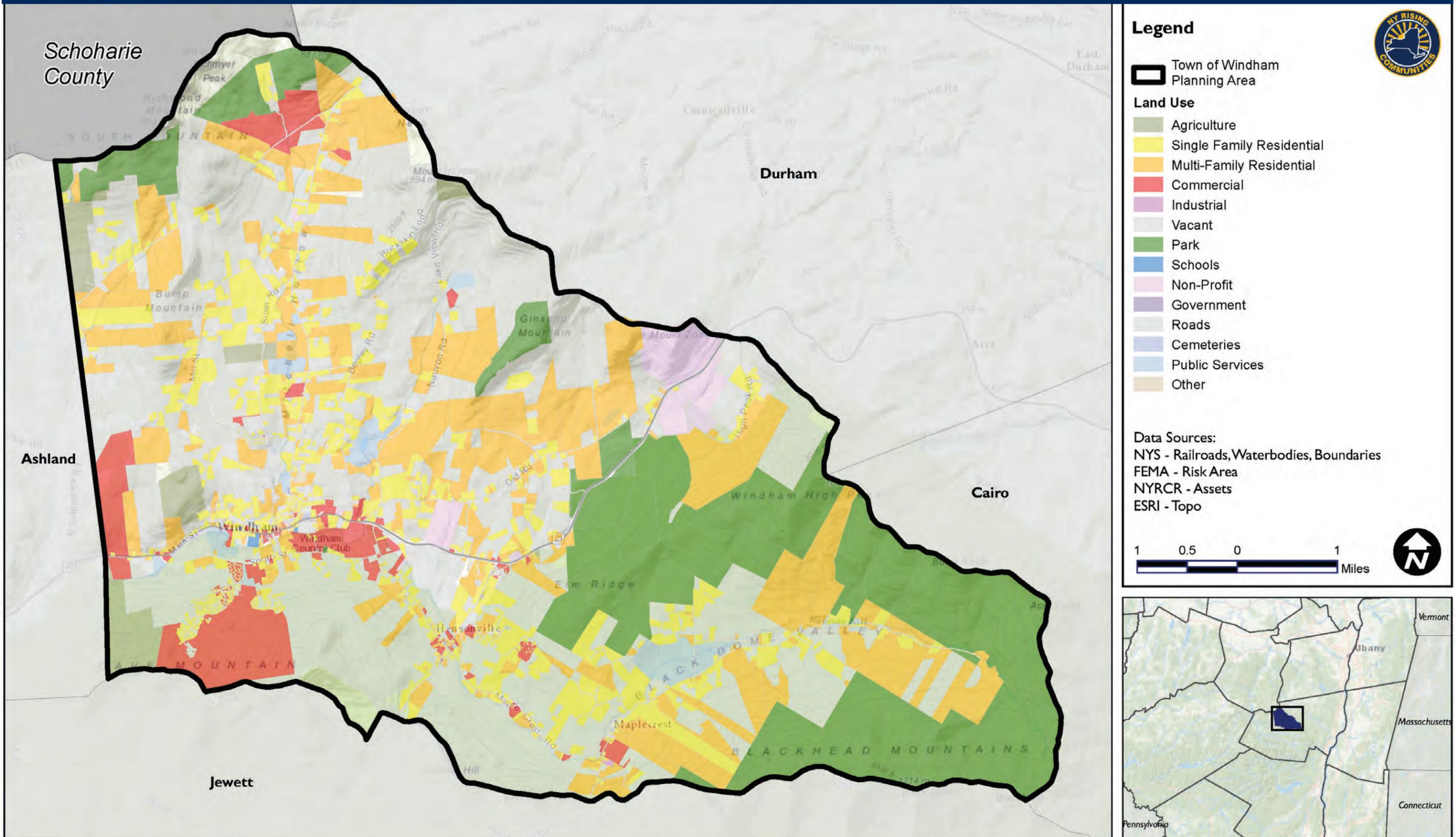
FIGURE 1.2 – WINDHAM LAND USES



- Vacant (15.29 sq. miles)
- Residential (13.96 sq. miles)
- Wild, Forest, and Conservation Land (8.366 sq. miles)
- Recreation and Entertainment (1.758 sq. miles)
- Agricultural (1 sq. mile)
- Commercial (1 sq. mile)
- Community Services (0.943 sq. miles)
- Public Services (0.6 sq. miles)
- Industrial (0.043 sq. miles)

Source: Town of Windham Comprehensive Plan (2000)

NYRCR: Town of Windham, Greene County
FIGURE 1.3 – LAND USE MAP





Infrastructure, Transportation, Facilities

Flood Control

Currently, there are three public flood control structures in the Town of Windham that were constructed between 1965 and 1974. Construction of these dams was recommended by a 1965 U.S. Department of Agriculture (USDA) Soil Conservation Service (now known as the Natural Resources Conservation Service) report entitled Watershed Work Plan for Watershed Protection, Flood Prevention, and Water Management in the Batavia Kill Watershed. The Work Plan called for the development of four flood control structures on the Batavia Kill that were designed to sustain a 100-year

flood event. Three of the four recommended structures have been built, maintained, and operated by the Batavia Kill Watershed Protection District, including the Mitchell Hollow Dam, Nuavo Dam and C.D. Lane Dam. All three of these structures were built with earthen embankments, outlet pipes, and emergency spillways to accommodate very large flood events. According to the 2006 Batavia Kill Stream Management Plan, construction of the fourth dam was not pursued due to negative environmental impacts and the results of a cost-benefit analysis indicating that the significant cost of construction out-weighed the potential benefits.

It has been reported that these three flood control structures have greatly reduced the amount of damage from floods in the watershed. These three dams are itemized in Table 1.3.

TABLE 1.3 – WINDHAM DAMS

Name	Water Body	Year Complete	Owner
Batavia Kill Watershed Dam #1	Batavia Kill	1974	Greene County, NY
Batavia Kill Watershed Dam #4A	Batavia Kill	1967	Greene County, NY
Batavia Kill Watershed Dam #3	Batavia Kill Tributary	1970	Greene County, NY

Source: Greene County Hazard Mitigation Plan (2009)

Transportation

The Town of Windham is located between I-88 and I-87, and bisected by New York State Route 23, which provides regional transit access and connectivity to regional metropolitan centers, as well as convenient travel routes to more distant locations. Additional elements of the highway system include a network of Greene County-owned roads and local collector streets that provide alternate transit routes, as well as access to homes, businesses, and other local assets. Like many rural areas with limited road networks, repeated flooding has created significant evacuation and safety issues in the past, as main thoroughfares become inundated and impassable.

Windham also contains a number of bridges and culverts that span the Batavia Kill and its tributaries, including:

- Rt. 40 Bridge in Maplecrest;
- Slater Rd. Bridge in Maplecrest;
- Wedding Bell Lane Bridge;
- Rt. 40 Bridge in Hensonville;
- Rt. 65 Bridge in Hensonville;
- Church St. (Rt. 79) Bridge in Windham;
- Main St. (Rt. 296) Bridge in Windham;
- South St. (Rt. 12) Bridge in Windham; and
- Two golf course bridges in Windham.

TABLE 1.4 – COMMUNITY FACILITIES

Windham-Ashland-Jewett Central School
Windham Ambulance
Windham Police Department
Hensonville Hose Co.
Windham Hose Co. #1
Waste Water Pump Station 1
Waste Water Pump House 1
Pump House
Town Water Pump House
Waste Water Pump House 2
Waste Water Pump House 3
School Bus Garage
Town Hall
Main Care Fuel Storage Center

Source: Greene County Hazard Mitigation Plan (2009)

Over many years and many floods, these structures have sustained various levels of damage, and have been repaired or replaced periodically with assistance from the Federal Emergency Management Agency (FEMA) and additional resources. Implementing necessary repairs and improving structures to be more resilient against future storms will be critically important to the future of the community.

Local Facilities

The Town of Windham is supported by essential local services, including a local police department and fire department. A summary of local facilities and service providers available in the Town is provided in Table 1.4.



Local fire personnel are among first responders in flood events. Photo of rescue truck is courtesy of Jeff Luckey.



Pictured here is the Windham-Ashland-Jewett Central School, an important community facility. Photo is courtesy of Raymond Adams.

Economic Profile

Economic Trends and Income

The Town of Windham, like many of its neighboring mountaintop towns in Greene County, thrives because of a tourism and vacation home-driven economy. The area’s wilderness, terrain, and rural character create the inherent potential for outdoor recreation and economic growth; however, it is the Town’s proximity and connections to large metropolitan areas, including New York City, Albany, and northern New Jersey, that allow it to capitalize on this potential.

With close access to Interstates 88 and 87, and with immediate access to State Route 23, providing travel times of about 2.5 hours to New York City and Hartford, Connecticut, it is not surprising that Windham’s economy focuses on tourism trade. Visitor spending infiltrates most areas of community quality of life by creating jobs, supporting local shops and restaurants, and enhancing and diversifying local recreational facilities and opportunities.



The Town of Windham’s economy has been historically linked to the natural surroundings and resources since its initial settlement, and this relationship has evolved. Windham traditionally grew with an agricultural and artisan economy fueled by cattle, orchards, potatoes, and extensive timber and tanning operations.

By 1835, as many as 34 sawmills existed in Windham. After turnpikes were built, the Town became a gateway to the west for people and goods via what is now State Route 23. However, a drop in agricultural production in the second half of the twentieth century halted some of the booming local industries and began a period of reforestation and restoration.

As resources rebounded, forests regrew, technologies changed, and national economies adjusted, the Town of Windham and other Catskills towns effectively shifted their economic focus toward tourism, outdoor recreation, and becoming second-home destinations.

Today, the local economy is supported primarily by outdoor recreation, including ski resorts, hiking, biking, golf, fishing, and a number of locally owned shops, restaurants, bars, and hotels that cater to the tourist trade.

Agriculture continues to contribute to the economy with the presence of some farms in town, although the number is much reduced from a century ago.

Workforce and Key Industries

The local workforce in the Town of Windham consists of residents 16 years of age or older and considered working age (84.2% of the total population). While numbers alone suggest a sizable potential workforce, it is worth noting that 38.2% (653 people) are over the age of 55, an increase from 34.1% (566 people) in 2000. If the population continues to age as this trend indicates, this may increase the difficulty for local businesses to find suitable staff, and may limit longer-term economic growth potential for the Town.



Pictured here is a common scenic woody view in and around the Town of Windham. It is ideal for hiking and numerous other types of outdoor recreation. Photo is courtesy of Raymond Adams.

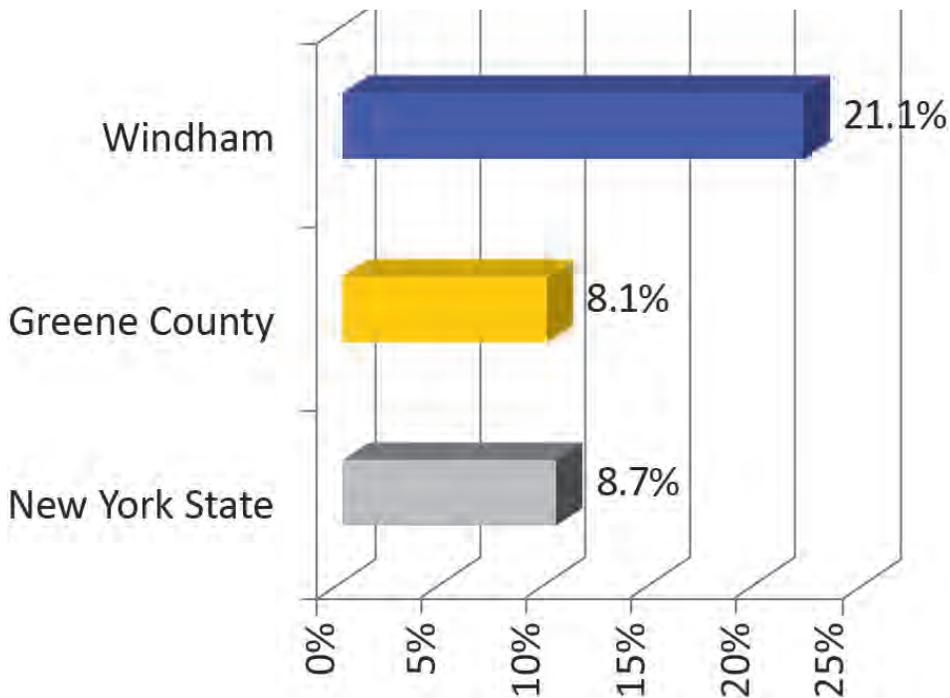
The high unemployment rate in the Town of Windham (21.1%) far outpaces the rest of Greene County and New York State, which have unemployment rates of 8.1% and 8.7%, respectively. It is likely that a portion of this high unemployment rate is a result of the seasonal nature of Windham’s economy, with some workers only finding or seeking employment for portions of the year.

According to the American Community Survey, in 2012, the median household income for the Town of Windham was \$55,846, which is a modestly higher than that of Greene County (\$47,539), and more closely aligned with the State, overall (\$56,951). Additionally, 10.8% of the Town’s residents were considered to be living below the poverty line, and 39.8% were considered to be of low and moderate incomes, according to the U.S. Department of Housing and Urban Development (HUD) in 2000.

Wages are generally lower in the Town than in larger urban and metropolitan areas, a fact that contributes to difficulties in housing affordability and the Town’s attractiveness to young families and a sufficient, qualified workforce.

The major economic driver in the Town is the Arts, Entertainment, Recreation, Accommodation, and Food Service Sector, which contributes 20.1% of businesses in Windham, compared to only 10.8% in Greene County and 8.6% in the State of New York. A primary contributor to this industry, and important local asset, is Windham Mountain. Windham Mountain is a successful ski resort, recreation center and a major local and regional economic driver. Windham Mountain creates numerous employment opportunities and supports the successful outdoor recreation and tourism industries through skiing, hiking, biking, events and other recreational opportunities.

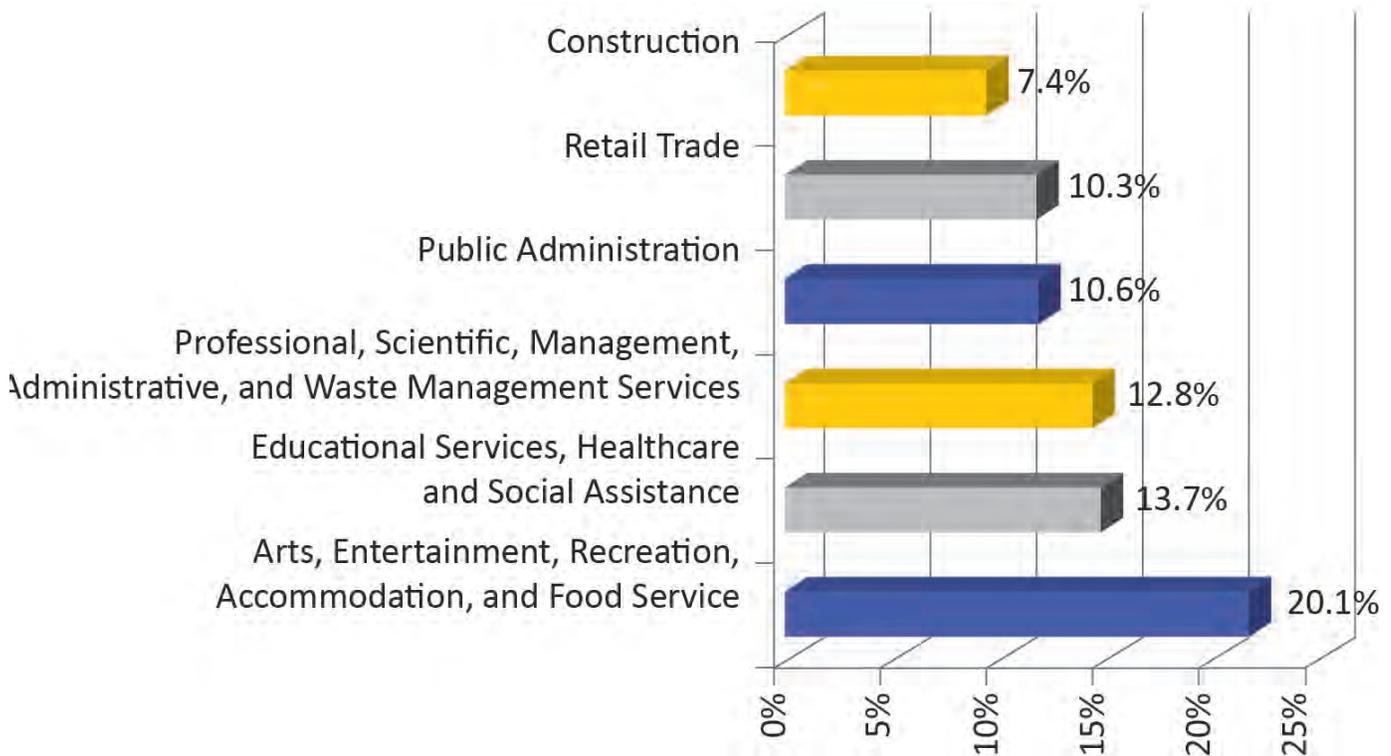
FIGURE 1.4 – UNEMPLOYMENT COMPARISON



Source: 2008-2012, 5-Year American Community Survey



FIGURE 1.5 – WINDHAM EMPLOYMENT SECTORS



Source: 2008-2012, 5-Year American Community Survey

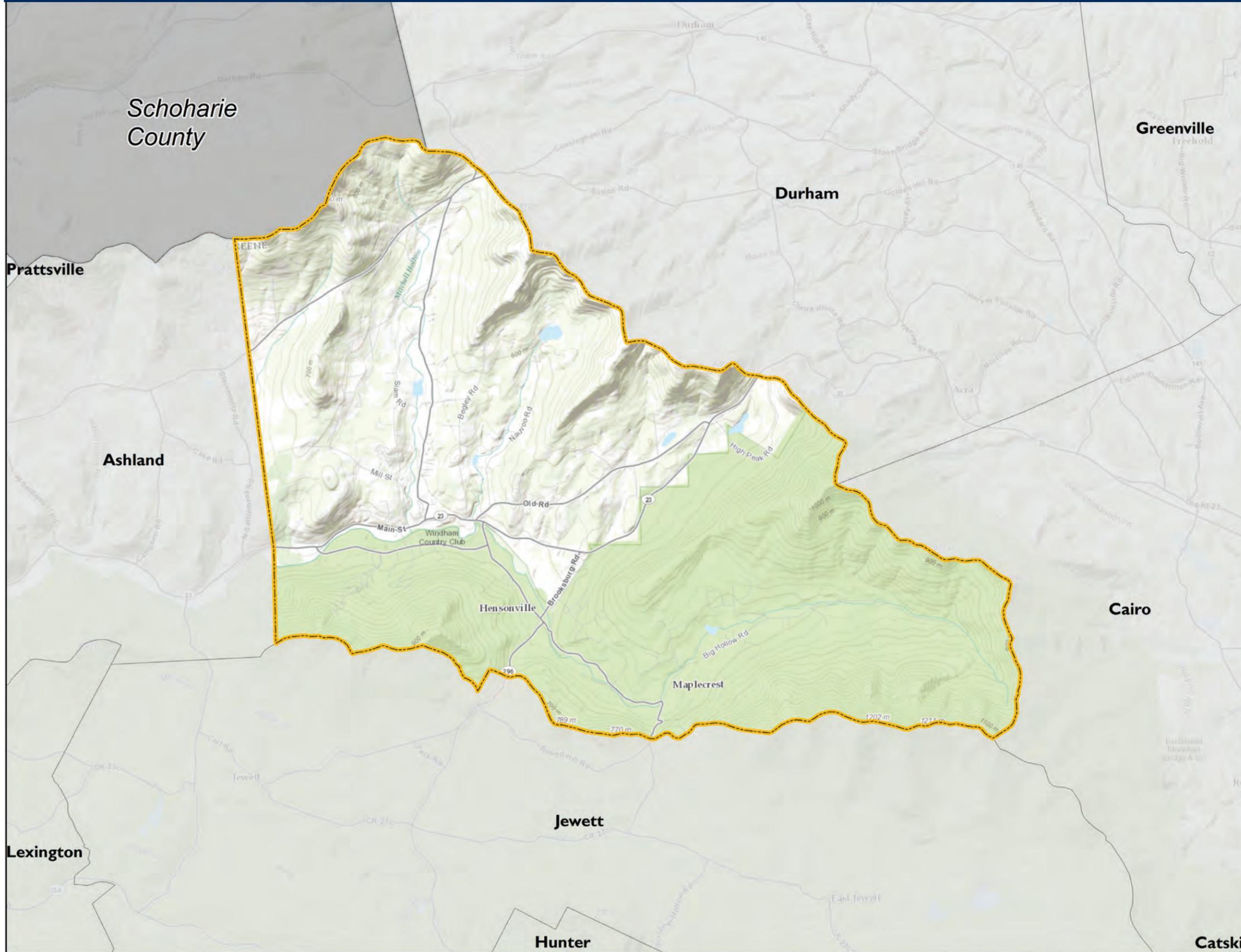
Geographic Scope of the Town of Windham NYRCR Plan

One of the first steps undertaken by the Town of Windham NYRCR Planning Committee (Committee) was to establish a geographic scope for the NYRCR Plan. This scope represents the geographic focus of subsequent analysis and project identification. Based on a review of past events, the source of historical flooding, and the location of critical facilities impacted by flooding, the

Committee defined a geographic scope that conforms to the municipal boundaries of the Town of Windham. This area includes the Town’s commercial corridors, various residential neighborhoods and hamlets, protected farmlands and conservation lands, and many locations that experienced severe physical and economic damage from Hurricane Irene and Tropical Storm Lee.

Figure 1.6 depicts the geographic scope of the NYRCR Plan as designated by the Committee.

NYRCR: Town of Windham, Greene County
FIGURE 1.6 – OVERVIEW MAP

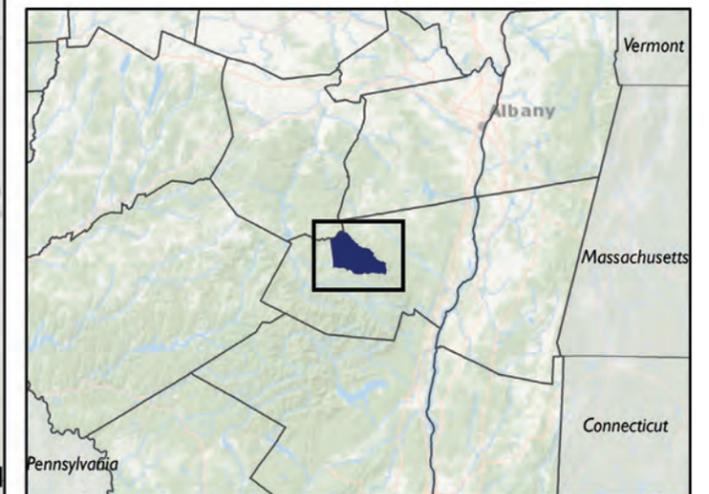
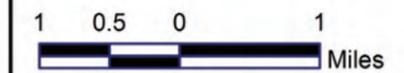


Legend

-  Town of Windham
-  Planning Area



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





Description of Storm Damage

Hurricane Irene

AUGUST 25 – SEPTEMBER 5, 2011

Hurricane Irene tracked up the East Coast of the United States from August 21 – 27, 2011, when wind speeds decreased to tropical storm forces. Irene made its third landfall in coastal New Jersey, and then hit New York State on August 28, 2011, bringing heavy rains to the Catskill Mountains and through the Schoharie and Mohawk Valleys.

According to the National Climatic Data Center (NCDC), 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 August 28, 2011, knocking down trees and power lines across numerous counties, including Greene County and in the Town of Windham. During the height of the storm, thousands of people throughout the region were without power; for some, the blackout lasted a week or more. On August 31, 2011, President Obama issued a major disaster declaration (DR-4020) for New York State and the counties impacted by Irene, including Greene County.

Over a 24-hour period (August 28-29, 2011), approximately 18 inches of rain fell in the Town of Windham, causing devastating flooding in the communities along the Batavia Kill and other waterways throughout Greene County. Torrential rain quickly caused the stream to swell dangerously, as sheets of water cascaded down the mountainous terrain, carrying sediment and debris into the Town. The severity of



Pictured here is a home that collapsed and was destroyed during Hurricane Irene. Photo is courtesy of Bridget Pelham.

the situation elevated, as surging floodwaters knocked down trees, destroyed power lines, and ripped up roads with alarming ease. This forced residents to seek emergency shelter in second floors of homes and on rooftops.

The intensity of the floods damaged bridges, culverts and roadways, and isolated many residents without means of evacuation or rescue. Flood waters significantly harmed the Town's building stock with many homes and businesses suffering damage and four homes and three businesses completely destroyed. Although the majority of impacted businesses have rebounded from the storm, several have not re-opened.

While many residents required shelter during these storms, only one of the Town's three primary shelters was not inundated with water. The local ski mountain, Windham Mountain, which would typically function as an informal shelter, also suffered flood damage during Hurricane Irene, which prevented the facility's use as a shelter. The lack of adequate sheltering in Town further compounded the dangerous conditions created by the immense flooding.

Undersized culverts and bridges throughout the Town failed to accommodate the floodwaters that inundated neighboring properties and cut off transportation access. During the storm, all three of the Town's flood control structures were forced to utilize their emergency spillways, resulting in approximately \$2 million in damages.



The wrath of Hurricane Irene was immense, and compromised rescue efforts in Windham. Photo of washed out grass on properties at roadside is courtesy of Bridget Pelham.



Washed out roadways and collapsed infrastructure left many without power for an extended period. Photo is courtesy of Bridget Pelham.

Tropical Storm Lee

SEPTEMBER 7 – SEPTEMBER 10, 2011

Just one week after the Town of Windham battled through Hurricane Irene, residents were hit a second time by Tropical Storm Lee, which brought significant rainfall across many parts of New York State, and causing more flooding in Windham and the surrounding area. Fortunately, for the Town of Windham, the flooding from Tropical Storm Lee was minor compared to the damage from Hurricane Irene.

While FEMA issued a second major disaster declaration (DR-4031) on September 8, 2011, again providing Public Assistance and Individual Assistance for recovery operations to communities in New York, Greene County communities were not impacted enough to receive additional assistance.

Despite only minor damage, the inclement weather so soon after such horrific devastation brought additional psychological and emotional strain to the Town of Windham. Additional flooding and rain delayed recovery efforts and slowed efforts to respond to damages sustained to local roadways, culverts, homes, and businesses.

Recent Hazard Event History

In addition to Hurricane Irene and Tropical Storm Lee, Greene County has experienced numerous flood and hazard events throughout its history. Table 1.5 provides a summary of recent hazard events.



TABLE 1.5 – RECENT HAZARD EVENT HISTORY

Date of Event	Event Type	FEMA Declaration #	Local Damages and Losses
January 1996	Flood	-	Snow melt, flooding, and road closures.
February 23–27, 1996	Snow	-	Severe snow storm, road closures, and local building damage.
September 19, 1999	Flood (Remnants of Hurricane/Tropical Storm Floyd)	DR-1296	Greene County experienced approximately \$3 million in flood damages. As of December 6, 1999, FEMA indicated that Greene County was approved for over \$121,000 in Public Assistance. This event created unstable conditions along many rivers and streams throughout the County.
July–August 2003	Severe Storms, Tornadoes and Flood	DR-1486	Greene County experienced nearly \$75,000 in flood damages.
September 18, 2004	Flood (Remnants of Hurricane Ivan)	-	Greene County suffered many road closures in Windham, Climax, Jewett, Catskill, Coxsackie, Leeds, Lexington, Prattsville, and Kiskatom. The Batavia Kill exceeded its flood stage of 5.0 feet, cresting at 7.47 feet at the Red Falls gauge.
April 2–4, 2005	Severe Storms and Flood	DR-1589	Greene County experienced approximately \$1.3 million in flood damages. The floodwaters overflowed creeks and tributaries, uprooted trees, and destroyed roadways and many private properties. Over 40 roads were closed throughout the County. Many homes and businesses suffered significant damage. FEMA only approved \$1.1 million in Public Assistance reimbursements to the County, including the Town of Windham.
June 2–July 10, 2006	Severe Storms and Flood	DR-1650	This event was the largest and most costly natural disaster that New York State had encountered since Hurricane Agnes in 1972. FEMA approved over \$609,000 in Public Assistance reimbursements for various restoration and mitigation project costs in Greene County.
April 14–17, 2007	Severe Storms/Inland and Coastal Flood	DR-1692	New York State experienced between \$12.8 and \$60 million in eligible damages, including Greene County.

Source: Greene County Hazard Mitigation Plan (2009)



Groundwater saturation, runoff, and sustained flooding caused the collapse of foundations like this throughout Windham. Photo is courtesy of the Town of Windham.

Flood Hazard Areas in the Town of Windham

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. Floodplains are often referred to as the 100-year and 500-year floodplains.

A 100-year flood event is not a flood that will occur once every 100 years; rather, it is a 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.

Due to this misleading term, FEMA has properly defined it as the 1% annual chance flood, which is now the standard used by most Federal and State agencies, and by the National Flood Insurance Program (NFIP).

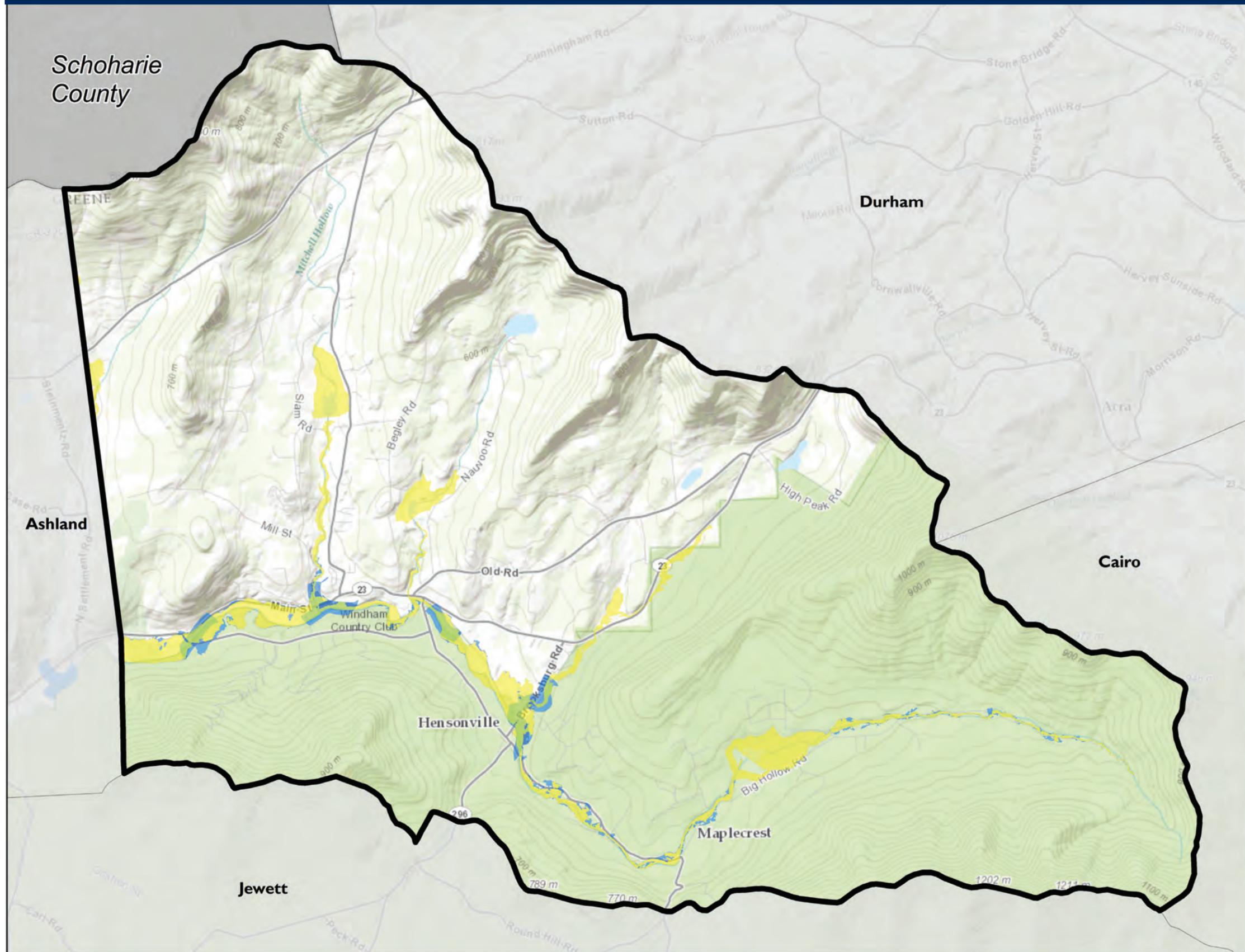
The flood hazard area corresponds to the FEMA-designated Special Flood Hazard Area (SFHA), defined as the area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. Like many communities that grew along the banks of rivers and streams, the Town of Windham's most densely populated areas tend to be in or near identified floodplains, thus placing residents at greater risk.

The FEMA Flood Hazard Area Boundaries are displayed in Figure 1.7.



Pictured here is an example of damage caused by Hurricane Irene—downed telephone poles and trees. Photo is courtesy of the Town of Windham.

NYRCR: Town of Windham, Greene County
FIGURE 1.7 – FEMA FLOOD HAZARD AREA MAP



Legend

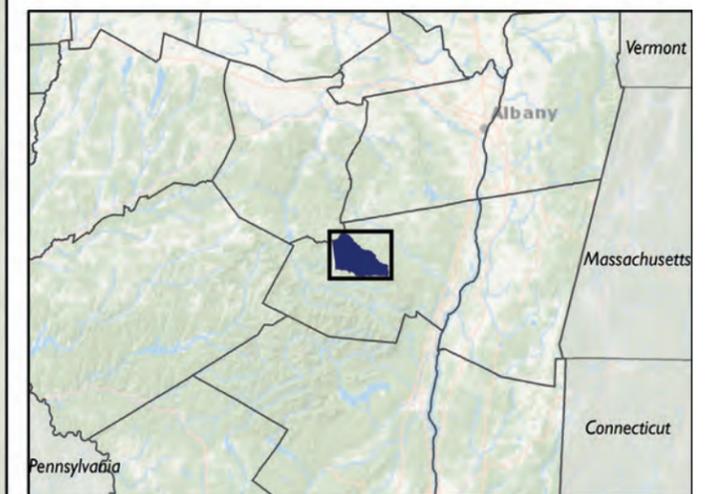
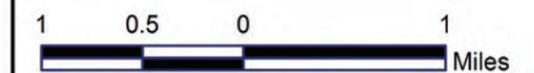
 Town of Windham
 Planning Area

FEMA Flood Hazard Areas

 100-Year
 500-Year



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





Critical Issues

After a review of existing plans and technical analysis, public input, inter-agency coordination, and Committee guidance and discussion, a series of preliminary critical issues were identified that span the breadth of community development, safety, and quality of life.



Pictured here is the Batavia Kill. Photo of bridge and fast-moving kill is courtesy of Jeff Luckey.

The natural assets of the Catskill Mountains, including the Batavia Kill and steep terrain, are both its greatest assets and greatest challenges. The combination of physiological, meteorological, and hydraulic conditions in the Town of Windham have defined the character of the Catskills for generations, and paved the way toward prosperity and growth.

The abundance of natural resources, mountainous terrain, and snowy winters create an environment ripe for agricultural production, resource harvesting, and more recently, tourism and second home ownership. The economic importance of extensive tourism and vacation home ownership cannot be underestimated, as they drive the local economy, catalyze investment, and create revenue and jobs for local residents and businesses. These same conditions, however, also create a community that is prone to repetitive flooding and property damage, all of which continues to place the NYRCR Plan Area at risk.

While the remoteness and wilderness of the Catskill Mountains contribute to its character, tranquility, and economic success, the geography also contributes to many of the NYRCR Plan Area’s most threatening issues, such as isolated populations, lack of readily accessible medical and community facilities, housing affordability, limited developable land, unreliable communications, and workforce challenges. These challenges can constrain community development and quality of life.

Town of Windham Critical Issues

Repetitive Flooding

- *Flood-prone Conditions*
- *Property Damage*
- *Infrastructure Damage*
- *Economic Loss*
- *Lack of Back-up Power*
- *Isolated Population*
- *Natural System Impacts*
- *Stream Project Challenges*

Economic and Community Development

- *Seasonal Shifts, Limited Amenities/Services*
- *Under-utilized Recreational Potential*
- *Insufficient Communications Capability*
- *Housing Affordability*
- *Insufficient Workforce*
- *Development Challenges*

Lack of Medical and Senior Facilities

Repetitive Flooding

FLOOD-PRONE CONDITIONS

The natural conditions of the Batavia Kill watershed have contributed to frequent flooding since the first settlers moved to the area in the late eighteenth century. According to the Cornell Climate Report, the geographic position of New York State makes it



vulnerable to frequent precipitation from coastal storms (Nor'easters, Tropical Storms, and Hurricanes). The State is also vulnerable to storms and frontal systems that move eastward across the continent and pass through or in proximity to New York State. When combined with poor soil permeability, steep slopes, and narrow valleys of the Catskills, these intense bouts of rainfall quickly saturate the ground, leading to increased runoff, erosion, and dangerous flooding. With numerous existing structures in flood zones, structural damage and serious risks to safety are all-too-frequent occurrences in the Town of Windham.

The first recorded loss of life due to flooding in Windham occurred in 1893, as a crowd gathered on the Church Street Bridge to watch the flooding of the Batavia Kill. When a fallen tree floating in floodwaters struck the bridge, the impact swept the bridge away, carrying the onlookers with it and killing one woman. Additional lives have been lost to flooding through the years including the Town's fire chief in 1960, and another resident in 2011, during Hurricane Irene.

Despite existing successful regulatory requirements and multiple flood control structures, all available studies and analysis point to flooding as a critical issue that will continue to cause significant devastation, threaten human life, and cause damage to local and regional assets. Additionally, expected future floods are likely to cause secondary hazards, such as ground failure and water quality and supply concerns, evacuations, utility deterioration and failure, transportation problems, as well as numerous public health concerns.

PROPERTY, INFRASTRUCTURE, FACILITY DAMAGE

The Town's proximity to the Batavia Kill not only poses serious safety risks for residents, but also places numerous homes, businesses, and essential infrastructure systems at significant risk for flood-related damages.

In addition to causing the tragic loss of a life in Windham, Hurricane Irene was responsible for 4-6 feet of floodwater that destroyed or significantly damaged numerous homes and businesses, and severely

compromised infrastructure systems. These included road closures, bridge and culvert damage, and the loss of power for up to two weeks. Undersized culverts and bridges throughout Town failed to accommodate the floodwaters that inundated neighboring properties and cut off transportation access.



Clean-up after the storms was an enormous effort. Photo of debris is courtesy of Bridget Pelham.

The areas in Town at the greatest risk for future flood damage can be identified, in part, by assessing the locations of the most severe property and infrastructure damage that occurred during Hurricane Irene and Tropical Storm Lee.

During these two storm events, major impacts were suffered along Route 56 and Route 40 in Maplecrest; on Route 40, between Hensonville and Maplecrest; on Route 296, 65a and 65 in Hensonville; and on Route 23 in downtown Windham. In the Hamlet of Maplecrest, culverts, roadways, and properties were damaged along Route 56, stranding residents and destroying homes. In that location, flooding of the Batavia Kill led to severe bank erosion and negative stream impacts.

During Hurricane Irene, in the Hamlet of Hensonville, the Route 65 Bridge became impassible; road inundation cut off one of few primary access routes into the Hamlet. Homes and businesses along Route 296, Route 40, Route 65, and Route 65a were severely damaged. Along Route 40, homes were knocked from their foundations, resulting in the death of one resident. Windham Town Hall along Route 296 was flooded and lost electric and phone service.



As a result, emergency management had to be moved to the Waste Water Treatment Plant on South Street and other essential services including Windham Hose Company #1 and the Windham Police were completely displaced. Additional functions of Town Hall including a senior center, and important document storage areas were damaged or destroyed.



Excessive winds and rising waters inflicted significant damage to homes across Windham. Photo is courtesy of Jeff Luckey.

The most severe damage in the Hamlet of Windham occurred primarily along Main Street (Route 23) and South Street. Several feet of water from the Batavia Kill and its tributary, Mad Brook, flooded Main Street, damaging and destroying homes, businesses, and public facilities. Homes and businesses near the confluence of Mad Brook and the Batavia Kill suffered extreme damage, as water overwhelmed the retaining wall and the Main Street Bridge.

The Windham-Ashland-Jewett Central School and many buildings near the west end of Main Street also suffered severe property damage. Along Windham Mountain, there was a washed out, 8-foot-diameter culvert at the base of the ski center, which crosses under South Street. This washout dramatically limited access to, and egress from, Windham Mountain, thereby threatening public safety and mobility. Evidence suggests that these same areas are at risk for future flood damage; the Town should consider implementing proactive strategies to ensure the protection of homes and critical assets, and the uninterrupted provision of essential services.

Within Town limits, 51 people and 36 homes with an estimated replacement value of \$6,067,000 are within the 100-year floodplain. An additional \$8,949,000 in replacement value for commercial, industrial, agricultural, religious, government, and educational buildings are located within the 100-year floodplain, including local critical facilities. During a future 1% and 0.2% flood event, these precarious conditions could result in residential building stock loss of over \$7.5 million and \$8.1 million in home damages, respectively. In addition, a future flood event could cause considerable losses to commercial buildings, community facilities, agricultural operations, religious buildings, and government buildings. This represents potential total building stock damage of over \$15 million for a 1% flood event, and over \$17 million for a 0.2% flood event.

FEMA's Hazards US-Multi-Hazard Risk Assessment Model (HAZUS-MH) estimates that for the 1% annual chance event, 156 people may be displaced and 25 people may seek short-term sheltering. This represents 9.4% and 1.5% of the Town's population, respectively. For the 0.2% annual chance event, an estimated 177 people may be displaced, and 28 people may seek short-term sheltering, representing 10.7% and 1.7% of the Town's population, respectively.

It is important to note that these are estimates for a future 1% and 0.2% storm event, which may fail to capture the true impact and threat from a storm the size of Hurricane Irene, which far exceeded the 0.2% event.

ECONOMIC LOSS

If not already a serious enough threat, future floods also stand to damage local and regional economies, as well. Business interruption, losses to the local tax base, crop loss, as well as intangible fears all negatively impact the economic potential of the Town of Windham. Following Hurricane Irene and Tropical Storm Lee, businesses were closed for an extended period, due to flood damage; three businesses that were severely damaged failed to re-open, further limiting the available amenities in the Town and reducing the tax base.



LACK OF BACK-UP POWER

Many critical local facilities, including Windham Town Hall, the Town's well water pump stations, the local bus garage, the Centre Church property (that serves as a community center), and the Town highway garage are not equipped with emergency power generation. Further, the Town does not have dedicated bulk propane storage; this creates potentially dangerous conditions and the loss of essential services during disasters. In addition, the three local gas stations also lack emergency power capability, contributing to further limitations for evacuations and increased risk for stranded or isolated residents.

ISOLATED POPULATION

Both physical and communications-related isolation for residents of Windham are major concerns for future health and resiliency. Repetitive flooding, failing infrastructure, and limited access routes can cause significant potential safety risks for local residents during major flood events. During Hurricane Irene, residents throughout the Town became dangerously isolated as transportation routes became impassable. The Hamlet of Maplecrest, in particular, was completely isolated because the primary access route washed out. This prevented evacuation and limited assistance for residents. Limited transportation redundancy and the potential for physical isolation throughout Town is made increasingly dangerous by the lack of Internet and cellular telephone phone service in Windham, leaving residents without access to emergency information or the ability to reach out for assistance.

NATURAL SYSTEM IMPACTS

In addition to threatening human life and the built environment, severe flood events have also negatively impacted natural systems, creating stream instability along the Batavia Kill and increasing the rate of erosion. The Batavia Kill and its tributaries suffered extensive damage during Hurricane Irene and Tropical Storm Lee. The areas that were the most severely damaged provide an indication of where the greatest future risk of flooding impacts may exist.



Pictured here is an unimaginable scene in Windham following the storms. Photo of house colliding with another is courtesy of Bridget Pelham.

During the major storms of 2011, bank scouring and erosion occurred along numerous stretches of the waterways, including: along Route 65, northeast of Hensonville Hamlet; Route 40 in Hensonville Hamlet; Route 56, between Hensonville Hamlet and Maplecrest Hamlet; along the north bank of the Batavia Kill, from Church Street to the Windham-Ashland-Jewett Central School in Windham Hamlet; and along the Batavia Kill to the east of Windham Hamlet. In addition, a dry ditch draining about 30 acres of land underwent severe erosion and was deeply scoured approximately 30 feet up the channel.

Moreover, as major floodwaters overwhelmed stormwater systems, the additional runoff that flowed into the stream not only increased erosion even further, but also carried additional sediment contaminated with chemicals into the stream network.

A number of areas along the Batavia Kill in the Town of Windham have vegetation-related issues, including invasive species and lack of riparian buffers. Areas of native plant species along the banks of waterways, known as riparian buffers, provide numerous ecological, hydrological, and flood-safety benefits for communities by stabilizing streambanks, filtering pollutants, and slowing storm runoff entering the stream. In some areas of Windham, non-native or invasive species (including Japanese Knotweed) out-compete native species and reduce the effectiveness of the vegetated areas. Japanese Knotweed, in particular, has compact and shallow root systems that are very ineffective



at embankment stabilization and at reducing flood velocities.

Particular areas of concern, as documented in the 2006 Batavia Kill Stream Management Plan, include:

- Batavia Kill Headwaters (Big Hollow Headwaters to Hensonville):
 - Poor riparian conditions are present in the reach at the Milton MacGlashen property as well as the restoration project site running upstream from Peck Road Bridge to above the Leon MacGlashen farm.
 - A short reach just above the C.D. Lane Lake also exhibits poor riparian conditions.
- Middle Watershed (Greene County Route 67 in Hensonville to the South Street Bridge):
 - The riparian condition is highly variable. Some sections are characterized by an affective buffer on both sides of the stream and other sections are highly deficient in riparian structure.
 - In the stream reach from Greene County Route 67 to the State Route 296 Bridge, instability of the stream system has exceeded the ability of the riparian buffer to prevent streambank erosion and significant areas of mature buffer have been damaged or lost.
 - Channel migration in this reach has resulted in over-widening of the stream and loss of riparian function.
 - In isolated areas such as at the country club and GNH Lumber, no buffer exists.
- Lower Watershed (South Street Bridge to Schoharie Creek):
 - Riparian buffers are poorer in quality and in many cases absent.
 - Over 50% of the buffer is inadequate.
 - Agricultural operations, road construction, and other human activities, as well as stream instability processes, have significantly degraded the riparian zone and there are numerous areas with streambank

erosion and lack of shade.

The heavy flows and additional erosion resulting from insufficient vegetation conditions creates additional potential for property loss among landowners, along with expensive road maintenances for highway crews, and water quality and habitat degradation.

STREAM PROJECT CHALLENGES

The Town of Windham faces several challenges in strengthening the stream banks of the Batavia Kill. Developing a solution requires a balance among the often-different goals and preferences of the stream’s diverse stakeholders, such as: property owners concerned with erosion; outdoor recreation users; public officials concerned with infrastructure safety; and those who use the water supply for making snow, irrigation, or drinking water.

To advance any stream restoration and stabilization projects, the Town of Windham would have to:

- Secure approvals from the appropriate State agencies;
- Coordinate with land owners whose primary residences are elsewhere;
- Gain approvals from private property owners to alter their land; and
- Address stream instability, streambank erosion, and other related issues, without causing additional problems upstream or downstream.

Economic and Community Development

The Town of Windham is both blessed and challenged by its scenic and isolated environment. While the residents benefit from the rich natural resources of the surrounding area, both for recreation and economic growth, the Town’s remoteness, tourism focus, and environmental conditions also create numerous economic and community-development challenges. Addressing these challenges could help establish a four-season economy and support the Town’s ability to fully recover from past storms and become more

economically resilient during any future storms.

SEASONAL SHIFTS, LIMITED AMENITIES, AND SERVICES

The Town’s hamlets are commercial and tourism hubs that provide shopping, recreation, and cultural opportunities for residents and visitors. However, these amenities are currently limited in number and diversity, partially due to the seasonal nature of the economy. Balancing commercial growth with seasonal population and revenue fluctuations is a considerable challenge facing the Town of Windham. During peak seasons, there are insufficient amenities, such as hotels and stores, to maximize the economic potential of the tourism industry. However, during off-peak seasons, additional hotels and businesses may struggle to survive through the patronage of only the relatively small, year-round population.

Despite considerable tourism potential, commercial uses contribute only 2.3% of the Town’s total land area. Currently, there are few modern hotel accommodations, and limited shopping and entertainment opportunities outside of restaurants and bars. Without sufficient options, many residents and tourists often elect to travel 30 minutes to neighboring Catskill communities for additional commercial amenities. This results in lost



While Windham is home to many quaint shops, such as the one pictured here, seasonal tourism challenges many retail establishments’ ability to remain open year-round and to provide continuous job opportunities to workers. Photo is courtesy of Raymond Adams.

potential income for local businesses.

To continue its role as a tourism destination and to improve quality of life for full-time residents, the Town of Windham must establish a year-round economy to enable downtown areas to grow as community and economic focal points. A more consistent, year-round visitor and revenue pattern would go far to spur the development of additional shops, services, and restaurants. In such an economic climate, recreational opportunities, community gatherings, and events held to advance a greater sense community are more likely to flourish. Growth for its own sake, however, is not necessarily desirable; additional commercial growth should carefully conform to local character and markets to ensure the Town’s character and scale.

UNDER-UTILIZED RECREATIONAL POTENTIAL

Despite a thriving recreation and tourism industry, Windham is not yet fully leveraging the year-round tourism potential of local and regional assets. While outdoor recreation and enjoyment of local assets is an important part of everyday life for many Windham residents, multiple historically important recreational amenities have been particularly under-utilized in recent years. This would include the once-popular C.D. Lane Park and Camp Oh-Neh-Tah at Silver Lake.



The image here is the picturesque covered bridge at Camp Oh-Neh-Tah at Silver Lake. Photo is courtesy of Raymond Adams.



Following the extensive flooding that resulted in vegetation and infrastructure damage during Hurricane Irene, the lake at C.D. Lane Park (once a popular recreation and community-gathering asset) is unused.

Camp Oh-Neh-Tah and Silver Lake, which were once important and much-loved outdoor escapes for underprivileged girls from New York City, have also become largely unused in recent years. In addition, numerous swimming pools, a bowling alley, and other recreational assets have been lost over the years.

The loss or under-utilization of these and other recreation assets hinders efforts to establish a year-round economy, and exacerbates economic challenges associated with seasonal population and workforce fluctuations. These assets and related challenges limit immediate and long-term economic recovery and resiliency.

Further limiting efforts to build a year-round local economy is the lack of a coordinated marketing and branding initiative. In addition to better utilization of existing and creation of new recreation assets, there is a need for local way-finding guides. A local branding initiative may help to attract visitors and enable them to better access a full range of outdoor recreational opportunities. Potential initiatives include an improved on-line presence through a new Town website, coordinated signage and way-finding guides, development of marketing materials, and community events that increase foot traffic.

INSUFFICIENT COMMUNICATIONS CAPABILITY

Cellular telephone and Internet service in Windham can be unreliable. As cell and high-speed Internet access become increasingly important for business operations and quality of life, the lack of reliable telecommunications and Internet service in the Town can discourage entrepreneurs, business owners, and even tourists. In addition to constricting economic growth, this lack of communications capability also creates a public health and safety concern.



A local branding initiative, complemented by way-finding guides, can help to attract additional visitors to local amenities. Photo of Welcome to Windham sign is courtesy of Raymond Adams.

Unreliable communications infrastructure has public health and safety concerns. Without reliable, modern communications, first responders are limited in their ability to disseminate emergency information, and stranded or imperiled residents are unable to connect to responders or loved ones.

HOUSING AFFORDABILITY

According to the 2012 Five-Year American Community Survey, the median home value in the Town of Windham is \$240,000. This figure represents a 100% increase in value since 1990 (\$117,400), and is considerably higher than the median home value for the rest of Greene County (\$179,700). With almost 35% of homes valued at more than \$300,000 and a median rent of \$810 per month, it becomes increasingly difficult for young families and locally employed, first-time homebuyers to afford housing in Windham. These rising home prices and rents have resulted in 33.7% of homeowners with a mortgage and an alarming 44.8% of renters who are considered “cost-burdened” by HUD, because they spend more than 30% of their income on housing.



Nearly half of renters and more than a third of homeowners pay so much of their income for housing that they are officially considered “burdened,” meaning that the essential costs of life may be difficult to afford.

INSUFFICIENT WORKFORCE

Currently, multiple interrelated conditions contribute to an insufficient number of qualified and reliable workers to support growth in the local economy. In addition to the housing affordability challenges that deter young families and workers, the ebb and flow of the seasonal economy further exacerbates this issue. While the outdoor recreation, tourism attractions, and second homeowner population provides essential patrons for local businesses, it also establishes a seasonal economy with resulting shortages in the workforce and revenue during off-peak seasons. In addition, an aging population, combined with a trending “brain drain” among educated young people who choose to leave the area, create serious fiscal and logistical challenges for local businesses. Of particular note is the quickly shrinking class size at the local school. The student population has shrunk to approximately 380 total students, K-12, which is a sign of a significantly reduced potential for a future local workforce and homebuyers.

These staffing and workforce challenges can hinder immediate and long-term economic recovery and resilience. Because of the large seasonal fluctuations in Windham, a future disaster during peak season could have severe economic consequences. If impacted business owners are unable to find adequate staffing following such a disaster, the loss of peak-season revenue and insufficient workforce could prevent a business from re-opening.

DEVELOPMENT CHALLENGES

Steep terrain, difficult soils, and the presence of significant areas of New York State- and New York City-owned land limits potential development areas in the Town.

Lack of Medical and Senior Care Facilities

With an increasingly aging population, physical isolation, and limited communications capability, the Town of Windham is increasingly in need of access to quality healthcare and senior care facilities. Currently, there is only one doctor in Town, and the nearest hospital is about 35 miles away. Also, there is a waiting list for entry into the senior living facility in Town, which results in both protracted waiting periods, and forces some to seek accommodation away from the Town they call home. Access to healthcare is essential during and



Steep terrain and difficult soils often limit potential development areas in the Town. Photo of hills is courtesy of Raymond Adams.



following a disaster event for the health and well-being of all residents.

Community Vision

Through collaborative discussions, stakeholder engagement, reviews of existing plans and studies, and a focused intention toward holistic community recovery,

Vision Statement

“The Town of Windham will protect and leverage rich natural and cultural resources to become a world-class, four-seasons destination, and an unwavering example of community resolve, sustainability, and economic growth.

The Town will increase prosperity, vitality, and long-term growth by addressing critical issues, building strategic alliances, and focusing on improving quality of life, while sustaining Windham’s unique rural and historic character.

Furthermore, we recognize our community’s strength of the human spirit and ongoing neighbor-helping-neighbor capacity, and we are dedicated to protecting the health and welfare of each of our residents.”

the Committee adopted the following Vision Statement to guide the recovery and resiliency effort for this Town of Windham NYRCR Plan.

Relationship to Regional Plans

The Committee recognizes the importance of identifying issues and challenges that transcend municipal boundaries, and to working collaboratively with neighboring communities to gain greater regional resiliency and prosperity. To that end, the Town has utilized opportunities for regional collaboration throughout this NYRCR Plan process, including:

- Leveraging existing regional plans and studies;

- Encouraging stakeholder input from neighboring communities;
- Identifying projects with regional benefits;
- Exploring opportunities to leverage multiple funding sources;
- Protecting assets with regional significance; and
- Fostering inter-agency cooperation to address any potential hurdles to project implementation.

The Town of Windham has participated in the development of several plans and studies in recent years that have guided the growth and development of select aspects of the Town. The majority of these plans were prepared by outside agencies and generally approach conditions, issues, and recommendations at the regional level. However, several plans provide key local information. These include the Greene County Hazard Mitigation Plan (2009), the Batavia Kill Stream Management Plan (2006), and the Town of Windham Local Flood Analysis (LFA) (2014). The Committee worked with Greene County Soil and Water Conservation District officials, who are responsible for the Town of Windham LFA, to collaborate, where appropriate, to inform analysis and project identification.

The Committee has reviewed and incorporated existing documents into the planning process to build on relevant data, methodologies, stakeholder engagement, and consensus to inform the development of this Town of Windham NYRCR Plan.

As the planning process proceeded, key gaps in analysis and information were identified and potential solutions were formulated as part of selecting projects and initiatives for implementation through the NYRCR Program.

The content and recommendations of this document are intended to serve as the basis for additional local planning efforts in the future.

REVIEW OF EXISTING PLANS

The Town of Windham contributed to several regional

studies and plans in recent years that aim to foster collaborative initiatives that enhance quality of life and all aspects of economic, community, and environmental health. The development of this NYRCR Plan included a review of these and other prior regional planning efforts to identify common goals, emerging issues, and opportunities for collaboration. This review also helped

to identify regional key economic drivers, housing stock characteristics, and demographic trends that would influence regional community development. The Committee drew on these prior planning efforts to identify potential projects that would be of regional significance, benefiting the Town of Windham, as well the region. Table 1.6 summarizes the existing plans

TABLE 1.6 – REVIEW OF EXISTING PLANS AND STUDIES

Resource	Relevance	Key Components for Town of Windham NYRCR Planning Process
Town of Windham Comprehensive Plan – Draft (2000)	<ul style="list-style-type: none"> Establishes a vision for the future growth, development, and protection 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. 	<ul style="list-style-type: none"> Community vision Detailed community/demographic/economic data Goals and recommendations for all areas of community and economic development Critical issues Past, current, and recommended projects/initiatives
Greene County Comprehensive Economic Development Strategy (2007)	<ul style="list-style-type: none"> Provides a regional economic development plan for Greene County, New York. Outlines strategies for economic growth as well as hamlet revitalization by capitalizing on the region’s assets including natural resource-based recreation opportunities and associated tourism potential. 	<ul style="list-style-type: none"> Inventory of existing conditions and key trends County vision Identified goals Priority projects for economic development
Greene County Hazard Mitigation Plan (2009)	<ul style="list-style-type: none"> Provides County and local strategies and recommended actions for mitigating all potential hazards to the Town. Provides detailed information on past and current flood issues, stream and hydrological conditions, past and current flood initiatives, and recommendations for additional mitigation actions to address future disaster events. 	<ul style="list-style-type: none"> Detailed past flood information Local facility information Hazard vulnerabilities and flood-related issues Assessed values and potential losses Past and ongoing mitigation projects Regional collaborations and initiatives Proposed mitigation initiatives
Batavia Kill Stream Management Plan (2006)	<ul style="list-style-type: none"> Provides local and regional guidance on stream and watershed management to preserve and improve water quality, protect environmental resources, and reduce community flood risk. Provides details on stream and hydrological characteristics, conditions, processes, local issues, and concerns related to stream management as well as recommendations for improvement and ongoing initiatives. 	<ul style="list-style-type: none"> Summaries of local issues and concerns collected through scientific analysis and stakeholder outreach Existing/ongoing stream restoration projects Detailed stream management recommendations



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

Resource	Relevance	Key Components for Town of Windham NYRCR Planning Process
Greene County Comprehensive Emergency Management Plan (2007)	<ul style="list-style-type: none"> Establishes a framework for reducing risk from, responding to, and recovering from emergencies and disasters in the County, including in the Town of Windham. Outlines the roles and responsibilities of County agencies in carrying out the plan, and details the duties and responsibilities of staff serving in the County Emergency Operations Center (EOC). 	<ul style="list-style-type: none"> Vulnerability assessment Capability analysis Restoration of public services Recovery and redevelopment processes and timelines Listing of available assistance programs
Greene County Agricultural Development and Farmland Protection Plan (2002)	<ul style="list-style-type: none"> Provides additional information on County and local economic conditions, land-use challenges and trends, strategies for managing growth, and farmland protection 	<ul style="list-style-type: none"> Demographic and economic data, trends, and conditions Agricultural and tourism growth initiatives Regional business collaborative initiatives
Greene County Housing Action Plan (2008)	<ul style="list-style-type: none"> Provides an assessment of current housing conditions in Greene County. Identifies existing gaps in County housing stock and recommends actions to ensure adequate housing for all residents to address these gaps and unmet housing needs. 	<ul style="list-style-type: none"> Housing market analysis Housing needs assessment Critical issues related to housing Fiscal impact analysis Implementation strategy
Town of Windham Local Flood Analysis (2014)	<ul style="list-style-type: none"> Examines conditions causing or contributing to flooding in the Town of Windham. Evaluates potential flood mitigation opportunities in the Hamlets of Windham, Hensonville, and Maplecrest. 	<ul style="list-style-type: none"> Past flood event and damage information Flood analysis Evaluation of potential mitigation improvements

and studies reviewed, and incorporated them into this planning process, along with an indication of the key components that will help drive implementation of this Town of Windham NYRCR Plan.

PROJECTS WITH REGIONAL SIGNIFICANCE

Throughout the identification and development of projects, the Committee sought opportunities to affect change on a regional level, while simultaneously exploring potential cost reductions through collaboration.

Infrastructure projects that would benefit the Town, neighboring communities, 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 early in the development of this NYRCR Plan that it is common for one community to contain critical economic, cultural, or social assets that have significance for neighboring communities and the region. To that end, the Committee ensured that projects aiming to protect these assets or to enhance their positive impact were identified.

INTERAGENCY COOPERATION

As the Committee identified its list of projects, it consistently reached out to regional organizations. This included entities such as the Greene County Planning Office, watershed councils, and regional economic development agencies. Discussions focused on project ideas and collaborative opportunities, and identified any required regulatory approval processes. Critically important was the assessment of available resources that regional entities provided to the Committee throughout the planning process.



Section 2

Assessment
of Risk
and Needs



Photo is courtesy of Raymond Adams.



Section 2: Assessment of Risk and Needs

Overview

A primary goal of the Town of Windham NY Rising Community Reconstruction (NYRCR) Plan is to ensure that both reconstructed assets and any proposed, post-storm, new construction projects are more resilient during future storm events. The Town of Windham NYRCR Planning Committee (Committee) endeavored to accurately identify, catalog, and analyze economic, health and social services, housing, infrastructure, and natural and cultural resources in the defined Town of Windham NYRCR Plan Area (Plan Area).

The Committee used an open, public process to develop a comprehensive inventory of assets within the Town of Windham (Town), with support of the Consultant Team and the public. This occurred through a series of four Public Engagement Events that were held at strategic points of the Town of Windham NYRCR Plan (Plan) development. Additional public comments, garnered at regular, bi-weekly Committee Meetings, also helped to advance and corroborate a compilation of sufficient and accurate information to assess risks to the Town's assets under current and future conditions.

Inventory Process

DATA COLLECTION

To kick off this assessment process, the Committee, with support from the Consultant Team, prepared a preliminary inventory of assets through stakeholder outreach, Committee deliberations, and review of datasets. For purposes of this Town of Windham NYRCR Plan, assets are considered to be locations, features,

infrastructure, and development located within the Plan Area, whose loss or impairment due to flooding and storm events would compromise any essential social, economic, or environmental functions and/or critical facilities in the Town.

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. Additional information supporting the Committee's efforts was found in the Greene County Hazard Mitigation Plan (2009). Data was also gathered from Committee members during scheduled meetings and via a community map portal described herein.

A Collaborative Approach to Public Engagement

Geographic Information Systems (GIS) can be a vital tool for communities undergoing an inventory of structures, natural features, or other assets associated with a physical location. However, GIS services are less available to most suburban and rural areas of New York State than to their urban counterparts. While not recorded in any discernible geographic format, the wealth of local knowledge possessed by suburban and rural residents could contribute to this inventory. NYS DOS and the Consultant Team used GIS technology to capture, analyze, and present information to the Committee in support of their deliberations.



The Town of Windham NYRCR Committee and Consultant Team deliberate issues at regular meetings. Photo of Committee is courtesy of Raymond Adams.

COMMUNITY MAP PORTAL

Local knowledge of assets, gathered through bi-monthly Committee Meetings and Public Engagement Events, was combined with additional asset information that enabled development of an interactive GIS web-mapping portal. This tool was used to display and modify details and locations of all identified assets, and provided additional information developed through the risk assessment process for each asset.

Asset Classification

Identified assets were reviewed and classified into five categories, in accordance with the Federal Emergency Management Agency's (FEMA) National Disaster Recovery Framework (NDRF). These categories, along with examples, are described in Table 2.1.

Assets were also classified as either "critical" or "non-critical" facilities. Critical facilities, as described by FEMA, are essential to the health and welfare of the whole population, and are especially important following hazard events. Critical facilities may include emergency service facilities, such as hospitals and other

medical facilities, jails and juvenile detention centers, police and fire stations, emergency operations centers, public works facilities, evacuation shelters, schools, and other uses that house individuals with functional and access needs.

A non-FEMA-designated critical facility may have been deemed critical by the Committee if the asset is locally significant. This includes assets that may be considered critical by other Federal agencies, New York State (State) and local officials, and/or by the Committee and members of the local public. Together, these two "tiers" of critical assets provided the Committee with a better picture of overall risk in the Plan Area, which was defined by the geographic boundaries of the Town of Windham.

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 in order to identify assets that are at-risk and to what degree. The three categories of risk area 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 risk area categories reflect the frequency and likelihood of flood inundation. In descending order of risk magnitude, they are "Extreme," "High," and "Moderate." Figure 2.1 shows the risk areas in the Town of Windham NYRCR Plan Area.

To achieve a more accurate determination of frequency and likelihood of flood inundation throughout the Plan Area, the analysis was expanded beyond identified FEMA FHAs to include additional areas of "Moderate" risk associated with historically damaged areas that were identified by the Committee. Moreover, the analysis also included 1,000-foot radial buffers surrounding locations previously damaged by flooding.

TABLE 2.1 – ASSET CATEGORIES

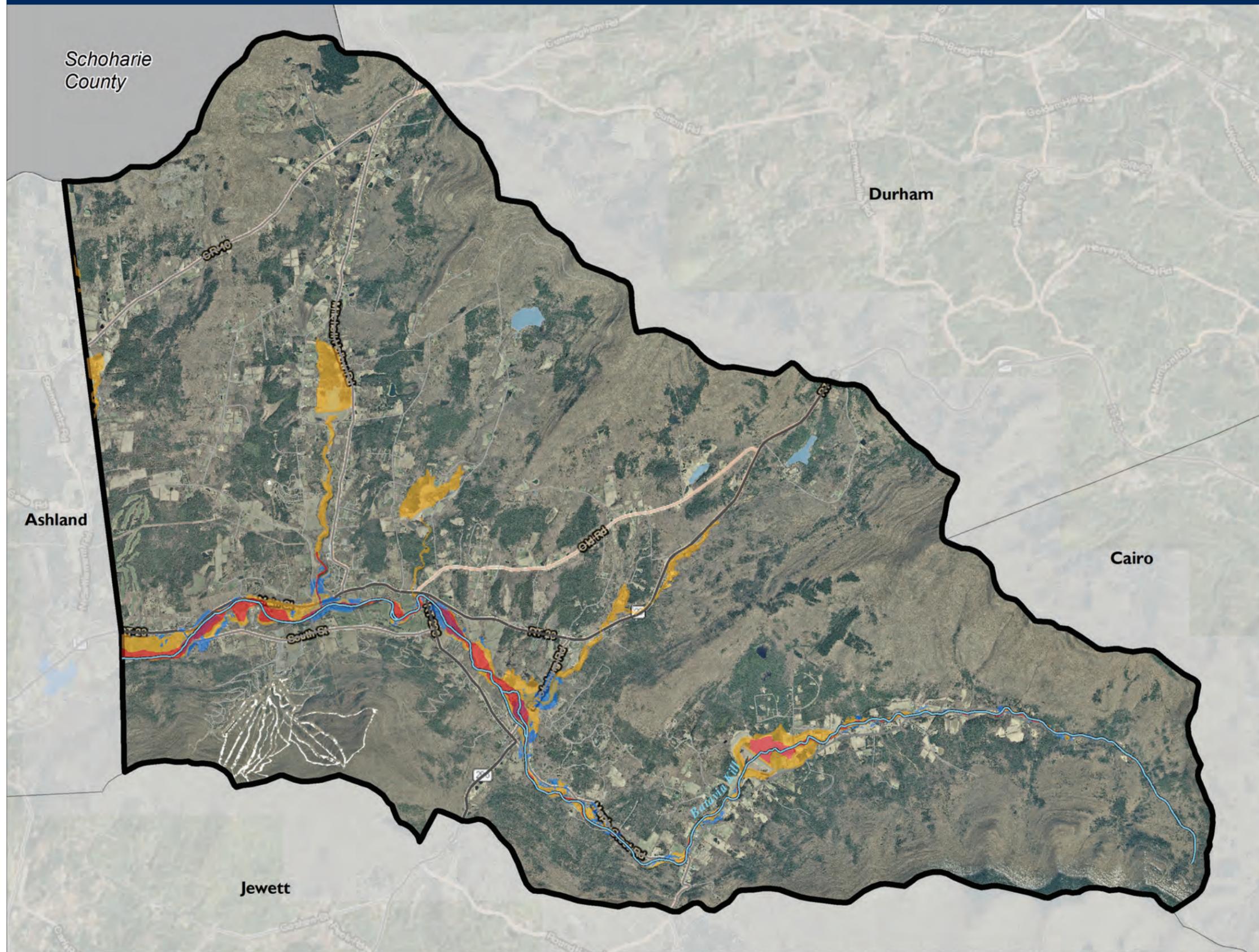
Asset Class	Examples
Community Planning and Capacity Building*	This RSF comprises plans, management functions, and recovery activities, not physical assets.
Economic	Office buildings, business and industrial parks, manufacturing facilities, warehouses, storage facilities, groceries, restaurants, banks, 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 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



The Town of Windham NYRCR Committee and Consultant Team deliberate issues at regular meetings. Photo of sign listing Windham Community Events is courtesy of Jeff Luckey.

NYRCR: Town of Windham, Greene County
FIGURE 2.1 – RISK AREA MAP



Legend

 Town of Windham

 Batavia Kill

Risk Area

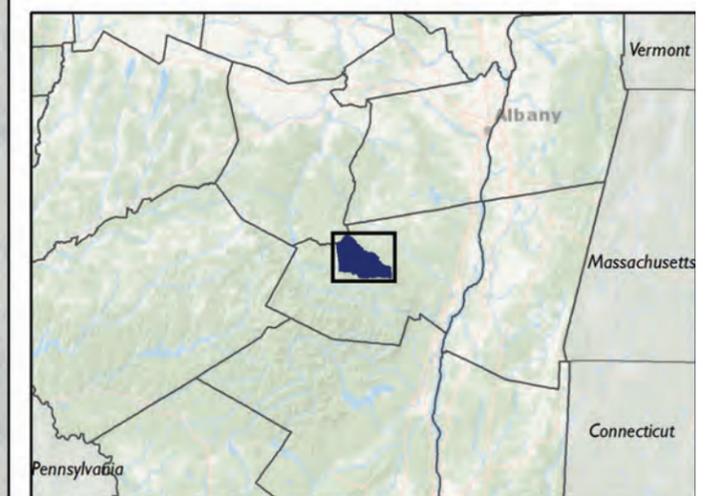
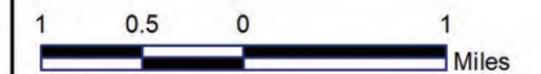
 Extreme

 High

 Moderate



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





Description of Community Assets

The following describes the Town’s identified assets, organized by the NRDF’s Recovery Support Functions (RSF), and provides additional information regarding each group of assets. Figures 2.3 through 2.6 show locations of assets by RSF within the NYRCR Plan Area, and the extent of the defined risk area.

Economic Assets

The highest concentrations of economic assets are clustered in the Town’s three hamlets, particularly along Main Street in the Hamlets of Windham and Hensonville. These assets consist of numerous, locally owned businesses that help to define the community’s character, to increase quality of life, and to provide unique shopping experiences for visitors. Moreover, many of these assets support Town residents during disaster situations by furnishing supplies, food, and other essential goods and services. These income-

generating economic assets also contribute to the tax base on which the Town’s residents rely for a variety of public services and utilities. Hurricane Irene’s and Tropical Storm Lee’s negative impacts on these economic assets included physical damage, interruptions of business, lost revenues, and personal losses suffered by employees. Security of these economic assets and protection during future storms is critical to increasing the Town’s future resiliency.

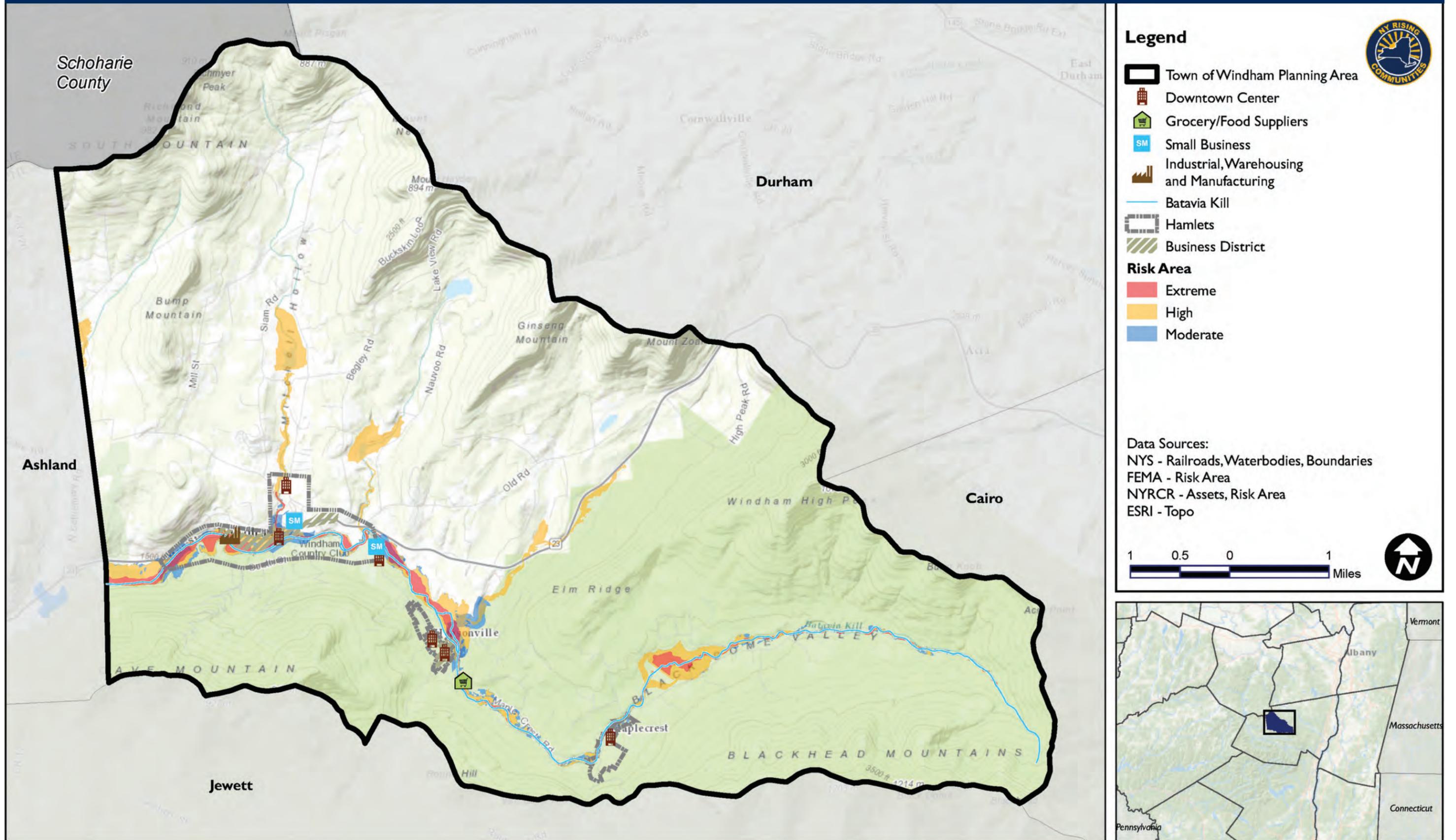
The Committee recognized the importance of a dual focus to ensure resiliency of the local economy and to nurture the necessary environment for development of a more robust, four-season economy.

The Committee identified five assets within this category, including the downtown areas of each of the Town’s three hamlets. These downtown areas are included as individual assets, which include numerous important local businesses. A full list of these businesses in the downtown and hamlet area assets is provided in Section 5: Additional Materials of this NYRCR Plan. Figure 2.2 is a map of the Town’s Economic Assets.



This view of downtown shops in Windham is indicative of the local architectural charm. Photo is courtesy of Raymond Adams.

NYRCR: Town of Windham, Greene County
FIGURE 2.2 – ECONOMIC ASSETS





Pictured here is Windham Hose Company #1. Photo is courtesy of Tetra Tech, Inc.

Health and Social Service Assets

This category includes assets that serve a variety of public functions, from health treatment facilities to general-purpose shelters in public schools, and from post offices to town halls. During a flood

event, these facilities could serve as critical disaster response and recovery centers. Identification of these assets is essential to future disaster management and preparedness.

Parts of the Town were severely impacted from flooding that hindered and often prevented access by some residents to extremely limited health and social services. Some residents and business owners were unable to access health and social services due to impassable and damaged roads and bridges.

Twelve facilities in this category were identified, including Windham-Ashland-Jewett Central School, which serves as an emergency shelter; and local fire departments, whose members responded valiantly to address effects of Hurricane Irene and Tropical Storm Lee.

Figure 2.3 is a map of the Town’s Health and Social Service Assets.



Pictured here is the Windham-Ashland-Jewett Central School. Photo is courtesy of Tetra Tech, Inc.



Infrastructure Assets

Infrastructure assets include highways, bridges, culverts, water supply, stormwater, wastewater, water control facilities, and solid waste management.

State Route 23, the major highway traversing the Town, is the primary transportation infrastructure identified by the Committee. During emergencies and disasters, this highway is critical for evacuating citizens and responding resources. Other infrastructure assets identified include water and wastewater facilities, and a number of flood control sites.

During past flood events, many of these assets, including road segments, culverts, and flood control structures, have undergone significant damage. This has resulted in increased safety risks, decreased mobility, and considerable property damage. The Committee has listed 40 features and facilities in this category.

Figure 2.4 is a map of the Town's Infrastructure Assets.

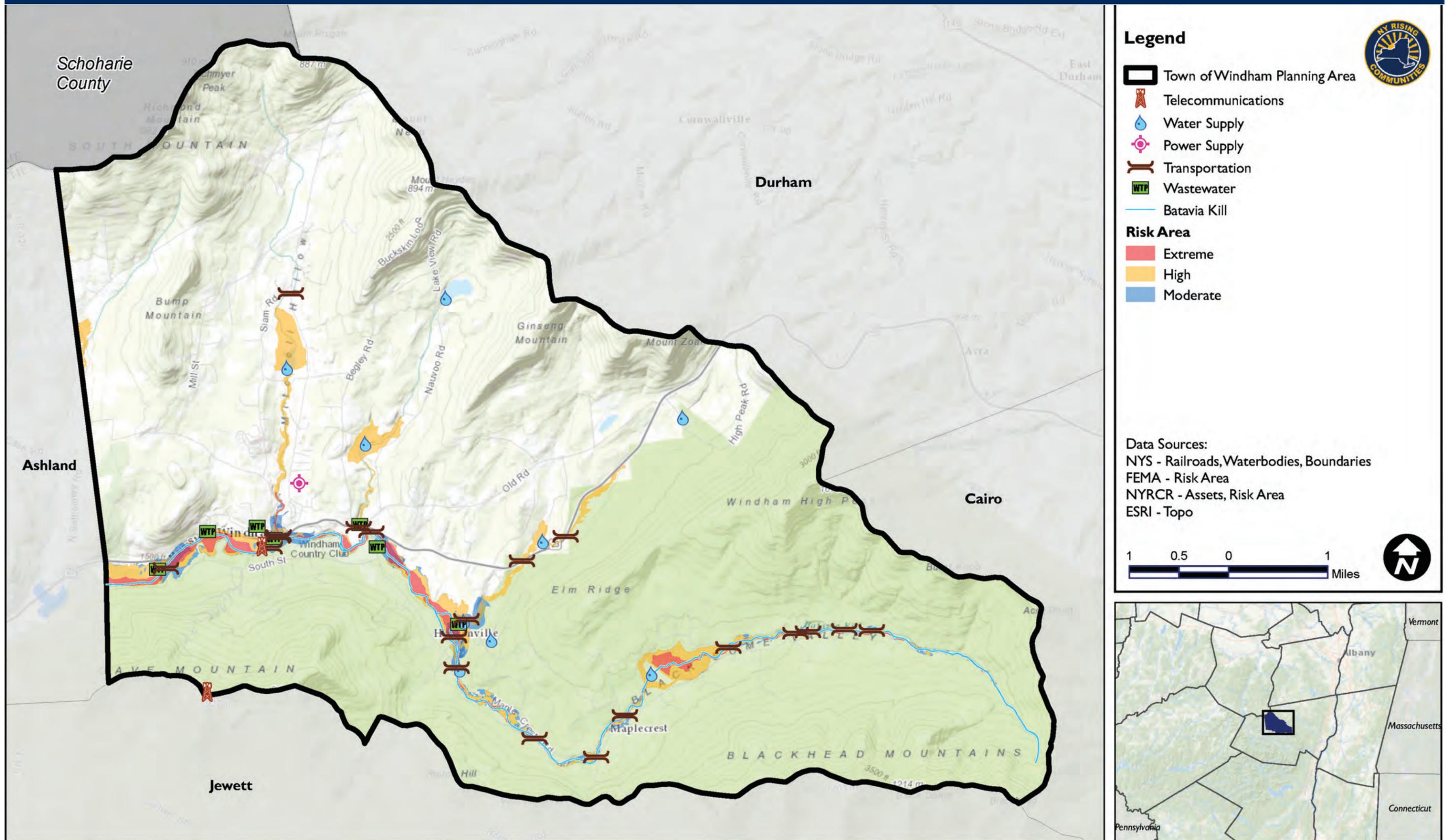


Debris deposition is apparent at this bridge in Windham. Photo is courtesy of Raymond Adams.



Pictured here is a channelized section of a Batavia Kill tributary near Mill Street in Windham. Photo is courtesy of Raymond Adams.

NYRCR: Town of Windham, Greene County
FIGURE 2.4 – INFRASTRUCTURE ASSETS





Natural and Cultural Resource Assets

The Town has an abundance of natural resource assets that are essential to the character of the Town of Windham, and are significant drivers of the local and regional economies. This asset category includes natural and cultural resources such as natural habitats, wetlands and marshes, recreation facilities, parks, public access, open spaces, agricultural areas, religious institutions, libraries, museums, historic landmarks, and performing arts venues.

Natural and cultural resources are important to the quality of life within the Town, and some features help mitigate some impacts of flooding during specific scenarios. The Committee identified 22 assets in this category, recognizing the importance of maintaining natural features to limit risk, and of better utilizing key natural and cultural assets.

Figure 2.5 is a map of the Town's Natural and Cultural Resource Assets.

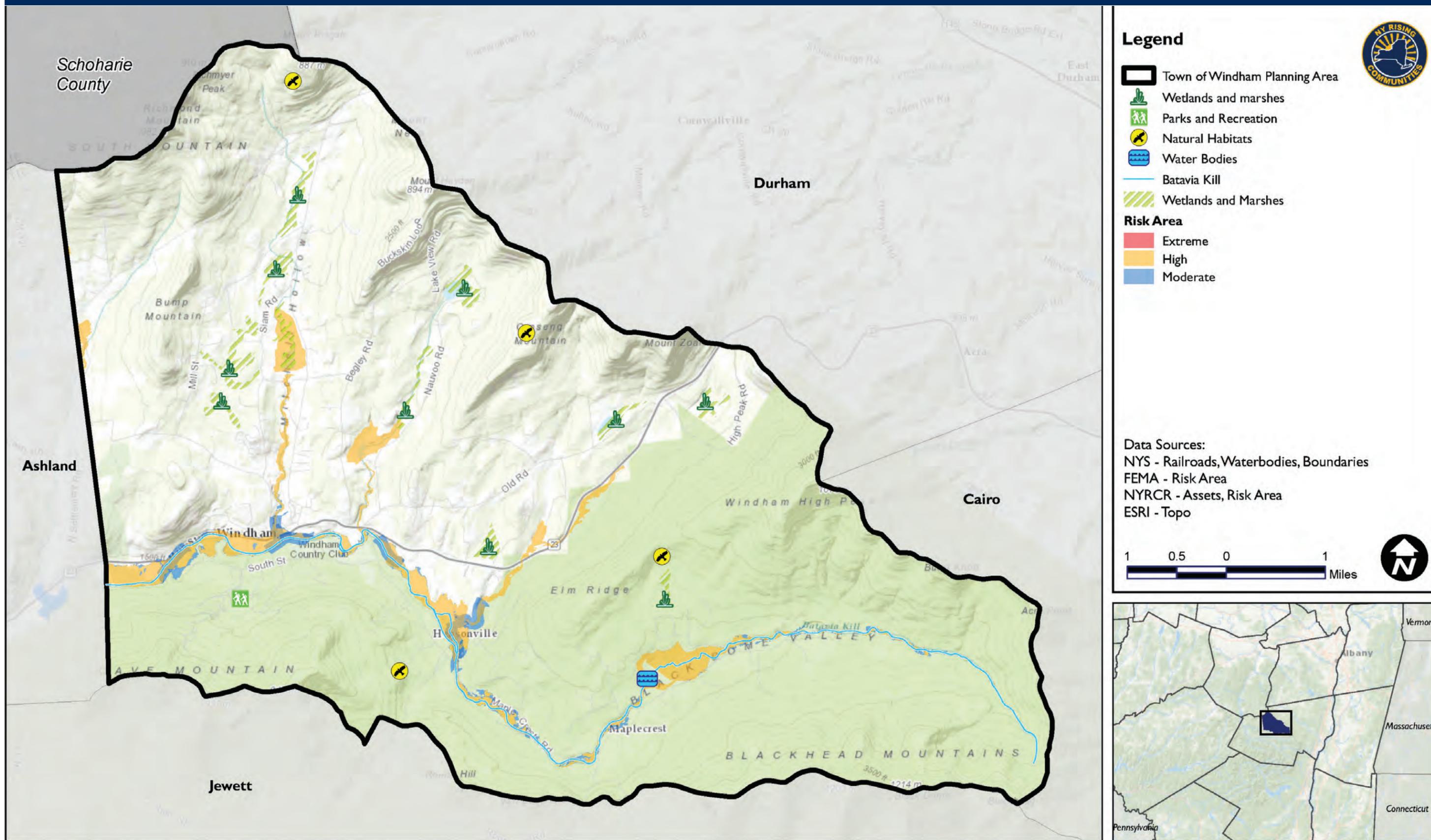


Pictured here is the United Methodist Church in Hensonville. Photo is courtesy of Tetra Tech, Inc.



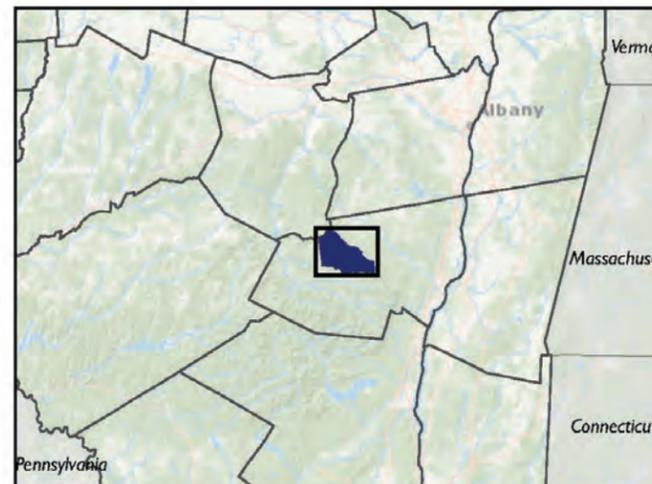
Pictured here is the beautiful Silver Lake at Camp Oh-Neh-Tah. Photo is courtesy of Raymond Adams.

NYRCR: Town of Windham, Greene County
FIGURE 2.5 – NATURAL AND CULTURAL RESOURCE ASSETS



- Legend**
- Town of Windham Planning Area
 - Wetlands and marshes
 - Parks and Recreation
 - Natural Habitats
 - Water Bodies
 - Batavia Kill
 - Wetlands and Marshes
- Risk Area**
- Extreme
 - High
 - Moderate

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





Housing

The Committee recognized the importance of each home in Town, as well as the significant and devastating impacts of flooding on many of these homes caused by Hurricane Irene and Tropical Storm Lee. To reflect this, the Committee included the Town’s three hamlets as individual assets in this inventory, as they represent the highest concentrations of homes and residential neighborhoods. The Town’s three hamlets are identified and mapped as economic assets for the purposes of this assessment, but also capture these high concentrations of housing assets.

Additional information related to the importance and conditions of housing assets within the Town, including those outside of the three hamlets, are included in the Critical Issues and Needs and Opportunities sections of this Town of Windham NYRCR Plan.

Assessment of Risk to Assets and Systems

Based on feedback from the local public and Committee, in conjunction with information captured by the asset inventory, risks to the Town’s assets were assessed by using the NYS DOS-provided Risk Assessment Tool. An overview of assets and locations at highest risk was presented to elicit suggestions of issues for further consideration in the development of strategies and projects.

Description of Methodology

The Risk Assessment Tool is designed to assess and quantify risks to individual community assets via 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 to represent the risk of each asset relative to one another. The Risk Assessment Tool calculation combines scores for the three factors using the formula: Risk = Hazard x Exposure x Vulnerability.

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

$$\begin{array}{l}
 \text{HAZARD} \\
 \times \text{EXPOSURE} \\
 \times \text{VULNERABILITY} \\
 \hline
 = \text{RISK}
 \end{array}$$

- **HAZARD SCORE:** This is assigned for each asset, based on a 100-year storm event occurring within the next 100 years.
- **EXPOSURE SCORE:** This is 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:** This reflects the level of impairment or consequences that assets may undergo from a hazard event, and reflects the ability of the asset to resist damage from the hazard.

100-YEAR FLOODPLAIN

A 100-year floodplain (or 1% annual chance floodplain) can be described as a bag of 100 marbles, with 99 clear marbles and one black marble. Every time a marble is pulled out from the bag, and it is the black marble, it represents a 100-year flood event.

The marble is then placed back into the bag and shaken up again before another marble is drawn. It is possible that the black marble can be picked one out of two or three times in a row, demonstrating that a 100-year flood event could occur several times in a row. (Interagency Floodplain Management Review Committee, 1994)



Interpretation of Risk

Risk scores help to identify assets with elevated potential to undergo storm damage. Some factors that should 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.

The Consultant Team evaluated risk of both a 100 year storm (1% annual chance) and a 500-year event (0.2% annual chance), which represent higher-intensity storm events. Risk was calculated for each asset, resulting in categorization as “severe,” high,” “moderate,” and “residual.” For further information regarding risk scores, refer to Section 5: Additional Materials.

Severe Category

Both exposure and vulnerability should be reduced for assets in this category, if possible. It is recommended that relocation of these assets should be very seriously considered.

High Category

Risk scores in this category indicate conditions that could lead to significant negative outcomes from a storm. It is recommended that actions be taken 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. Consideration of a combination of measures is recommended to reduce exposure or vulnerability.

Residual Category

Risk scores in this category occur for an asset outside of an identified risk area, and whose exposure and vulnerability are relatively low. This situation suggests floods would pose minor or infrequent consequences. Note that risk is never completely eliminated. Some residual risk still remains, even after management measures have been implemented. Monitoring conditions and adapting, as necessary, are recommended.

For further information regarding risk scores, refer to Section 5: Additional Materials.

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 percent chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once within a relatively short period of time.

A **regulatory floodway** is a 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 no increases in upstream flood elevations.

Source: FEMA



Assessment Results

Many assets identified in the Town are within or are proximate to the center of the hamlets of Windham, Hensonville, and Maplecrest, with the Batavia Kill being a key thread connecting these hamlets. Many areas of development within these hamlets, as well as individual assets outside of the them, are either on or near the floodplain. Moreover, sections of each of these hamlets are within the floodway.

In mountainous communities, such as the Town of Windham, where flash flooding from mountain runoff can be expected, important assets may also be at risk of flood damage, even though they are not located within a designated floodplain. Additionally, many assets that may not be in a floodplain could be and have been affected by overland stormwater runoff.

Increasing severity and frequency of storms within recent years has rendered the Town more susceptible to the devastating effects of flooding. Clearly, many assets within the Town are exposed and extremely

vulnerable to storm events, including many assets that are not included within the risk area for the purposes of this analysis.

Not all assets vulnerable to severe and repetitive flooding are within the regulatory 100-year floodplain or identified “Risk Area.” For instance, a number of assets, including roadways, underwent significant damages during Hurricane Irene; the flooding that resulted from Irene exceed most projections.

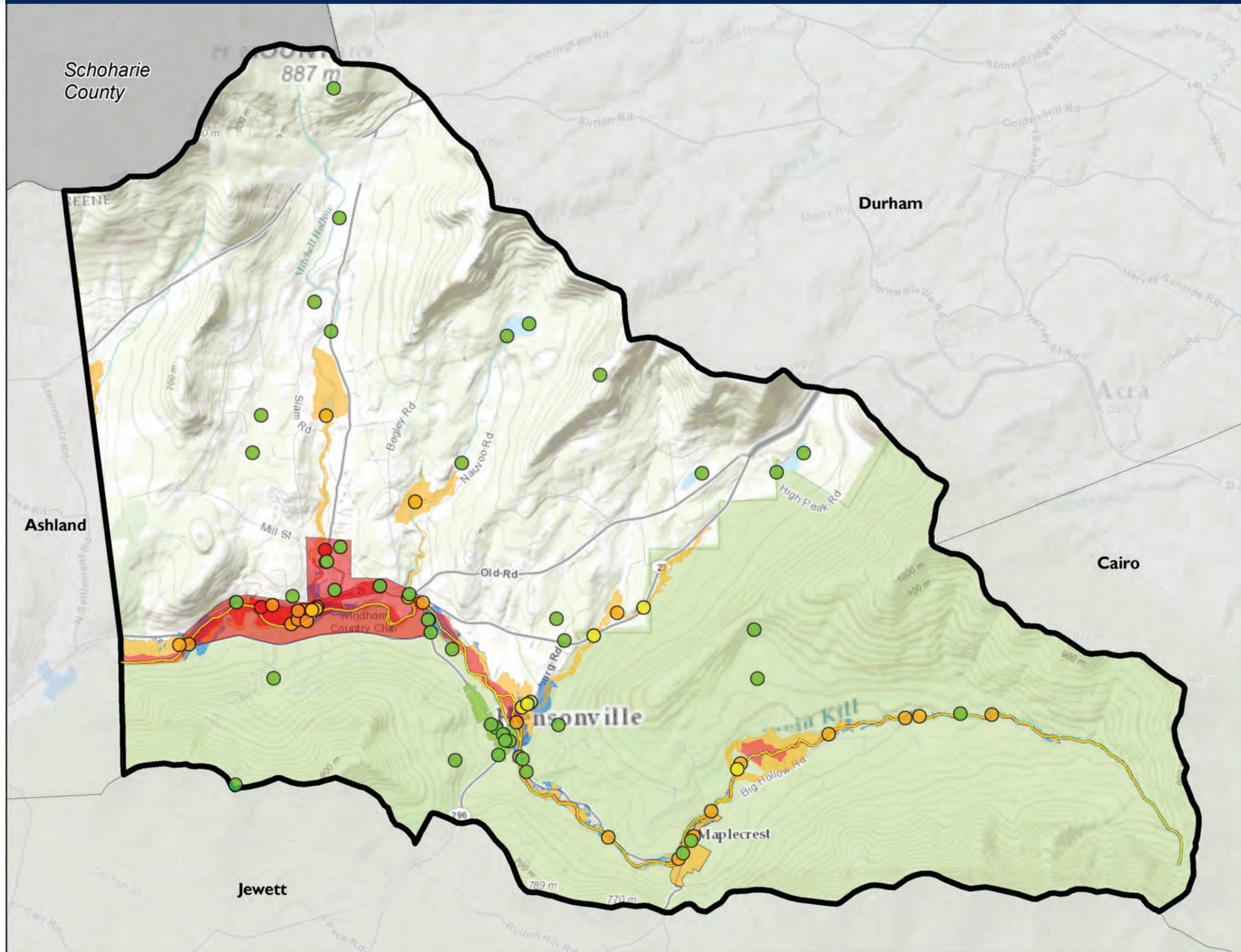
As previously discussed, no risk scores were generated for assets outside of an identified risk area. Figure 2.6 shows the geographic distribution of risk scores for a 100-year storm event.

As shown by risk scores at Figure 2.6, a number of assets with severe and high risk scores during a 100 year event are within one of the hamlets in close proximity to the Batavia Kill. The assets with the highest risk scores include the hamlet of Windham’s Main Street business district (severe), the GNH Lumber Yard (severe), and the hamlet of Maplecrest (high).



Damage was extensive in the post-Irene environment. Pictured here is a damaged school bus covered in fallen trees and partially buried next to running water. Photo is courtesy of Jeff Luckey.

NYRCR: Town of Windham, Greene County
 FIGURE 2.6 – RISK SCORE MAP



Legend

Town of Windham Planning Area

Risk Score

- Severe
- High
- Moderate
- Residual

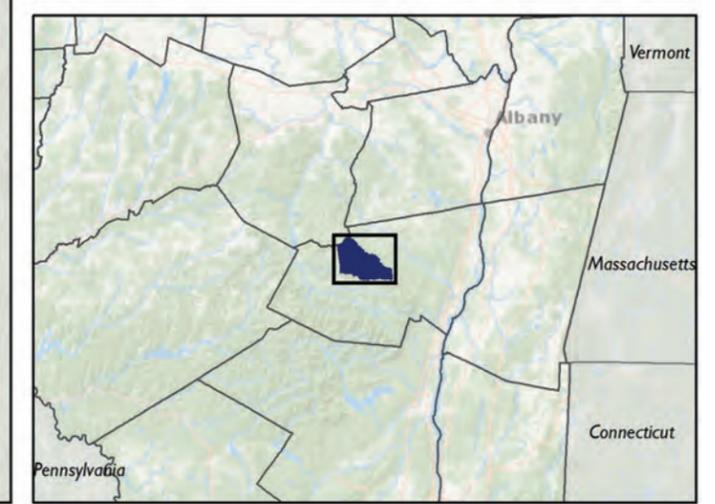
Risk Area

- Extreme
- High
- Moderate

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





ECONOMIC ASSETS

The risk scores listed below indicate that a number of the Town’s economic assets are at severe or high risk from flooding, including the Main Street business district in the Hamlet of Windham, which is at severe risk during a 100-year event. This risk reflects information provided by the local public and the Committee. 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. Table 2.2 lists the risk scores for the Town’s Economic Assets.

The buildings listed in Table 2.2 as most vulnerable and exposed to flooding within the Town should be considered for possible relocation. Floodproofing or other mitigation measures should be considered for other buildings. Much of the development within the center of the hamlets of Windham, Hensonville, and Maplecrest is either on or near the floodplain, and many key assets in the Town are at risk from flooding.

TABLE 2.2 – ECONOMIC ASSETS

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Windham Main Street Business District	Downtown Center	Severe	Severe
Windham Hamlet	Downtown Center	Severe	Severe
Maplecrest Hamlet	Downtown Center	High	High
Hensonville Hamlet	Downtown Center	Residual	Residual
Hensonville Main Street Business District	Downtown Center	Residual	Residual

Source: NYS DOS, 2014

HEALTH AND SOCIAL SERVICE ASSETS

While many of the Town’s health and social services assets have only a residual risk of flood damages, one of the most critical assets in this category — the Windham-Ashland-Jewett Central School—is at high risk from flooding, according to the risk assessment. Historically, schools have played a huge role in supporting a community’s response to an emergency or disaster. The NYS Education Department, recognizing the importance of school facilities in communities, requires schools to establish emergency plans that outline how school facilities and resources will support the community in times of disaster. Schools in small communities are typically singular assets; plans or alternative resources must be in place to prepare for an event, during which a school or schools are damaged or inaccessible, and cannot function as planned.

As noted earlier, this Town of Windham NYRCR Plan assumes a critical role for volunteer fire services during a response to flooding events and other emergencies



First-response vehicles, such as this one, are vital health and social service assets in Windham. Photo is courtesy of Jeff Luckey.

and disasters. Windham Hose Company #1 is also at high risk during 100-year flood events. The response capabilities of the fire service, especially during initial hours of the response, would not easily be replaced, and during significant flooding events, mutual aid

resources may have difficulty reaching all parts of the community.

Table 2.3 lists the risk scores for the Town’s Health and Social Service Assets.

TABLE 2.3 – HEALTH AND SOCIAL SERVICE ASSETS

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Windham-Ashland-Jewett Central School	Schools	High	High
Windham Hose Co. #1	Emergency Operations/Response	High	High
Windham Post Office	Government and Administrative Services	High	High
Family Medicine Clinic / Office of Dr. Samedov	Healthcare Facilities	Residual	Residual
Greene County Emergency Medical Services, Inc.	Emergency Operations/Response	Residual	Residual
Greene County Transfer Station	Government and Administrative Services	Residual	Residual
Hensonville Hose Company	Emergency Operations/Response	Residual	Residual
Hensonville Post Office	Government and Administrative Services	Residual	Residual
Maplecrest Post Office	Government and Administrative Services	Residual	Residual
Town of Windham Police Department	Emergency Operations/Response	Residual	Residual
Town of Windham Town Hall	Government and Administrative Services	Residual	Residual
Windham Ambulance Service	Emergency Operations/Response	Residual	Residual

Source: NYS DOS, 2014

INFRASTRUCTURE ASSETS

Based on information provided by the local public and the Committee, 19 infrastructure assets were identified as high risk from flooding during a 100 year flooding event, while the risk assessment identified many others to be at moderate risk.

Thirteen of the 19 high-risk infrastructure assets are highway or bridge locations, which are essential for safety, mobility, and evacuation procedures during emergencies. An additional three of the high-risk assets are flood control dams, which provide important protection for property and infrastructure systems during flood events. If damaged or impaired during a storm, the loss of mobility and services associated with these assets also represents significant risk for

health and social services. This can include preventing access to shelters, limiting rescue efforts, and hindering ambulance, police, and fire department operations, among others. Table 2.4 lists the risk scores for the Town’s Infrastructure Assets.

According to the guidance and methodology described, substantial mitigation actions should be taken to reduce both vulnerability and exposure of these infrastructure assets. Bridges and facilities most vulnerable and exposed to flooding within the Town should be considered for substantial upgrades. Projects that can mitigate damage to or maximize resiliency of critical components of the Town’s transportation system should be considered.



TABLE 2.4 – INFRASTRUCTURE ASSETS

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Batavia Kill Watershed Dam #1	Water Supply	High	High
Batavia Kill Watershed Dam #3	Water Supply	High	High
Batavia Kill Watershed Dam #4A	Water Supply	High	High
St. John Pond Dam	Water Supply	High	High
Verizon Sub Station	Telecommunications	High	High
Windham Wastewater Treatment Plant	Wastewater	High	High
13 Bridges	Transportation	High	High
Hensonville West Winds Well	Water Supply	Moderate	Moderate
School Bus Garage	Transportation	Moderate	Moderate
Town Water Pump House	Wastewater	Moderate	Moderate
Waste Water Pump House 1	Wastewater	Moderate	Moderate
Waste Water Pump House 3	Wastewater	Moderate	Moderate
4 Bridges	Transportation	Moderate	Moderate
Hensonville – 2 Water Wells	Water Supply	Residual	Residual
Highway Garage	Transportation	Residual	Residual
Lake Heloise Dam	Water Supply	Residual	Residual
NYSEG Substation	Power Supply	Residual	Residual
Pump House	Wastewater	Residual	Residual
Silver Lake Dam	Water Supply	Residual	Residual
Storage Tank	Water Supply	Residual	Residual
Waste Water Pump Station 1	Wastewater	Residual	Residual
Waste Water Pump House 2	Wastewater	Residual	Residual
2 Bridges	Transportation	Residual	Residual
WRIP CH 250	Telecommunications	Residual	Residual

Source: NYS DOS, 2014



Because power and telephone lines are above-ground, as shown here above an antiques store in Windham, they are often compromised in severe storm events. Photo is courtesy of Raymond Adams

NATURAL AND CULTURAL RESOURCE ASSETS

Based on information provided by the Community and Committee, three natural and cultural resource assets were identified at high risk from flooding during a 100-year flooding event. Many natural and cultural resource assets have been routinely affected by flood events, especially the flood events associated with Hurricane Irene and the remnants of Tropical Storm Lee. The health and natural functionality of these assets face unique risks based on their locations relative to other physical elements of the natural and man made landscape. For example, high-velocity flood waters can lead to severe bank erosion in streams, disrupting sediment and increasing turbidity, which may also negatively affect fish and aquatic ecosystems. Wetlands may be compromised by pollutant loading or by high-velocity floodwaters.

Table 2.5 lists risk scores for the Town’s Natural and Cultural Resource Assets.



Pictured here is a view of Windham Mountain in early fall. Photo is courtesy of Raymond Adams.

Buildings and facilities listed in Table 2.5 as the most vulnerable and exposed to flooding in the Town should be considered for flood-proofing mitigation measures and possible relocation. However, these considerations should also apply to facilities not within the regulatory floodplain, and therefore, are not associated with a risk score, where historical flood damages suggest future vulnerability.

TABLE 2.5 – NATURAL AND CULTURAL RESOURCE ASSETS

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Centre Church/Windham Civic Center	Community Centers	High	High
Masonic Lodge	Cultural or Religious Establishments	High	High
United Methodist Church	Cultural or Religious Establishments	High	High
Batavia Kill	Water Bodies	Moderate	Moderate
Greene County/Windham	Natural Habitats	Residual	Residual
Hope Restoration Christian Fellowship	Cultural or Religious Establishments	Residual	Residual
Living Faith Community Church	Cultural or Religious Establishments	Residual	Residual
NYC Watershed CE – Windham	Natural Habitats	Residual	Residual
RA Greene 2 Mount Pisgah	Natural Habitats	Residual	Residual
St. Theresa’s Catholic Church	Cultural or Religious Establishments	Residual	Residual
U.S. Deposit Fund Mort. 117	Natural Habitats	Residual	Residual
Windham Mountain	Parks and Recreation	Residual	Residual
10 Wetlands and Marshes	Wetlands and Marshes	Residual	Residual

Source: NYS DOS, 2014



Hydraulic Modeling: An Additional Tool for Analyzing Risk

The Town has suffered numerous damages from repetitive flooding of the Batavia Kill, along with other minor waterways and tributaries that drain land areas within the Town. This substantial flood risk primarily traces to the proximity of infrastructure systems, critical facilities, and residential and commercial development to the waterways throughout the Town. Also affecting risk are current stream conditions that impede flow of water and/or contribute to increased flood risk to surrounding properties. Confluences of tributaries and culverts may also affect flood conditions of waterways throughout the Town.

To understand the underlying causes of flooding and sediment transfer in the area, a hydraulic analysis was conducted of riverine sections of the Plan Area for which 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 effects of specific obstructions within particular sections of the waterways.

This analysis confirmed that flooding from the Batavia Kill in Windham impacts the commercial areas along Main Street, many homes, the fire station, churches, the Windham Ashland Jewett Public School and lumberyard. Other causes of flooding included a high sediment load and localized flooding when tributaries overflow their banks. The most problematic of these are gravel/cobble deposits near the Rte. 65 Bridge, the Mad Brook tributary in the town of Windham, and an unnamed tributary northeast of Maplecrest near the intersection of Rte. 56 and Charbonneau Way. Although both tributaries have fairly small, forested watersheds, flooding occurs because of an undersized bridge over Mad Brook, and an undersized culvert under Route 56. In addition, there are businesses and homes that are adjacent to Mad Brook which further confine the channel and restrict bridge widening and/or channel widening options.



Pictured here is the Batavia Kill, a frequent source of flooding. Photo is courtesy of Raymond Adams.

In order to evaluate baseline flooding conditions, the hydraulic analysis was completed for the portion of the Batavia Kill that flows from the CD Lake Dam through Windham and for Mad Brook using the most recent effective HEC-RAS data. The existing flood conditions were evaluated to understand the extents of inundation from the Batavia Kill and Mad Brook and to compare the impacts of the various project scenarios identified by the community.

Hydraulic analysis was performed to compare baseline conditions versus project conditions for the following scenarios:

- Levee downstream of Church Street with select property relocation and Batavia Kill floodplain enhancements
- Mad Brook retaining wall improvements
- Main Street bridge over Mad Brook replacement
- Route 65 bridge gravel removal
- Levees behind homes along Route 40
- Route 56 culvert improvement
- Batavia Kill floodplain enhancements on right bank N/S of Church Street



Assessment of Needs and Opportunities

The Committee identified preliminary needs and opportunities for the Town, categorized according to each of the six RSFs that serve as the structural road map for this NYRCR Plan.

Community Planning and Capacity Building

The Community Planning and Capacity Building RSF addresses the Town's ability to implement storm recovery activities and to plan for mitigating the effects of future storms.

Remaining current with local planning efforts, including ordinances, plans, and the implementation of best practices, will ensure consistency of growth and development in the Town. The NY Rising Reconstruction Program provides an important opportunity for the Town to review existing codes and ordinances, and to ensure current practices support reconstruction that aligns with local sensibilities and ideals. In addition, this allows the Town to identify areas for improvement that are related to emergency planning, public spaces, the pedestrian realm, education, and other components of community development and strategic planning.

During the development of this NYRCR Plan, the Committee identified the need to provide support for and strengthen relationships with numerous non-profit and community-based organizations. In particular, several needs and opportunities were identified that are related to additional local facilities that could serve as emergency shelters and also host community events and support these local organizations. In addition to their cultural value, many of these local groups provided important outreach and assistance efforts following Hurricane Irene; the Committee recognized their importance to the Town. Additionally, the need for adequate sheltering was identified as two of three local shelters were flooded during Hurricane Irene.

The Committee identified numerous targeted needs and opportunities to improve emergency procedures, information dissemination, community facilities, and other areas of community planning and capacity building.

COMMUNITY PLANNING AND CAPACITY BUILDING NEEDS AND OPPORTUNITIES

Need: Increase public education and outreach to ensure residents and visitors have access to emergency planning and preparedness information prior to, during, and after emergencies. Additional outreach may include information on emergency notification systems, evacuation routes, shelter locations, and household disaster preparedness, among others.

Opportunity: Explore the creation of a reliable and efficient communications system for emergency information.

Need: Provide facilities and support for local organizations to plan for and respond to emergencies, and to conduct community events.

Opportunity: Build a strong working relationship between local non-profits and community-based organizations through the creation of a community resource center that could provide operating space and additional resources for these types of organizations. Potential users include, but are not limited to, the Arts Alliance, Historical Society and Museum, the Chamber of Commerce, the Community of Windham Foundation. Space could also be provided for local artists to display their work and for community members to receive emergency preparedness training.

Need: Ensure that growth and development avoid high hazard areas and respect the scale, character, and historic resources of the Town.

Opportunity: Develop additional land use controls, including a local zoning ordinance. Consider creation of design guidelines or a form-based code.

Opportunity: Update the local Comprehensive Plan to incorporate the most current available information and to address trends and conditions that have emerged in recent years.

Opportunity: Plan for improvements in public infrastructure, streetscaping, and pedestrian realms in target areas of each hamlet to encourage walkability, improve aesthetics, and support economic development. Improved pedestrian mobility could also provide greater safety and additional evacuation options during emergencies.

Need: To ensure safe and reliable access to essential sheltering facilities during an emergency.

Opportunity: Identify improvements to local sheltering strategies, locations, and facilities.



Economic Development

Economic planning in the wake of a disaster should include a dual approach, focused on both protecting existing businesses and fostering support for new business and industrial growth.

Hurricane Irene and Tropical Storm Lee impacted the Town’s economy in multiple ways. These storms inflicted damage to commercial business stock, impaired business operations, caused significant lost revenue, and exacerbated existing economic challenges.

The heart of the local economy in the Town is the outdoor recreational and tourism industry. The Town’s hamlets provide shopping, dining, and recreational opportunities for residents and visitors alike, and include many locally owned and successful businesses. The natural assets of the region, and the Town’s charm and character, support a healthy tourist trade and a strong second-home market.

While portions of the year are economically strong, seasonal fluctuations stemming from outdoor tourism and second-home markets create unique workforce and revenue challenges for local business owners. In addition, numerous local assets are not currently utilized to their full economic potential. To fully capture



The provision of health and social service assets contributes to economic development. Image of banners from The Windham Hose Company and Ladies Auxiliary courtesy of Jeff Luckey.

ECONOMIC DEVELOPMENT NEEDS AND OPPORTUNITIES

Need: Establish a year-round economy and four-season tourism industry. A four-season economy will support new shopping and recreation amenities, increase the quality of life for existing residents, and address existing revenue, workforce, and economic growth challenges.

Opportunity: Explore creation of additional off-peak-season community events to encourage additional visitors, to provide new revenue for local businesses, and to increase a sense of place. Capitalize on the success of the Windham Area Recreational Foundation (WARF) summer events to create new opportunities, including use of Windham Mountain ski lifts to transport mountain bikers.

Opportunity: Leverage existing recreational assets and create new assets to encourage a four-season tourism industry that supports additional amenities and alleviates seasonal challenges for local business owners.

Specific opportunities include additional swimming options to replace recently lost swimming pools, re-opening of C.D. Lane Park and Lake, and expansion of the trail network to connect the Town’s assets, attractions, and restaurants, among others. In particular, consider establishment of trails that would connect with Camp Oh-Neh-Tah.

Need: Protect existing businesses and make them more resilient during future storms.

Opportunity: Develop a relocation program to assist business owners who own flood-prone properties and want to remain in the Town.

Opportunity: Consider strategic property acquisitions through existing or new voluntary buy-out programs. Utilization of voluntary buy-out programs through the Hazard Mitigation Grant Program (HMGP), Community Development Block Grant-Disaster Recovery(CDBG-DR) funds, or other programs can increase safety, remove liability associated with repetitive flood properties, and create potential public spaces and recreational amenities.

Opportunity: Provide assistance to local business owners to repair any remaining damage from Hurricane Irene and Tropical Storm Lee.

Opportunity: Provide financial support to small businesses seeking to implement resiliency upgrades, as well as to entrepreneurs seeking to start micro-businesses.

Need: Reverse the current “brain drain” associated with educated youth leaving and not returning to the Town.

Need: Attract and retain young families, first-time home buyers, and a qualified workforce.



ECONOMIC DEVELOPMENT NEEDS AND OPPORTUNITIES (CONT'D)

Need: Strategically address vacant commercial buildings throughout the Town.

Need: Highlight and leverage local and regional assets through improved branding and marketing.

Opportunity: Establish a comprehensive, tourism-focused branding and marketing effort, including improved signage, print materials, an online presence, among other marketing concepts.

Opportunity: Collaborate with neighboring communities to improve regional branding, marketing, and tourism efforts..

unrealized economic potential, efforts are needed to establish a four-season economy that will provide more reliable revenue streams, a consistent workforce, additional amenities, and quality-of-life improvements for full-time residents.

Health and Social Services

Safe and reliable access to health and social services before, during and after disasters and emergencies is critical to community recovery. The Town's remoteness, isolation, and increasingly aging population place additional importance on providing safe access to these services. Existing limitations of local healthcare providers, transportation routes, emergency shelters, and senior care facilities pose considerable risks to all residents and especially vulnerable segments of the population during emergencies.

The considerable risks posed by this limited access to critical public health and safety services is further highlighted via presentation below of a number of specific needs and opportunities identified by the Committee.

HEALTH AND SOCIAL SERVICES NEEDS AND OPPORTUNITIES

Need: Provide back-up power generation capacity to ensure continued operation of critical facilities during and after a future disaster.

Opportunity: Provide and install fixed back-up power generators in key facilities.

Opportunity: Provide incentives for private businesses that contribute important services to install back-up power generators. Businesses under consideration for this include local gas stations and others that provide safety and evacuation assistance, and other benefits during emergencies.

Need: Ensure the provision of essential services, including healthcare, sheltering facilities, and senior services.

Need: Protect socially vulnerable populations during flood events.

Opportunity: Explore potential utilization of Camp Oh-Neh-Tah as a shelter and emergency operations center.

Opportunity: Explore potential re-use of vacant buildings for emergency shelters and emergency supply storage in each hamlet. A particular opportunity may exist to create a shelter on Barnum Road (Sugar Maples).

Opportunity: Strategically plan for an aging population by encouraging the development of additional healthcare and senior care facilities.

Opportunity: Create additional options for accessing various healthcare providers and services. Explore creation of in-Town emergency services that can provide first-aid and basic life support services to stabilize patients while they wait for more advanced life support assistance.

Housing

Several acute housing needs and opportunities in the Town stem from a combination of local conditions, including flood-prone properties, a strong second-home market, and an increasingly aging population. Damages sustained by numerous homes in the wake of Hurricane Irene, along with rising home values and limited senior living options, warrants dedicated efforts to encourage new housing outside the floodplain. This housing should be affordable and suitable to a wide range of incomes and age groups.

To ensure the retention of the existing housing stock, the local tax base, and the Town's historic character, flood mitigation improvements should be explored.



These include acquisitions, flood-proofing measures, structural elevations, and property relocations. Additionally, effects of decreasing housing affordability require further attention; if this trend remains unaddressed, it will continue to limit the Town’s ability to retain and attract a younger workforce, young families, and first-time homebuyers.

HOUSING NEEDS AND OPPORTUNITIES

Need: Increase resident safety, property protection, and structural resilience for homes in flood-prone areas.

Need: Identify remaining property damage from Hurricane Irene and Tropical Storm Lee. Provide homeowners with information on current and emerging assistance programs, including voluntary buy-outs, mitigation improvements, and relocation assistance.

Need: Create a housing strategy that provides adequate senior living options. Current senior housing options in the Town are very limited and there is a several-year waiting list.

Need: Address cost-burdened residents, and provide housing to accommodate a consistent workforce, young families, and first-time home buyers.

Opportunity: Support mitigation improvements of flood-prone properties to protect structures from future damage, including flood-proofing and elevations, among others.

Opportunity: Develop a relocation program to assist residents who own flood-prone properties and want to remain in the Town.

Opportunity: Consider strategic property acquisitions through existing or new voluntary buy-out programs. Utilization of voluntary buy-out programs through HMGP, CDBG-DR, or other programs can increase safety, remove liability associated with repetitive flood properties, and create potential public spaces and recreational amenities.

Need: Provide assistance to local homeowners, including second-homeowners, to repair any remaining damage from Hurricane Irene and Tropical Storm Lee.

Infrastructure

Many of the critical infrastructure systems in the Town are highly susceptible to flood damage, the resulting loss of service, and increased safety risks. As discussed previously, floodwaters experienced during Hurricane Irene and Tropical Storm Lee caused severe damage to transportation infrastructure, flood control structures, and Town facilities, while also exposing additional deficiencies in communications and public utility systems.

Of particular concern for a remote community with limited transportation redundancy is partial or complete shutdown of numerous transit routes throughout Town. Notably, all three hamlets have faced dangerous conditions as main arterials (including State Route 23, and others) became completely inundated, preventing evacuation and rescue efforts.

Concurrently, stormwater system overflows, numerous undersized culverts, and all three local flood control structures failed to accommodate the volume of floodwaters. This resulted in utilization of emergency spillways and considerable damage to vegetation, property, and infrastructure.

Compounding these dangerous conditions are locations of critical facilities within flood-prone areas, and a general lack of communication capability stemming from limited cellular phone, broadband Internet, and emergency communications.

These factors, combined with a lack of back-up power for essential public facilities, expose Town residents to extreme health and safety risks during disasters and emergencies.

Residents and Committee Members have noted deficiencies in a variety of infrastructure systems, including transportation, communications, and power systems, among others. Rebuilding infrastructure with increased resilience will be critical to improve the Town’s capacity to respond to future disasters.



INFRASTRUCTURE NEEDS AND OPPORTUNITIES

Need: Identify and implement stormwater, waste water, and drainage improvements in the Town.

Need: Render critical facilities more resilient, or where appropriate and feasible, relocate them to protect against future damage.

Opportunity: Explore the creation of a stormwater collection system within the forty four-acre New York State Department of Environmental Protection (NYS DEP) parcel at the west end of South Street in the Hamlet of Windham. Such a system could help alleviate stormwater problems at Windham Mountain, Windham Mountain Village, and along South Street. This area could also serve as a passive recreational area.

Need: Address infrastructure deficiencies that cause or contribute to repetitive flooding in the Town.

Need: Ensure safe and reliable mobility before, during, and after storm events.

Need: Address areas of damaged, insufficient, or non-existent public and pedestrian features and amenities.

Opportunity: Improve resilience of existing transportation routes, and explore opportunities for increased redundancy.

Opportunity: Explore the need for bridge and culvert improvements to increase resiliency, resident safety, property protection, and mobility during future flooding.

Opportunity: Create pedestrian realm and streetscaping improvements along areas damaged during the storms or with existing deficiencies. Areas for consideration include Church Street, Mitchell Hollow, Mill Street, and sections of State Route 23 and South Street.

Need: Gain additional information on dam safety and the status of C.D. Lane Park Dam, in particular.

Need: Examine the capacity and performance of three flood control dams in the Town. These dams were designed on a maximum of eight inches of flood capacity. Maplecrest dam has overflowed into the spillway on at least four occasions. The other two dams did not utilize auxiliary spillways until Irene; however, damage to vegetation was considerable.

Opportunity: Identify and implement improvements to flood control structures to improve safety and functionality.

Need: Improve cellular telephone and broadband Internet coverage in the Town. Lack of reliable communication and information-sharing capability throughout most of Windham is a detriment to safety, emergency response, quality of life, tourism, and economic development.

Need: Improve connections of residents with emergency responders, and connect local emergency responders to additional regional responders and resources.

INFRASTRUCTURE NEEDS AND OPPORTUNITIES

Opportunity: Support additional cellular telephone and broadband Internet infrastructure development. Support current efforts to secure grant funding to construct improved emergency response communications systems, and to improve connections with Delaware and Schoharie Counties' emergency resources.

Opportunity: Explore the possibility of expanding the current tower development project to include additional 911 communications service for residents, and additional private communications capability. Consider the possibility of repeater transmitters to improve communications.

Opportunity: Work with public agencies and service providers to develop a plan to provide a network of new telecommunication towers. A small local network of strategically placed towers could enhance safety, convenience, and economic benefits for residents, visitors, and businesses.

Need: Address deficiencies and vulnerabilities in the provision of power before, during, and after future disasters.

Opportunity: Develop strategies for creating resilient and redundant power systems for critical facilities, including Town Hall, Windham-Ashland-Jewett Central School, and fire departments, among others.

Opportunity: Identify potential solutions to decrease the likelihood and duration of power outages at homes and businesses.

Opportunity: Create additional fuel storage systems and locations.

Natural and Cultural Resources

Natural infrastructure has been increasingly recognized and promoted among hazard and climate planners as a low-impact and sustainable means to mitigate losses from natural hazards. Moreover, leveraging natural and cultural resources can lead to improved flood management and property protection, as well as additional community benefits, such as economic growth, improved quality of life, and ecological protection.

Increased volumes of water in the Batavia Kill and its tributaries during flood events have negatively impacted the natural conditions and functionality of the stream system. Increasing erosion and stream bank failure from flooding and runoff reduce stream



capacity, damage habitats, and pose substantial risk to adjacent property owners from flooding. Exploring these conditions and potential solutions could protect property owners, maintain ecological balance, and ensure that the Town continues to reap the benefits of these natural resources.

While the local economy already capitalizes on many of the natural and cultural assets as economic drivers, the full potential has not yet been realized. Taking advantage of underutilized assets and exploring opportunities for additional amenities may significantly improve quality of life for local residents, and increase tourism trade and revenues for business owners.

NATURAL AND CULTURAL RESOURCES NEEDS AND OPPORTUNITIES

Need: Address stream instability and damage to stream banks and channels that result from flooding and stormwater runoff.

Opportunity: Restore and/or stabilize stream channels and stream banks to improve functionality, reduce erosion, protect adjacent properties, improve water quality, and better control water volume during flood events.

NATURAL AND CULTURAL RESOURCES NEEDS AND OPPORTUNITIES (CONT'D)

Need: Improve and better utilize key natural, cultural, and recreational assets, and explore creation of new amenities.

Opportunity: Target key assets that have fallen into disuse or underutilization to help establish a four-season economy.

Opportunity: Pursue options to expedite refilling of C.D. Lane Lake to re-establish this important recreational and community asset.

Opportunity: Expand existing trail network and create additional trails, trail expansions, and trail connections for multiple uses, such as walking, hiking, and mountain biking, among others.

Opportunity: Explore additional outdoor recreation expansion projects, including water sports, swimming pools, and other “green” recreation options.

Need: Retain and protect the Town’s historic character and resources.

Opportunity: Identify at-risk historic buildings and resources, and explore potential solutions to mitigate damage from future storm events.

Opportunity: Explore opportunities for greater mobility and connectivity between Windham Mountain and the Hamlet of Windham’s downtown business district.



Pictured here is a way-finding sign for the Windham Path, a favorite walking and hiking trail. Photo is courtesy of Raymond Adams.



**Town Of
Windham**

Photo of highway sign indicating Town of Windham is courtesy of Raymond Adams.

Section 3

Reconstruction
and Resiliency
Strategies



Photo is courtesy of Raymond Adams.

Section 3: Reconstruction and Resiliency Strategies

The Town of Windham NY Rising Community Reconstruction (NYRCR) Planning Committee (Committee) developed a series of strategies to directly address the issues, needs, and opportunities identified during this NYRCR planning process. These strategies were crafted to respond to specific needs and to establish a focused path toward future resiliency and improved quality of life throughout the Town of Windham (Town).

The series of strategies presented in this section were developed and refined based on detailed analysis, ongoing discussions, NYRCR Planning Committee Meetings, and public feedback. These strategies aim to improve conditions across numerous aspects of the Town’s safety, resiliency, and quality of life.

These strategies reflect community values, issues, needs, and opportunities; they are the foundation for developing projects and implementation strategies.



Pictured here is a streetscape view of downtown Windham. Photo is courtesy of Raymond Adams.

Many of the needs and opportunities identified by the Committee and presented in Section 2 appear explicitly in one or more of the strategies, as either a strategy title or a strategy description. Others are presented as actions or projects in the associated tables beneath each strategy description. A full description of projects is included in Section 4: Proposed and Featured Project Profiles and in Section 5: Additional Materials.

Strategy 1

Improve communications and emergency response capabilities to ensure the provision of essential services before, during, and after hazardous events; to enhance quality of life; and to promote economic growth.

This strategy aims to improve safety, emergency response capability, and quality of life for the Town of Windham through a series of communications- and capacity-building initiatives. This strategy primarily supports four Recovery Support Functions (RSFs) of the Federal Emergency Management Agency’s (FEMA) National Disaster Response Framework: Infrastructure, Economic Development, Health and Social Services, and Community Planning and Capacity Building.

The Town of Windham stands to increase safety and resilience during and after disaster events by investing in critical facilities, enhancing cellular and broadband Internet systems, and performing additional outreach and training in emergency preparedness procedures. In particular, the need for improved communications infrastructure, systems, and processes was identified numerous times during public outreach, analysis, and Committee Meetings.



By upgrading communications capability in the Town, people can more readily access emergency resources and stay informed of current conditions. Additionally, improved communications services provide the following benefits:

- Increase residents' daily quality of life
- Promote economic growth by encouraging start-up businesses
- Support entrepreneurs who work from home; and
- Attract young families and workers who are accustomed to reliable cellular and broadband service.

Strategy 1 aims to address specific issues identified by the Committee, including a lack of back-up power, isolated populations, insufficient communications capability, and economic challenges.

Investments to ensure the provision of essential services before, during, and after emergencies are included in this strategy. In particular, the proposed projects respond to the need for sufficient back-up power generation at key local facilities. This strategy will support the provision of clean water, emergency response activities, sheltering, and other types of

assistance through the installation of permanent power generators at multiple locations throughout the Town.

Additionally, this strategy supports additional improvements to community facilities, including sheltering capabilities, as well as resources to support local non-profit organizations, artists, and other cultural institutions. Opportunities to establish community facilities and resources would support the implementation of this strategy.

The Committee also identified the importance of proper emergency planning and outreach initiatives that are implemented prior to any future flood or disaster event. Implementation of this strategy will foster future investments in additional emergency response planning, education, and outreach to ensure that residents and visitors have access to emergency planning and preparedness information prior to, during, and after emergencies. Additional emergency planning would also identify opportunities to improve emergency response capability, facility needs, and sheltering resources.

Table 3.1 identifies the Proposed and Featured Projects developed by the Committee to accomplish Strategy 1. Other recommendations that support this Strategy can be found in Table 5.1: Additional Resiliency Recommendations, located in Section 5 of this NYRCR Plan.



Pictured here is Japanese knotweed along the Batavia Kill. Photo is courtesy of Tetra Tech, Inc.

TABLE 3.1 – STRATEGY 1

Strategy 1: Improve communications and emergency response capabilities to ensure the provision of essential services before, during, and after hazardous events; to enhance quality of life; and to promote economic growth.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Silver Lake Project	This proposed project would create access to new passive and active recreational opportunities, an emergency shelter, and a multi-purpose community facility at Silver Lake and Camp Oh-Neh-Tah. The retrofit of several existing camp buildings will leverage the significance of this unique asset to serve multiple functions, including improved emergency sheltering, access to recreation, and additional resources and flexible space for local organizations, groups, and events.	\$1,961,500	Proposed	Y
Back-Up Generators for Critical Facilities	Purchase and install fixed back-up generators for local facilities to ensure service and emergency capability during and after disaster events. Locations include one installed at each of the two Windham well water pump stations, one installed at Town Hall, and one installed at the Town Highway Garage.	\$343,000	Proposed	N
Communications Improvements	This project would provide for communications infrastructure upgrades to improve emergency response capabilities, as well as personal cellular and broadband Internet service to increase quality of life and to promote economic growth.	\$1,000,000	Featured	Y

Strategy 2

Increase the resiliency of public infrastructure to improve mobility and safety in times of disaster, and to protect property and infrastructure from future storm damage.

During Hurricane Irene and Tropical Storm Lee, many of the Town of Windham’s infrastructure systems, such as roads, bridges, and culverts, were severely damaged or impaired. In addition to direct damage, the heavy flooding caused by these storms also exposed the insufficiency of certain key structures and systems to withstand the effects of future flood events. To respond to these impacts, the Committee created both short-term and long-term initiatives to address the conditions that cause or contribute to flooding throughout the Town.

To this end, Strategy 2 primarily directs efforts to ensure the protection and function of public infrastructure systems to improve mobility, safety, property protection, and emergency response access during floods and other emergencies. This strategy also supports economic growth and quality-of-life improvements through greater use of existing assets, and leverages the Town’s strong commitment to outdoor recreation.

During Public Engagement Events and Committee Meetings, significant concern was expressed about compromised roadways during past flood events that led to isolated residents and impaired access by emergency responders.

This strategy is focused on providing resilient public infrastructure to ensure mobility, evacuation, and access to essential services during an emergency.



Maximum mobility during disaster events is necessarily predicated on a resilient transportation network, particularly in locations that are persistently vulnerable to flooding.

To implement this strategy, projects focus on improvements to reduce flooding and/or mitigate damage through investments in public infrastructure systems. Some projects are designed to better withstand and accommodate rising floodwaters to enhance protection of infrastructure and neighboring properties. Other projects are intended to help direct the floodwaters to more appropriate areas, thus reducing the risk of flood damage and increasing resident safety.

In some cases, proposed actions will improve existing infrastructure to accommodate anticipated flows, while others will seek to direct floodwater to appropriate areas.

Projects that elevate and upgrade an undersized bridge or culvert will help to provide safe transportation routes by reducing roadway inundation and flooding of adjacent properties. Other projects will improve safety and resiliency, while providing new recreational opportunities to support a four-season economy.

Collectively, this strategy addresses needs and opportunities, as well as proposing investments in three RSFs, including Infrastructure, Natural and Cultural Resources, and Economic Development.

Table 3.2 identifies the Proposed and Featured Projects developed by the Committee to accomplish Strategy 2. Other recommendations that support this Strategy can be found in Table 5.1: Additional Resiliency Recommendations, located in Section 5 of this NYRCR Plan.



The Town of Windham NYRCR Committee spent considerable time formulating strategies based on both public input and scientific analysis. Photo shown of three members and NYRCR staff is courtesy of Raymond Adams.

TABLE 3.2 – STRATEGY 2

Strategy 2: Increase the resiliency of public infrastructure to improve mobility and safety in times of disaster, and to protect property and infrastructure from future storm damage.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Mad Brook Retaining Wall Improvements	This project involves repairs/improvements to the Mad Brook retaining wall and drainage system to increase structural stabilization and ensure continued functionality and flood protection. Project work would include repairs to damaged sections of the wall and consideration for extending the length of the wall and gravel harvesting to better channel capacity.	\$195,500 to \$362,500	Proposed	N
Route 56 Culvert Upgrade	This project involves the upgrade and improvement of an undersized, four-foot corrugated metal pipe culvert on Route 56 with a larger 6-foot-by-6-foot box culvert to expand capacity, improve mobility, ensure access to the dam, and reduce localized flood impacts.	\$170,000	Proposed	N
Back-Up Generators for Critical Facilities	Purchase and install fixed back-up generators for local facilities to ensure service and emergency capability during and after disaster events. Locations include one installed at each of the two Windham well water pump stations, one installed at Town Hall, and one installed at the Town highway garage.	\$343,000	Proposed	N
South Street Stormwater Collection System	This project is a proposed culvert improvement, wetland treatment system, and passive recreation project along South Street. It includes the creation of a stormwater collection system, wetland area, and retaining pond on a 44 acre New York State Department of Environmental Protection (NYS DEP) property at west end of South Street in the Hamlet of Windham to provide flood storage, recreational use, and economic growth.	\$2,500,000	Proposed	N
Mad Brook Hydraulic Feasibility Study	This project would conduct detailed hydrologic, hydraulic, and sediment transport analyses of Mad Brook from Mountain View Road to the confluence with the Batavia Kill. The study will be used to better define the flooding and channel stability risks of the current channel configuration, and will evaluate options to restore channel capacity, improve flood conveyance, and reduce sediment transport, while improving water quality and habitat. This study will complement the recently completed Local Flood Analysis to jointly pursue long-term solutions to flood conditions.	\$80,000	Featured	N



Strategy 3

Reduce risks for residents and visitors by addressing stream conditions that cause or contribute to repetitive flood damage, increasing property protection from future flood damage, and promoting safe and adequate housing for all residents.

Strategy 3 focuses on improving resident safety and protecting properties. Through investments in protective measures, and by encouraging development outside of flood-prone areas, the Town of Windham can reduce the risk of future property and infrastructure damages and of economic losses similar to those caused by Hurricane Irene and Tropical Storm Lee.

To address the flood-prone conditions of the built environment in the Town of Windham, this strategy focuses investment toward greater structural resilience and the prevention or mitigation of flooding in the built environment.

Projects that support Strategy 3 will improve protection for homes and businesses through several complementary methods. Some projects aim to address the flood conditions directly, by providing protective features that direct water away from properties, while others focused on increasing the ability of structures to withstand flood inundation. This strategy aligns with four RSFs, including Infrastructure, Housing, Economic Development, and Natural and Cultural Resources. Collectively, the initiatives associated with this strategy would create greater safety for residents and visitors, reduce future costs associated with flood damage, and protect the numerous assets that establish the character and charm of the Town of Windham.

Table 3.3 identifies the Proposed and Featured Projects developed by the Committee to accomplish Strategy 3. Other recommendations that support this Strategy can be found in Table 5.1: Additional Resiliency Recommendations, located in Section 5 of this NYRCR Plan.



This image depicts rip-rap bank stabilization at the Batavia Kill. Photo is courtesy of Raymond Adams.



TABLE 3.3 – STRATEGY 3

Strategy 3: Reduce risks for residents and visitors by addressing stream conditions that cause or contribute to repetitive flood damage, increasing property protection from future flood damage, and promoting safe and adequate housing for all residents.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
South Street Stormwater Collection System	This project is a proposed culvert improvement, wetland treatment system, and passive recreation project along South Street. It includes the creation of a stormwater collection system, wetland area, and retaining pond on a 44-acre NYS DEP property at west end of South Street in the Hamlet of Windham to provide flood storage, recreational use, and economic growth.	\$2,500,000	Proposed	N
Mad Brook Retaining Wall Improvements	This project would include a Mad Brook retaining wall and drainage system repairs and/or improvements to increase structural stabilization and ensure continued functionality and flood protection. Project work would include repairs to damaged sections of the wall, and a potential extension of the length of the wall, as well as gravel harvesting to improve channel capacity.	\$195,500 – \$362,500	Proposed	N
Route 56 Culvert Upgrade	This project would include an upgrade and improvements of an undersized, 4-foot corrugated metal pipe culvert on Route 56 with a larger, 6-foot-by-6-foot box culvert to expand capacity, improve mobility, ensure access to the dam, and reduce localized flood impacts.	\$170,000	Proposed	N
Mad Brook Hydraulic Feasibility Study	This project would conduct detailed hydrologic, hydraulic, and sediment transport analyses of Mad Brook from Mountain View Road to the confluence with the Batavia Kill. The study will be used to better define the flooding and channel stability risks of the current channel configuration, and will evaluate options to restore channel capacity, improve flood conveyance, and reduce sediment transport, while improving water quality and habitat. This study will complement the recently completed Local Flood Analysis to jointly pursue long-term solutions to flood conditions.	\$80,000	Featured	N



Strategy 4

Enhance the local economy and quality of life by expanding outdoor recreational amenities and capitalizing on underutilized assets and four-season tourism opportunities.

Hurricane Irene and Tropical Storm Lee led to numerous economic challenges for the Town of Windham, from which the Town has not yet fully recovered. In some cases, these economic hardships underscored and exacerbated existing issues already faced by local business owners. While infrastructure improvements and safe living spaces are essential to recovery, a resilient economy is equally important to the long-term health of the Town.

Throughout this NYRCR planning process, Committee Members, business leaders, and residents identified several key local economic challenges. Some challenges stem from the Town's prominence as a vacation, tourism, and second-home destination. This creates revenue fluctuations, housing affordability issues, and workforce shortages. Other challenges are attributable to the Town's remote location. These challenges include

unreliable communications, limited amenities, and difficult terrain for construction. Improved planning and coordination is required to address other issues, such as underutilized recreational assets, connectivity, transit needs, and limited marketing and branding of the Town.

Despite these difficulties, business owners in Windham have typically met and overcome challenges and thrived. However, the storm events of late summer 2011 caused additional disruption by destroying buildings, interrupting business operations, and introducing new issues to the local economy.

As floodwaters coursed through primary business districts, structural damages led to costly repairs for business owner. In turn, this led to lengthy and, in some cases, permanent business interruptions, the loss of jobs, and destruction of tax-generating real estate. Damages to homes and other properties also changed consumer spending patterns by reducing expendable income and introducing psychological barriers to shopping. These changes further reduced revenue for many local businesses, making it even more difficult to remain solvent.



Local events, such as the Windham Autumn Affair advertised, can enhance the local economy. Photo is courtesy of Raymond Adams.



Strategy 4 aims to address underlying economic challenges in the Town of Windham, promote healthy growth, and respond to any remaining impacts and difficulties caused or exposed by Hurricane Irene and Tropical Storm Lee. In particular, this strategy focuses efforts toward supporting a four-season economy that provides reliable revenue for businesses, improved communications to support new businesses and shoppers, and additional amenities to increase options for residents and visitors.

In addition, this strategy seeks to capitalize on key local assets to further diversify the economy and make it more resilient and adaptable in the face of future storms. By so doing, the Town will preserve the existing tax base and amenities critical to the tourism market while strategically growing opportunities for an expanded economy.

During Committee Meetings and Public Engagement Events, participants identified the need to create additional recreational opportunities to enhance economic stability and promote growth in the Town of Windham. Where possible, projects proposed under Strategy 4 will simultaneously improve flood protection and emergency response capabilities while creating new recreational and business opportunities.

One project proposed under this strategy would create a new public space along the western edge of the Hamlet of Windham to increase recreational access. This new, passive recreational area also could have profound flood and safety benefits for Windham Mountain and South Street, and the Town envisions it as a boon to local economic development, educational initiatives, and a draw for residents and visitors.

Investments in historic and socially important assets, such as Silver Lake and Camp Oh-Neh-Tah, promote outdoor recreation, create a much-needed emergency shelter, preserve a locally significant site, grow tourism opportunities, and continue efforts to assist socially vulnerable populations.

The provision of new recreational areas for families and visitors would also increase the likelihood that those

same people will also shop and lodge in Windham during off-peak seasons. Expanding the length of the peak season to be more year-round provides additional financial security for business owners and improves their ability to withstand a future storm and possible operational interruptions. The expansion of the existing trail network in the Town is one way to accomplish this, and may lead to enhancing Windham's appeal as a regional recreational destination, while expanding business opportunities.

Moreover, ensuring reliable cellular phone and broadband Internet services increases emergency service capabilities during disasters, and encourages tourism and start-up businesses.

While Strategy 4 is most focused on responding to the economic development and recovery challenges identified in the Town of Windham, the strategy addresses both the need to protect existing businesses from repetitive flooding, and to support investments in critically important local assets. As such, implementation of this strategy supports four Recovery Support Functions, including Economic Development, Infrastructure, Health and Social Services, and Natural and Cultural Resources.

Table 3.4 identifies the Proposed and Featured Projects developed by the Committee to accomplish Strategy 4. Other recommendations that support this Strategy can be found in Table 5.1: Additional Resiliency Recommendations in Section 5 of this NYRCR Plan.



The business community is integral to the economic vibrancy of Windham. Photo of Chamber of Commerce stone wall with flowers is courtesy of Raymond Adams.



TABLE 3.4 – STRATEGY 4

Strategy 3: Reduce risks for residents and visitors by addressing stream conditions that cause or contribute to repetitive flood damage, increasing property protection from future flood damage, and promoting safe and adequate housing for all residents.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Silver Lake Project	This proposed project would create access to new passive and active recreational opportunities, an emergency shelter and multi-purpose community facility at Silver Lake and Camp Oh-Neh-Tah. The retrofit of several existing camp buildings will leverage the significance of this unique asset to serve multiple functions, including improved emergency sheltering, access to recreation, and additional resources and flexible space for local organizations, groups, and events.	\$1,961,500	Proposed	Y
New Trails and Connections	Develop new trails and trail connections to expand the existing network, provide support for additional users, e.g., biking, hiking, horses, etc., and better link local and regional recreational assets. Expanded trail systems will also provide additional mobility options in emergency situations, and will create redundant access and evacuation routes.	\$300,000	Proposed	Y
South Street Stormwater Collection System	This project is a proposed culvert improvement, wetland treatment system, and passive recreation project along South Street. It includes the creation of a stormwater collection system, wetland area, and retaining pond on a 44-acre NYS DEP property at west end of South Street in the Hamlet of Windham to provide flood storage, recreational use, and economic growth.	\$2,500,000	Proposed	N
Communication Improvements	Upgrade communications infrastructure to improve emergency services, and cellular and broadband Internet services to increase quality of life and promote economic growth.	\$1,000,000	Featured	Y



Strategy 4 would go far to help mitigate the type of storm damage shown here. Photo of damaged house, collapsed garage is courtesy of the Town of Windham.



Strategy 5

Promote economic growth, emergency preparedness, sense of place, and community cohesion through support for non-profit and community-based organizations, expanded marketing initiatives, and community events to strengthen “neighbor-to-neighbor” support networks, and to foster local arts and entertainment.

Strategy 5 complements Strategy 4 by seeking to enhance, protect, and promote future economic growth in the Town to increase its ability to withstand future economic impacts of flooding and other disasters. While Strategy 4 focuses primarily on the protection of existing physical economic assets and the creation of new amenities, Strategy 5 focuses on the underlying organizational and community-based initiatives that help to drive local economic resiliency. This strategy represents the “neighbor-helping-neighbor” mentality that helped the Town recover after Hurricane Irene and Tropical Storm Lee.

The disasters of 2011 highlight the valuable roles numerous community groups play in recovery, community cohesion, and resilience.

Strategy 5 targets the protection of these organizations to maximize their potential in the local economy and to assist in times of need. Providing space and support for local events, artists, and other cultural and non-profit groups will positively impact residents and visitors in even more meaningful ways. A thriving cultural, historical, and community life in the Town of Windham can draw additional tourism through new community events, while fostering local cohesion.

Windham’s natural, cultural, and historic assets are critical components of the Town’s recovery and future economic development goals. Support for these organizations and assets hinges on accurately identifying

and highlighting existing resources and their community importance, and recognizing areas where these assets can be supported or enhanced to provide the greatest community benefit.

To that end, this strategy supports investments in creating, improving, and promoting recreational, cultural, historic, and educational assets to drive economic growth and improve quality of life. In particular, investments in Silver Lake and improvements to Camp-Oh-Neh-Tah will create a unique regional attraction that will provide new recreational opportunities and additional support for local organizations. Collectively, this can encourage tourism and economic growth.

Strategy 5 also supports efforts to increase marketing and branding to capitalize on the rich recreational and eco-tourism potential of the area, and to encourage new and appropriate growth. Enhancements to print, digital, and other marketing media will drive additional tourism, increase revenue for local businesses, and support a four-season economy. In addition, this strategy supports investments in additional connectivity efforts, including locally-operated shuttle service to connect visitors and residents to recreational, cultural, and historic assets throughout the Town.

To achieve the goals set forth under Strategy 5, proposed projects will direct efforts and investments to support cultural institutions, non-profit organizations, local event organizers, and other groups that foster the neighbor-to-neighbor network of community support. This strategy addresses a range of needs and opportunities across three Recovery Support Functions: Natural and Cultural Resources, Community Planning and Capacity Building, and Economic Development.

Table 3.5 identifies the Proposed and Featured Projects developed by the Committee to accomplish Strategy 5. Other recommendations that support this Strategy can be found in Table 5.1: Additional Resiliency Recommendations in Section 5 of this NYRCR Plan.



TABLE 3.5 – STRATEGY 5

Strategy 5: Promote economic growth, emergency preparedness, sense of place, and community cohesion through support for non-profit and community-based organizations, expanded marketing initiatives, and community events to strengthen “neighbor-to-neighbor” support networks, and to foster local arts and entertainment.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Silver Lake Project	This proposed project would create access to new passive and active recreational opportunities, an emergency shelter and multi-purpose community facility at Silver Lake and Camp Oh-Neh-Tah. The retrofit of several existing camp buildings will leverage the significance of this unique asset to serve multiple functions, including improved emergency sheltering, access to recreation, and additional resources and flexible space for local organizations, groups, and events.	\$1,961,500	Proposed	Y
Communication Improvements	Upgrade communications infrastructure to improve emergency services, and cellular and broadband Internet services to increase quality of life and promote economic growth.	\$1,000,000	Proposed	Y



Promotion of local events helps to create community identity, bolsters economic vitality, and fosters local arts and entertainment, as does the Pumpkin Fest sign depicted here. Photo is courtesy of Raymond Adams.



Photo of windmill house is courtesy of Raymond Adams.

Section 4

Proposed and
Featured
Project
Profiles



Photo is courtesy of Raymond Adams.



Section 4: Proposed and Featured Project Profiles

The New York Rising Community Reconstruction (NYRCR) Town of Windham Planning Committee (Committee) has undertaken an iterative and methodical process to arrive at the Proposed Projects, Featured Projects, and Additional Resiliency Recommendations presented in this NYRCR Plan. The project identification process incorporated qualitative and quantitative assessments, combined with stakeholder outreach and Committee discussions to identify and categorize actions for consideration. The project selection process consisted of three primary steps.

1. **Initial Project Identification:** The project evaluation process was initiated through a combination of existing plan reviews, preliminary stakeholder surveys, and Committee discussions. This collectively resulted in more than 50 possible projects and initiatives that spanned the full breadth of needs and opportunities for the Town of Windham (Town).
2. **Preliminary Project Analysis:** The list of potential projects was refined through a series of increasingly detailed, qualitative and quantitative analyses. Project evaluation criteria included potential benefits, feasibility, funding eligibility and availability; and alignment with the Town of Windham NYRCR Plan goals.
3. **Detailed Analysis and Final Project Selection:** Final project selection and categorization occurred through a series of in-depth analyses applied to projects identified during the previous phase of assessment. This process included detailed cost-benefit analysis, risk reduction analysis, and hydraulic modeling. This was combined with ongoing public feedback and Committee discussions.

This section provides detailed project profiles for all Proposed and Featured Projects. Additional Resiliency Recommendations are presented in Section 5: Additional Materials. Projects presented in this section are not ranked or prioritized.



The magnificent local terrain provides many opportunities to further enhance community attractiveness and economic vibrancy. Photo of all mountain top is courtesy of Raymond Adams.



Silver Lake Project (Proposed Project)

Project Background

Located at the eastern gateway of the Town of Windham, just off State Route 23, Camp Oh-Neh-Tah is a 400-acre property that has the potential to serve multiple important community purposes. The property is situated 200-300 feet in elevation above the Town of Windham, is not in a floodplain, and features the beautiful Silver Lake and surrounding wilderness. The Camp is owned by Girls Quest, a not-for-profit organization whose mission is to nurture girls aged 8 to 17 from low-income families from the greater New York and Catskills regions. The purpose is to help them achieve their full potential and become active members of their communities by building academic and social competence.

Throughout the NYRCR planning process, the Committee and members of the community identified the need for a stronger year-round economy that is better able to recover from disasters. More reliable emergency sheltering, expanded access to recreation assets, and a centralized location for community organizations that provide critical disaster support services to residents and visitors, was also a key interest of Committee Members.

Greater utilization of this property presents an opportunity to preserve the cultural legacy of this unique local asset, while expanding and enhancing flood safety, recreation options, social programs and economic development.

CONNECTION TO THE DISASTER

Hurricane Irene and Tropical Storm Lee exposed significant limitations in local sheltering capabilities in the Town of Windham. Two of three shelters were flooded during the storms, creating serious safety risks for residents and visitors.



Pictured here is Silver Lake at Camp Oh-Neh-Tah in the fall. Photo is courtesy of Raymond Adams.

These storms also jeopardized the regional economy and created substantial challenges for businesses. Flooding impacted the local economy in numerous ways, including commercial property damage, business interruptions, business closures, loss of tax revenues, and damage to recreational assets.

The importance of many local organizations and the pervasive, community-focused mentality became evident during the flooding and aftermath of Hurricane Irene. As emergency responders moved into action, they were supported by numerous organizations in Town that provided safe shelter and resources to support recovery efforts, without expectation of anything in return. Finding ways to support and enhance these community-based recovery and public safety benefits is critical to long-term resiliency.

The 400-acre camp property could potentially address all of these needs. It features the picturesque 27-acre Silver Lake, which is bordered by rustic camp buildings, including a boathouse and a lovely, small windmill, and is surrounded by several hundred acres of wilderness.

For over 70 years, Girls Quest furthered their mission by operating a summer camp on the property for the girls it serves, providing them with outdoor experiential education that promotes literacy, ecological awareness, teamwork, peer support and role-modeling, creative expression, problem solving, and leadership. In recent years, Girls Quest was unable to run its camp program, but has opened the facility to collaborate with the Adaptive Sports Foundation of Windham Mountain Resort, serving individuals with disabilities through

adaptive sports programs. Together, these organizations can expand their important work of helping at-risk youth, disabled veterans, pediatric cancer patients, and senior citizens.

DESCRIPTION OF PROJECT

Strategic improvements to the property could meet critical community needs, including the provision of safe



Pictured here is the iconic covered bridge at Camp Oh-Neh-Tah. Photo is courtesy of Raymond Adams.

emergency sheltering, support for local organizations, and addressing the needs of vulnerable populations from Windham and the larger region. The unique property also may advance local educational, cultural, and economic initiatives.

This project addresses the recovery, risk mitigation, safety and welfare, social, and economic development needs of the community, while preserving the ability of the camp to meet the needs of the vulnerable populations currently being served.

More specifically, this project could provide:

1. Emergency sheltering outside of the floodplain for the Windham community and surrounding area;
2. A community center that can serve a myriad of purposes for multiple organizations, including a welcome center to provide information to visitors; office space for the community's many non-profit organizations; a senior center; and space for cultural, educational, and recreational events;
3. Potential flood mitigation through active management of the Silver Lake dam; and
4. New, four-season recreational opportunities for residents and visitors, including swimming and boating, that do not currently exist in the Town of Windham.

The Committee's vision for this effort is comprised of multiple projects, some of which are well-suited for inclusion in this NYRCR Plan as a Proposed Project, and others that are more appropriately categorized as Featured. The complex project is presented here in its entirety, with distinctions made within the project description.

Emergency Shelter (Proposed)

The Silver Lake Project could provide much-needed safe and comfortable emergency sheltering for residents and visitors of the Town of Windham and surrounding area that is outside the floodplain and equipped with necessary infrastructure and services.

The Camp's existing infrastructure includes a large drinking water well that could support hundreds of people; connection to a multi-million dollar, state-of-the-art waste water treatment plant that is capable of handling approximately 16,000 gallons of wastewater per day; and an emergency generator. This project could capitalize on these and other assets of the existing Camp, including an industrial kitchen, storage space, and several large buildings, to create a safe and comfortable emergency shelter. This could be accomplished primarily through the retrofit of two existing Camp facilities—the Cafeteria and Chip Cherokee buildings.

The existing 3,660-square foot Cafeteria building provides ample space, and could serve as the primary shelter facility, with space to feed up to 150 people. It could also provide space for beds, storage, and bathing. An addition could be constructed onto the Cafeteria to create a 700-square foot facility with men's and women's restrooms, closets, and a shower. The 1,756-square foot Chip Cherokee building could serve as additional sheltering space for more beds, bathrooms, and storage.

Both buildings will be winterized and brought up to current building code requirements, and will likely require additional retrofits to make them ADA-compliant. The addition of new bathroom facilities, improvements to the kitchen facility, roof, wall and flooring, and the heating/ventilation/air conditioning



and electrical systems may also be necessary. General site improvements, including paving the main driveway and pathways between the two buildings, would also be required.

Improvements made to the facility may also allow for this site to be used as a back-up location for the Town's Emergency Operations Center (EOC), if the primary and preferable locations within the Town are available.

Community Facility (Proposed)

The Town of Windham's distinction as being "tight-knit" is one of its greatest assets and can be leveraged to achieve greater economic vibrancy and resilience, as well as increased public safety in times of emergency. The Community's "neighbor-helping-neighbor" mentality is evident through the everyday support its residents offer one another, and through the efforts of the Town's numerous nonprofit, cultural, and artistic organizations. These organizations, and their focus on helping others, play an important role in creating a sense of place and community cohesion.



Pictured here is the inside of the large cafeteria at Camp Oh-Neh-Tah. Photo is courtesy of Eileen Murphy.

Assistance from these local organizations was instrumental in providing resources and support for emergency response and disaster recovery efforts during Hurricane Irene and Tropical Storm Lee. The Committee identified the need to support these groups and to continue fostering neighbor-to-neighbor recovery efforts.

With an economy that already faces multiple challenges related to isolation and seasonal fluctuations, investments in this unique and important local asset could offer significant opportunities for greater economic resilience. The creation of a resource center on the property for non-profit organizations, historical, and cultural exhibits, community events, and information on local businesses and attractions would allow Silver Lake to serve as an informational and community support hub. Facility, operational, and resource support for these groups strengthens the Town's ability to support emergency response and recovery efforts, while preserving Silver Lake's historic and cultural legacy, and fostering economic growth and encouraging cultural initiatives.

It is envisioned that the existing windmill and boathouse would be used to create an information center and resource center, respectively. The 1,995-square foot boathouse is equipped with two classrooms and existing storage space, which make it well-suited for conversion to a resource center. This center could offer offices, exhibit space, and flexible space for education and training. It is possible that the boathouse could serve both functions.

One or both buildings would be winterized and brought up to current building code requirements, and will likely require additional retrofits, including window and door repairs, to make them ADA-compliant. The addition of new bathroom facilities, improvements to the roof, walls and flooring, and the HVAC and electrical systems may also be necessary.

Flood Control Improvements (Proposed)

The Silver Lake dam is located at the headwaters of a tributary of the Batavia Kill upstream of the Town of Windham. This project includes a feasibility study to determine the potential for the dam to be utilized as a flood control structure that could reduce the impact of a future major flood in the Community. If the findings of the study support such a use, necessary improvements could be made to the dam.



Pictured here is the slide at the lake at Camp Oh-Ne-Tah. Photo is courtesy of Eileen Murphy.

Recreation and Social Improvements (Featured)

It is envisioned that the Camp Oh-Ne-Tah facilities would continue to be used by Girls Quest and the Adaptive Sports Foundation to serve at-risk youth, disabled veterans, and pediatric cancer patients, while also providing a new recreational resource for residents of and visitors to the Town of Windham.

Many of the facility improvements described would also allow for an expanded use of the site for the important programs run by Girls Quest and the Adaptive Sports Foundation. However, additional enhancements, such as development of accessible trails and upgrades to the Silver Lake boat launch, would further expand the function and benefit of the Silver Lake property for programs that serve vulnerable populations.

Additional site improvements could also improve quality of life for residents by offering new and expanded recreational opportunities, both on Silver Lake and the surrounding natural areas. These improvements may include an expanded trail network that connects to existing recreational trails in the area, camping facilities, designated public access areas on Silver Lake, a public boat launch, and possibly a boating program.

Enhancing the recreational opportunities available on Silver Lake site could help to further economic growth, tourism, and community health. While the Northern Catskills and the Town of Windham, in particular, are attractive to visitors and second homeowners for their outdoor recreational offerings, there is no water

recreation facility. A public-access lake for boating, swimming, and camping facilities (that also are currently not available in the Town of Windham) could fundamentally enhance the attractiveness of Windham for tourists, and dramatically improve the local economy, still recovering from the storm events.

Acquisition (Featured)

Implementation of the Silver Lake Project could potentially include the acquisition of all or part of the property. The feasibility of this project component may be investigated and pursued, if appropriate, during project implementation.

COST ESTIMATES

The estimated total project cost, as itemized below, is \$1,961,500, plus the cost of acquisition (the latter to be determined).

1. Creation of an Emergency Shelter in the Cafeteria Building and Chip Cherokee building:
 - Site improvements (paving): \$62,000
 - Cafeteria retrofit: \$731,900
 - Chip Cherokee Retrofit: \$302,770
2. Creation of a Community Resource Center in the existing boathouse: \$389,830
3. Flood Control Feasibility Study: \$75,000
4. Recreational amenities and programming improvements (Featured): \$400,000
5. Acquisition (Featured): To be determined

Project Benefits

This facility improvement, economic development, and social service project provides multiple benefits to the Town of Windham, including risk and safety improvements, and economic, historic, cultural, and social benefits.



FLOOD PROTECTION AND SAFETY

Creating much-needed emergency sheltering facilities significantly increases public safety during flood events. This project would create safe and comfortable sheltering for residents and visitors outside of the floodplain to ensure access to essential services and needs during a disaster.

Additional resources and space to support Town officials and local organizations would also enhance public safety by improving these groups’ ability to provide assistance to residents and visitors during future disaster events.

Also, the new facility would allow for access to power to charge cell phones and access the Internet to connect people with loved ones and emergency responders. The new facility would also include a central repository of emergency and evacuation procedures, educational materials, and space for training programs.



Pictured here is the type of emergency sheltering with beds envisioned at Camp Oh-Neh-Tah. Photo is courtesy of FEMA.

Finally, this project could also explore the potential for operating Silver Lake dam as a flood control structure. This could add additional flood protection to residents and businesses in the Town of Windham.

ANTICIPATED REDUCTION OF RISK

The creation of a shelter and multi-purpose community resource facility would support public safety, emergency response, and existing community-based services that

increase safety and reduce risk during emergencies. Upgrades to this facility would also allow for related benefits, such as power to charge cell phones and potential use of the site as a back-up Emergency Operations Center (EOC).

ECONOMIC

This project would bolster local artistic, cultural, and historic efforts by providing resources to support local organizations and space for exhibits and events. It would also support the tourist trade, and build resilience through the provision of information about local assets, and expanded access to recreational opportunities.

In addition, this project would have economic and community health impacts that benefit all residents and business owners, by encouraging additional economic growth and cultural initiatives, and by providing visitors with information on local offerings.

When complete, this project would encourage the creation of new events, organizations, artistic pursuits, and amenities to retain and attract residents and visitors, promote vibrancy, grow local tax revenues, and improve overall quality of life.

These improvements would also provide economic stimulus with the creation of construction and support-related jobs from labor, materials, equipment, and other sales for suppliers and support industries. This project would create approximately 15.8 total FTE jobs, including 13.5 FTE construction jobs, potentially creating employment for local and regional contractors, in addition to 2.3 FTE jobs from increased materials and equipment sales for suppliers and support industries.

As spending is injected into local and regional job and supply markets, an increase in induced spending also occurs, as employees and businesses that benefit from the construction work spend money on other goods and services.



SOCIAL

Improvements to the property would allow for the continuation of the important service Girls Quest provides for at-risk children and the expansion of programming to benefit other vulnerable populations.

In particular, it is envisioned that the improved facilities could bolster the social benefits provided by Adaptive Sports Foundation (ASF) through its critical work with the Wounded Warriors veterans program and pediatric cancer patients.

These programs, as well as new programs for seniors, could provide improved access to new facilities and recreational opportunities on the property. As an aging community with extremely limited options for seniors, this project could provide valuable resources and activities for older residents.

ENVIRONMENTAL

This project could benefit the environment through the preservation of all or most of the 400+ acre property as open space, preserving contiguous natural habitat and ensuring that environmentally sensitive areas of the property are protected.

This project also has the potential to further educate the Town's residents and visitors on the importance of habitat preservation, and raise awareness of environmentally sensitive areas. In addition, renovated facilities may increase environmental quality in the buildings.

PUBLIC SUPPORT

This project provides increased public safety and economic growth and resilience, which were among the most significant areas for investment supported by the Community throughout the planning process.

Improvements made by this project address existing sheltering needs and economic challenges related to repetitive flooding, and provides support for local organizations in the Town of Windham.



Pictured here is the windmill at at Camp Oh-Neh-Tah. Photo is courtesy of Raymond Adams.

Emergency response improvements and economic development initiatives were regularly cited as important resiliency project types among participants who responded to surveys, interviews, and project-type scoring during Public Engagement Events.

ADDITIONAL BENEFIT

This project would positively impact additional areas of community health and wellness.

Preserving Local Character and Retaining Sense of Place

Unique historic and recreational assets, such as Camp Oh-Neh-Tah and Silver Lake, contribute significantly to Windham's character and sense of place.

By investing in projects that can improve and leverage these assets, and by driving additional activity to local attractions, the Town would protect its unique character and sense of place. Where appropriate, existing historic character could be preserved and incorporated into adaptive reuse of Camp facilities. The resulting unique character and charm of a retrofitted historic structure can add to local character, while creating new productive uses.

Project Cost-Benefit Analysis

This project would provide for safe sheltering during future disasters; ensure ongoing critical social programs; provide for new recreation opportunities; and assist in



ongoing economic recovery from past storms. These benefits are essential for local flood safety, quality of life, and economic growth. Collectively, they justify the potential project costs.

Implementing this project could preserve and increase support services for vulnerable populations, and help to create a four-season economy.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of bid documents, review of responses, and the completion of construction of the emergency shelter and community facilities, is expected to occur over an approximate 20-month period.

Project implementation of the flood control and dam feasibility study would occur over an approximate 6-month period. Project implementation related to acquisition and recreation improvements is to be determined.

REGULATORY REQUIREMENTS

Completion of the proposed project would require regulatory and permitting approvals from appropriate agencies, such as a New York State (NYS) Department of Environmental Conservation (DEC), a NYS Department of Transportation (DOT) Highway Work Permit, and local construction and building permits.

JURISDICTION

At the time of this NYRCR Plan’s publication, jurisdiction for this project lies with the non-profit organization, Girls Quest.

SUMMARY

Silver Lake Project (Proposed Project)

- Investment: \$1,961,500 + Acquisition
- Flood Level Reduction: N/A
- Assets Protected: 1
- Potential Future Loss Prevented: Helps to prevent the potential loss of a unique local asset
- Jobs Created: construction: 13.5 FTE*; total: 15.8 FTE*
- Strategies Supported: 3
- Other Benefits:
 - Provides much needed safe sheltering during emergencies
 - Protects and preserves a locally significant asset
 - Economic growth and additional tourism attraction
 - Lifestyle and health benefits
 - Educational advancement
 - Social benefits through support for programs assisting vulnerable populations

** The FTE construction jobs were estimated based on a methodology developed by the U.S. 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.*

South Street Stormwater Collection System (Proposed Project)

Project Background

Hurricane Irene caused extensive and devastating flooding along the Batavia Kill. Intense rainfall caused the stream to swell, and floodwaters combined dangerously with sheets of water that flowed down the mountainous terrain onto properties and infrastructure systems in the Hamlet of Windham.

The intensity of the floods overwhelmed and damaged culverts, bridges, and roadways, and it isolated many residents, who were without means of evacuation or rescue. In addition, numerous homes and businesses were damaged or destroyed.

Sections of South Street and Windham Mountain Village that experienced significant flooding during Hurricane



Pictured is an example of a wetland area with passive recreation. Photo of boardwalk through the marsh land is courtesy of Tetra Tech, Inc.

Irene and Tropical Storm Lee do not have sufficient drainage and stormwater management systems to accommodate such large water flows during flood events. The limitations of these systems contributed to mobility restrictions, property damage, and safety concerns during Hurricane Irene and Tropical Storm Lee.

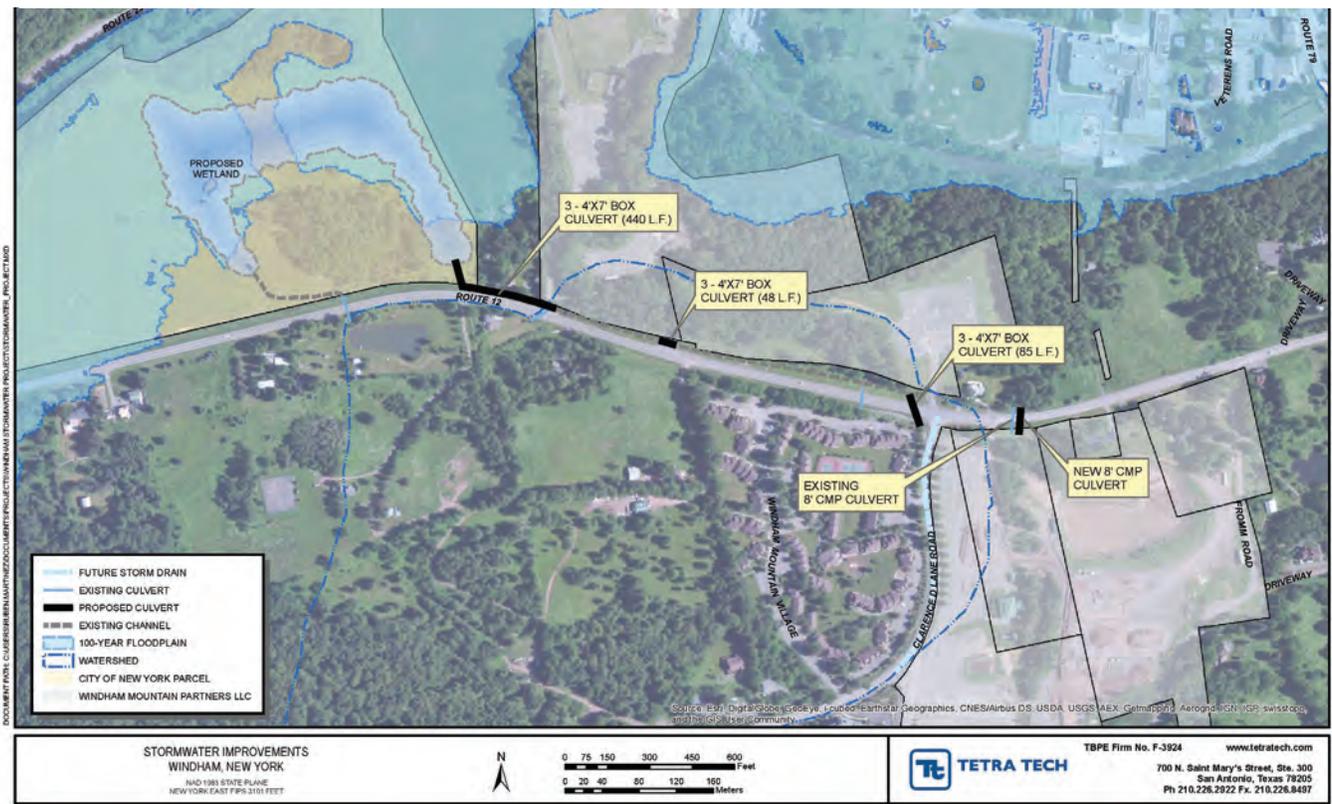
A stormwater collection system, strategically located along the western portion of the Hamlet of

FIGURE 4.1 – CONCEPTUAL RENDERING, SOUTH STREET STORMWATER COLLECTION SYSTEM





FIGURE 4.2 – CONCEPTUAL STORMWATER IMPROVEMENTS



Windham, would reduce future flood damages and increase safety and access to Windham Mountain Village. Through a series of drainage improvements, additional, undeveloped acreage will be utilized to absorb floodwaters and runoff from elevated areas on Windham Mountain.

CONNECTION TO THE DISASTER

The lack of adequate drainage and stormwater collection systems to accommodate runoff and stream floodwaters contributed to significant flooding in the Hamlet of Windham during Hurricane Irene. An eight-foot-diameter culvert at the base of the Windham Mountain Ski Center washed out and dramatically limited access to and egress from Windham Mountain. Infrastructure and properties along South Street and Windham Mountain all received significant damage and could be made safer through stormwater management and drainage improvements.

DESCRIPTION OF PROJECT

This project proposes an enhanced drainage system, including culvert improvements and the creation of a wetland treatment/passive recreational area along South Street in the Hamlet of Windham.

This project would create a stormwater collection system, wetland area, and retaining pond on New York City Department of Environmental Protection (NYC DEP) property on the west side of South Street in the Hamlet of Windham. It would alleviate flooding, provide recreational opportunities, and enhance economic growth.

When complete, these investments will improve access and safety during flood events by reducing flooding along South Street and in Windham Mountain Village. The project would also improve water quality in the Batavia Kill by capturing and treating sediment-laden stormwater in a constructed wetland. The project will



New wetland areas create educational opportunities for local students, residents, and visitors. Photo of group standing in the wetlands and learning about the wetlands is courtesy of Tetra Tech, Inc.

be configured to provide additional flood retention and stream capacity during large storms on the Batavia Kill, while also presenting opportunities for recreation and the creation of a unique scenic asset.

Specific project work will include upgrading two culverts near the intersection of Clarence D Lane and South Street, and creating additional drainage improvements. An existing eight-foot-diameter corrugated metal pipe to the east of CD Lane requires an additional eight foot pipe to handle the 100-year storm and to collect runoff from parts of Windham Mountain, the Enclave, and Windham Mountain Village. A second culvert to the west of CD Lane will be augmented with three box culverts. Additional culverts on the north side of South Street will convey the runoff east to a 44-acre property owned by the NYC DEP.

This improved drainage system will convey floodwaters away from infrastructure systems and homes at Windham Mountain Village and along South Street into the drainage area. A portion of the 44-acre tract will

be converted into a stormwater wetland and retaining pond to reduce sediment, nutrients, and erosive velocities before discharge into the Batavia Kill.

The new wetland and retaining pond would provide an opportunity to create a unique passive recreational asset and beautiful western gateway into the Hamlet of Windham. This project envisions the wetland and retaining area becoming the center of a natural recreational area with multiple amenities and scenic features. These include boardwalk-style paths, educational materials, and other features designed to withstand flooding. The paths within this area have the opportunity to connect with future sections of the Windham Path to create a unique and educational feature to the path system.

COST ESTIMATE

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



Project Benefits

This infrastructure repair, flood mitigation, and recreation project provides multiple benefits to this Town of Windham NYRCR Community, including risk and safety improvements, damage reduction, and economic, recreational, and social benefits.

FLOOD PROTECTION AND SAFETY

This project would greatly add to the protection of Windham Mountain and South Street in the Hamlet of Windham, from flooding that occurs during large storm events. It is envisioned that the stormwater collection system will divert a sufficient volume of water to alleviate or lessen flooding that would be expected during high-flow scenarios.

By directing floodwater away from South Street and Windham Mountain access roads, the resulting inundation reduction will increase safe travel in the Hamlet of Windham, thus improving mobility and access during storm events. With limited egress points, it is critical to ensure transit routes are safe for travel during storms to allow residents and emergency services to enter and exit the Hamlet.

As a result of this project, numerous homes and properties at the base of Windham Mountain and along South Street would also realize flood protection and safety improvements.

ANTICIPATED REDUCTION OF RISK

Initial analysis indicates that the improved drainage feature would reduce flood levels and damage for a number of properties and infrastructure systems in the Hamlet of Windham along South Street and on Windham Mountain. In turn, this would reduce safety risks for residents and vehicular traffic.

Properties in this area of the Town were among the first to flood during Hurricane Irene and are at increased risk for future flood damage, due to the combination of floodwaters from the Batavia Kill and sheet flooding from Windham Mountain. This project will divert water away from homes and infrastructure, and direct it into

a retaining area for treatment. This project will help to protect at least two identified assets (Windham Mountain and the Hamlet of Windham), and will also reduce risk for infrastructure systems and numerous homes.

FIRE PROTECTION

The proposed pond could provide an additional water resource to support firefighting operations. Based on the ultimate design, size, and impoundment volume of the proposed pond, access and infrastructure (dry hydrant) could be integrated into the project to enhance local firefighting capabilities.

ECONOMIC

Already a major driver of local revenue, job creation, and tourism, the recreation industry will be bolstered by the addition of a new wetland area, trail feature, and expanded recreational opportunities.

A new outdoor recreational asset will provide economic growth by supporting the existing, strong eco-tourism economy in the Town of Windham, while adding a unique, passive recreational feature.

While predominantly envisioned as a passive recreational area, this project will provide walkways, educational signage, and other visitor amenities that complement and diversify the Town's more active and programmed recreation options. This project will also serve an aesthetic benefit by introducing an attractive gateway feature along the western entrance to the downtown commercial area of the Hamlet of Windham.

These improvements will provide direct economic stimulus through the creation of construction- and support-related jobs from labor, materials, equipment, and other sales for suppliers and support industries. This project would create approximately 21 total full time equivalent (FTE) jobs, including 17.85 FTE construction jobs.

It would potentially create employment for local and regional contractors, in addition to 3.15 FTE jobs from increased materials and equipment sales for suppliers and support industries. Funds injected into construction supply lines may induce spending on local goods and services. In addition, by increasing infrastructure resiliency and property protection, this project will reduce any future maintenance or repair costs associated with flood damage.

Finally, this project also serves to reduce potential future damage to Windham Mountain Village and homes along South Street, representing significant future cost savings by avoiding repairs and potential loss of the tax base.

ENVIRONMENTAL

The completed project will complement the natural character traits of the Town of Windham and result in several environmental benefits. In particular, the project will prevent or lessen environmental damage that is caused during high water and flooding events by providing an additional area for runoff. The new wetland area created will provide a natural flood-mitigating feature to the existing landscape that will also serve to remove contaminants from entering the waterways.

It is envisioned that a portion of the 44-acre parcel would be used to hold stormwater surges, treat turbid-laden water prior to discharge to the Batavia Kill, and provide a water amenity within the aforementioned passive recreation park. Removal of sediments and pollutants during retention and treatment will reduce contamination, and improve water quality in the Batavia Kill. Properly constructed wetlands provide incredible opportunities for ecological and biological diversity, and will establish suitable environments for numerous species of plants, animals, and insects.

Table 4.1 summarizes the environmental benefits associated with this project.

PUBLIC SUPPORT

The project provides improved flood protection and infrastructure resilience to address repetitive flood conditions. It also creates new recreational amenities to drive economic growth and increase options for residents and visitors.

TABLE 4.1 - TYPE AND QUANTITY OF ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Creation of a stormwater collection system, wetland area, and retaining pond to alleviate flooding in the Town of Windham.	Creation of acres of drainage area at the west end of South Street.
Clean-Up Accomplished	Potential for debris removal along the drainage area.	TBD
Open Space Created	Creation of additional wetland areas and retaining pond features.	TBD
Importance for Habitat	The creation of the stormwater collection system will allow undeveloped acreage to absorb floodwaters from the Batavia Kill and runoff from elevated areas. The new wetland area will provide a natural flood-mitigating feature, and will create a diversely vegetated floodplain that is important for other wildlife.	



ADDITIONAL BENEFITS

Aesthetic Benefit

This project creates a visibly appealing water and natural area feature that supports the Town's existing character, and establishes a pleasing gateway on the west end of the Hamlet of Windham.

Trail Connection

Adds a unique feature to the Windham Path and complements the New Trails and Connections Project

Educational Advancement

Provides opportunities for expansion of local schools' science curriculum to include site visits, experiments, and ecology projects.

Project Cost-Benefit Analysis

This project stands to create truly diverse local improvements and a net benefit to resilience and health in the community. One of the most immediate benefits of this project is the increase in flood protection and mobility along South Street and for Windham Mountain Village. The management of floodwater and runoff can prevent damage and loss of access, similar to that which occurred during Hurricane Irene and can significantly increase public safety. This project also has far-reaching economic and social benefits by creating a unique recreation asset, education opportunities, avoiding future repairs, and maintaining the existing tax base, while ensuring safe access to one of the Town's largest economic drivers.

By providing benefits across so many important areas of community resilience, all of which were supported during public outreach, this project justifies both the capital cost and efforts to overcome any potential implementation challenges including permitting, property easements, maintenance costs, and any impacts on existing landuses.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of bid documents, review of responses, and the completion of construction work, is expected to occur over an approximate 19-month period.

REGULATORY REQUIREMENTS

Completion of the proposed project will require regulatory and permitting approvals from appropriate agencies, such as a NYS DEC Article 15 Permit, NYC DEP, a NYS DOT Highway Work Permit, and local construction and building permits.

JURISDICTION

The Town of Windham has jurisdiction of this Proposed Project.



SUMMARY

South Street Stormwater Collection System (Proposed Project)

- Investment: \$2,500,000
- Flood Level Reduction: reduced inundation for properties and infrastructure along South Street and on Windham Mountain
- Assets Protected: 2; reduced risk for numerous structures and infrastructure systems
- Potential Future Loss Prevented: future flood damage avoided through improved drainage
- Jobs Created: construction - 17.85 FTE; total: 21 FTE
- Strategies Supported: 3
- Other Benefits:
 - Unique passive recreation and trail system feature
 - Water quality and ecology improvement
 - Educational advancement
 - Creates an appealing gateway feature
 - Potential synergy with New Trails and Connections Project

** The FTE construction jobs were estimated based on a methodology developed by the U.S. 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.*



Mad Brook Retaining Wall Improvements (Proposed Project)

Project Background

Mad Brook is a tributary to the Batavia Kill that flows through the center of the Hamlet of Windham’s downtown. Because the channel is confined by buildings on both sides and an undersized bridge on Main Street, large storm events have resulted in flood damage to nearby properties and infrastructure. In general, during large storm events, the channel has overtopped its banks just upstream of the right bank retaining wall, and overtopped the bridge at Main Street, causing flooding in a westerly direction through the Hamlet.

CONNECTION TO THE DISASTER

The Mad Brook retaining wall is primarily designed to provide flood protection during smaller, more frequent storms, and has historically served this purpose with success. However major flooding, such as that which occurred during Hurricane Irene, exceed the current capacity of the wall to not protect the hamlet of Windham during these larger events.

During Hurricane Irene, the magnitude of flood water confirmed the limitations of the Mad Brook retaining wall by overtopping the structure and contributing to flooding and flood damage in the downtown of the Hamlet of Windham. The severity of flooding from Hurricane Irene damaged large sections of this system, and jeopardized its ability to protect properties from future flood events and limit inundation of Main Street. As water damaged and overtopped the existing wall, nearby commercial buildings suffered extensive damage, placing occupants at high risk and resulting in expensive rebuilding efforts. Several small businesses in particular were damaged as a result of these events causing significant safety hazards and financial burdens for the business owners.



Structural damage to the Mad Brook retaining wall and adjacent buildings after Hurricane Irene. Photo is courtesy of Jeff Luckey.

Repairs and improvements to this important infrastructure system are required to maintain and improve its flood protection value during small and moderate flood events and to extend that protection to larger events if possible in the future.

DESCRIPTION OF PROJECT

This project proposes the repair and improvement of the Mad Brook retaining wall and drainage system to increase structural stabilization and ensure continued and improved functionality and flood protection for neighboring properties, Main Street, and the Main Street Bridge.

The existing, 625-foot long Mad Brook retaining wall has provided flood protection along Main Street and for adjacent properties for up to 100-year flood events. However, Hurricane Irene and Tropical Storm Lee caused significant damage to the wall, reducing its ability to protect surrounding properties from future flooding and threatening to undermine the foundations of the structures along the creek. This project would include rehabilitating the existing retaining wall and extending the wall approximately 150 feet upstream. The new wall section would extend upstream of the existing wall to prevent floodwaters from getting behind the wall. A detailed engineering and design phase will be needed to accurately determine the appropriate added length and height.



Pictured here is the Mad Brook retaining wall. Photo is courtesy of Tetra Tech, Inc.

Gravel harvesting could also be considered to increase the cross-sectional area of the channel to improve channel capacity. If gravel harvesting is conducted, a plan would be required to maintain the designed channel dimensions. Collectively, these improvements would maintain and improve protection for properties, increase flood safety for vehicular traffic, improve access and emergency response, and protect the Hamlet of Windham’s commercial core.

COST ESTIMATE

The estimated total project cost is \$195,500 - \$362,500. Final project costs will depend on whether some or all components of the project are selected for implementation. Project components may include:

- Repair of 625 feet of existing wall: \$195,500
- Construct 150 feet of new wall: \$80,500
- Gravel harvesting: \$86,500

Project Benefits

This infrastructure repair and flood mitigation project would provide multiple benefits to the Town of Windham, including risk and safety improvements, damage reduction, and economic and social benefits.

FLOOD PROTECTION AND SAFETY

Repairs and improvements to the Mad Brook retaining wall will increase public safety and property protection, while enhancing mobility and stream function.



Pictured here is the Mad Brook retaining wall. Photo is courtesy of Raymond Adams.

This Proposed Project will address damage from Hurricane Irene to maintain the integrity of this key infrastructure system. It would allow for continued management of water surface elevations and flood protection for adjacent properties and infrastructure.

Improvements to the retaining wall would help to ensure continued flood inundation prevention for properties and Main Street, which increases safe travel and helps to provide reliable and much-needed transportation access for emergency responders during storm events.

As the primary thoroughfare and access route for the Hamlet of Windham, it is critical to ensure safe travel along Main Street during storms to enable residents and emergency services to enter and exit the Hamlet.

ANTICIPATED REDUCTION OF RISK

Hydraulic analysis, anecdotal evidence, and site visits all indicate that the retaining wall’s current configuration protects commercial assets in the floodplain and the Main Street Bridge. As a result, this project has the potential to reduce the risk for two assets (Main Street Bridge and the Hamlet of Windham’s commercial district) that were identified in the asset inventory. The reduction in risk is attributable to continued reduction in inundation extent, as a result of necessary repairs to ensure functionality.



If the wall is compromised, resulting soil erosion would undermine and jeopardize the foundations of structures along the creek. If this occurs, the structures would be placed at severe risk for collapse, and the resulting debris in the stream could cause additional damage to stream conditions, Main Street, and Main Street Bridge.

Rehabilitating the wall to maintain the current level of protection would increase flood safety and decrease potential risk to adjacent properties by stabilizing soils, protecting foundations, and controlling flood waters. These improvements would also ensure that the wall continues to reduce water inundation on Main Street during flood events, thus increasing safety and access to one of the Town’s main thoroughfares.

ECONOMIC

Improvements to the Mad Brook retaining wall will have direct economic benefits to the Town of Windham.

By protecting multiple adjacent commercial properties, the Town would ensure the continued provision of amenities for residents and visitors, retain jobs, and protect important tax-generating businesses.

Local businesses contribute significantly to the Hamlet’s role as a commercial center and tourist destination; their protection during future storms is paramount. Ensuring property protection and safe mobility along Main Street further promotes economic vibrancy in this key downtown area by reducing the risk to existing small businesses and promoting confidence in new investment. As the Town implements infrastructure projects that address lingering flood safety and accessibility issues in primary commercial areas, investors will be encouraged to grow businesses and job opportunities in Windham.

These improvements will also provide economic stimulus through the creation of construction- and support-related jobs from labor, materials, equipment, and other sales for suppliers and support industries. Depending on which components are implemented, this

project would create approximately 1.6 to 3.0 FTE jobs, including 1.4 to 2.6 FTE construction jobs, which could create employment for local and regional contractors, in addition to .2 to .4 FTE jobs from increased materials and equipment sales for suppliers and support industries.

Funds injected into construction supply lines would also cause additional induced spending on local goods and services. In addition, this project would have a financial benefit by increasing infrastructure resiliency, thus reducing future maintenance or repair costs associated with flood damage.

ENVIRONMENTAL

Improvement of the retaining wall mitigates potential environmental damage by protecting the stream bank from erosion during high-water events. The expected result of the project will improve conditions within and along Mad Brook by reducing debris, sediment, and contaminants from entering the waterway, and will likely help to enhance water quality.

The Mad Brook is identified as a class “C” waterway, which indicates that its water supports fisheries and is suitable for non-contact activities. This project will create a more reliable flow source to support aquatic life. It is anticipated that the post-construction condition will help facilitate the movement of trout to any spawning sites in the streams.



Damaged sections of the retaining wall contribute to debris and reduced water quality in the Mad Brook. Photo is courtesy of Raymond Adams.



PUBLIC SUPPORT

This project was conceived to address repetitive flood conditions, enhance public safety, increase resilience of commercial structures, and promote economic growth. As such, this project closely aligns with the public input received during Public Engagement Events and other outreach opportunities.

ADDITIONAL BENEFIT

In addition to the benefits described above, this project stands to positively impact additional areas of community health and wellness.

Leverage Recent Investments

Following Hurricane Irene and Tropical Storm Lee, limited sections of this feature were repaired. By continuing repairs and improvements, this project ensures earlier efforts and funds are not lost, due to failures of upstream sections of the wall.

Project Cost-Benefit Analysis

The repair and improvement of this important flood control feature will benefit overall resilience toward future storms, ensuring the continued protection of one of the Town's commercial centers and the safety of its residents and visitors. In addition, these improvements are important to improve mobility and emergency response during disasters, and to promote economic vibrancy by protecting businesses in the Hamlet of Windham's downtown.

The continued reduction of flood water on one of the Town's main thoroughfares, and increased protection for adjacent properties and infrastructure, significantly outweigh any potential costs related to construction, permitting, or construction easements. The relatively small capital investment associated with this project also increases its importance, as many diverse benefits are gained at a relatively minimal cost.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of bid documents, review of responses, construction easement coordination with adjacent property owners, and the completion of construction work, is expected to occur over about a six-month period.

REGULATORY REQUIREMENTS

Completion of this Proposed Project will require regulatory and permitting approvals from appropriate agencies, such as a New York State (NYS) Department of Environmental Conservation (DEC) Article 15 Permit, NYS Department of Transportation (DOT) Highway Work Permit, and local construction and building permits.

JURISDICTION

The Town of Windham has jurisdiction of this Proposed Project.



SUMMARY

Mad Brook Retaining Wall Improvements (Proposed Project)

- Investment: \$195,500 - \$362,500
- Flood Level Reduction: reduces current inundation during small and moderate flood events for adjacent properties and Main Street infrastructure
- Assets Protected: 2; reduced risk for multiple structures and infrastructure systems
- Potential Future Loss Prevented: Future flood damage avoided through improvements
- Jobs Created: construction: 1.4 to 2.6 FTE, Total: 1.6 to 3.0 FTE
- Strategies Supported: 3
- Other Benefits:
 - Helps to maintain mobility on a major thoroughfare
 - Project readiness
 - Relatively small investment for significant gain
 - Creates an appealing gateway feature

** The FTE construction jobs were estimated based on a methodology developed by the U.S. 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.*



Route 56 Culvert Upgrade (Proposed Project)

Project Background

Flooding associated with Hurricane Irene caused major impacts to properties and infrastructure systems. Damage to key infrastructure and resulting road inundation created dangerous conditions and complete isolation of parts of the Town of Windham, as inadequate or undersized culverts, bridges, and water conveyance infrastructure failed to accommodate the magnitude of flood water. These infrastructure insufficiencies and flooded roadways greatly hindered emergency response efforts and the ability of residents in parts of Town to evacuate or seek assistance.

Route 56 is a 4.5-mile, dead-end road that serves several dozen residences in the Batavia Kill valley, northeast of the Hamlet of Maplecrest. It also provides access to one of the Town's flood control dams at C.D Lane Park. Route 56 crosses both the Batavia Kill and its tributaries at numerous locations, each of which represents a potential area for road inundation and access restrictions. Residents may become isolated if, during a flood, any one of these crossings washes out. One critical location with a history of overtopping is the tributary crossing that is located 200 feet northeast of Charbonneau Way.

CONNECTION TO THE DISASTER

Sections of Route 56 became impassible during Hurricane Irene as undersized culverts failed to accommodate the volume of flood water. This contributed to isolation and safety concerns for Maplecrest residents and dangerous mobility restrictions for emergency responders.

The undersized culvert targeted for improvement through this project contributed to the flooding and damage of the road, isolation of Maplecrest residents, and prevention of access to the dam during the event.



Pictured here is an existing undersized culvert. Photo is courtesy of Tetra Tech, Inc.

DESCRIPTION OF PROJECT

This project proposes to upgrade and improve an undersized 4-foot corrugated metal pipe (CMP) culvert on Route 56 with a larger 6-foot-by-6-foot box culvert to expand capacity, improve mobility, ensure access to a nearby flood control structure, and reduce localized flood impacts.

The proposed improvement involves installing a larger culvert to help convey, at a minimum, the 100-year recurrence interval flow, which would also help pass any large debris that could block a smaller culvert.

The results of hydraulic analysis indicate that the existing culvert, a 4-foot diameter CMP, cannot pass the 100-year flow without overtopping the road. Additionally, debris jams were reported to be a major cause of culvert failure at this location. The proposed improvement would allow the structure to convey, at a minimum, the 100-year recurrence interval flow, which would also help pass any large woody debris that could block a smaller culvert. When complete, the improved crossing structure would help to ensure access to the Hamlet of Maplecrest and a critically important flood control dam during flood events.



Pictured here is an example of a larger box culvert that would improve conveyance and flood safety. Photo is courtesy of Tetra Tech, Inc.

COST ESTIMATE AND ADDITIONAL FUNDING

The estimated total project cost is \$170,000.

Project Benefits

This infrastructure improvement and flood mitigation project provides multiple benefits to the Town of Windham, including risk and safety improvements, damage reduction, and economic and social benefits.

FLOOD PROTECTION AND SAFETY

Completion of this culvert upgrade will greatly increase flood protection and safety. A larger and more-appropriately sized culvert will prevent road washouts and overtopping for a greater number of high-water and flooding scenarios. This will result in longer windows to support evacuations and will enhance access for first responders to areas of the Town that have traditionally been cut off during flood events. Specifically, this project will benefit the residents of the Hamlet of Maplecrest, who have historically been “cut off” during high-water situations, due to flooding and closure of Route 56.

This project will also preserve access to one of the Town’s flood control dams during flood events, and will allow for monitoring and operational control, thus increasing the structure’s role in flood prevention and protection.



Pictured here is an existing undersized culvert. Photo is courtesy of Tetra Tech, Inc.

ANTICIPATED REDUCTION OF RISK

The online U.S. Geological Survey (USGS) Streamstats application was used to estimate the 100-year peak flow of 133 cubic feet per second (cfs). The Federal Highway Administration’s HY-8 Culvert Analysis Program was used to estimate the effectiveness of various culvert types and sizes for passing the 100-year event. Note that this is a cursory analysis, based on approximated input data for use as a screening tool. A thorough engineering analysis is required to determine final culvert design.

The HY-8 results indicate that the existing culvert, a 4-foot diameter CMP, cannot pass the 100-year flow without overtopping the road. These findings support anecdotal evidence and local reports of culvert failure and road inundation at this location during past flood events. Several scenarios were run in HY-8 with a factor of safety of 1.5. This factor of safety resulted in an increased 100-year design flow of 200 cfs. The scenario results indicate that a minimum cross-sectional area of about 21 square feet is required.

Natural constraints at the site limit the maximum rise of the culvert to about 6 feet. Because debris jams were reported to be a major cause of culvert failure at this location, it would be advantageous to upsize the culvert to a 6-foot-by-6-foot box or other larger variation, such as a 5-foot-by-8-foot box, or even 6-foot-by-9-foot pipe arch to reduce the risk of debris clogging the culvert.



The ability to pass 100-year floodwaters to and accommodate potentially large debris, significantly reduces the likelihood of road inundation and associated risks to health, safety, and property protection.

FIRE PROTECTION

As noted, these improvements will support fire department emergency operations, by allowing department vehicles to use Route 56 during high-water events.

ECONOMIC

Implementation of this project may realize economic benefits for the community through job creation and local contracting and employment opportunities associated with culvert replacement efforts. Allowing Route 56 to remain passable during high-water events will also support routine economic activities in the Town of Windham and specifically, the Hamlet of Maplecrest.

Most directly, these improvements will provide economic stimulus through the creation of construction and support-related jobs from labor, materials, equipment, and other sales for suppliers and support industries. This project would create approximately 1.4 total FTE jobs, including 1.2 FTE construction jobs for local and regional contractors, in addition to .2 FTE jobs from increased materials and equipment sales for suppliers and support industries.

Funds injected into construction supply lines will also cause additional induced spending on local goods and services. In addition, this project will have a financial benefit by increasing infrastructure resiliency, thus reducing any future maintenance or repair costs associated with flood damage.

ENVIRONMENTAL

An upgraded culvert will prevent or lessen environmental damage upstream of the culvert by allowing conveyance of larger volumes of water. This will limit erosion, road damage, and deposition of debris. Replacing the currently undersized culvert with an improved structure provides several other environmental benefits, including improved stream function, debris removal, and increased capacity in the channel to accommodate potential floodwaters. Further, improvements will help to improve water quality and maintain a natural channel, which prevents habitat features from being harmed.

The results from analysis of NYS DEC data sets showed that this project is near a potential or historic record of threatened or endangered species, including the bald eagle, musk root, hooker's orchid, northern running-pine, and rough avens. The expected result of the project will improve conditions in and along the Batavia Kill, and is not likely to affect the identified endangered species. During the construction of the improvements, consideration of these species should be made to ensure their protection. Although no wetlands were identified in the project impact area, the reduction in water surface elevation during smaller interval storm events could lead to the revitalization of wetland areas.

The Batavia Kill is identified as a class "A" waterway, which indicates that its water is a supply source for drinking, culinary, or food processing. It also supports fisheries and is suitable for contact activities. The Batavia Kill is also identified as a potential location for trout spawning. By improving water quality and flow, this can protect this important drinking water source and wildlife habitat.

Table 4.3 summarizes the environmental benefits associated with this project.



TABLE 4.3 – TYPE AND QUANTITY OF ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Upgrade and improve an undersized culvert on Route 56 to expand capacity, reduce flood impacts, limit erosion, and debris deposition.	Upgrade and improve an undersized 4-foot corrugated metal pipe with a 6-foot-by-6-foot box culvert.
Clean-Up Accomplished	Clear accumulated debris along the existing culvert to improve stream functioning in the Batavia Kill.	TBD
Importance for Habitat	The improvement and upgrade of an undersized culvert will increase capacity, and improve mobility and access to flood control structures during flood events. This will create a more reliable flow source to support aquatic life and water quality within the Batavia Kill.	

PUBLIC SUPPORT

The project provides improved public safety and stream function, enhanced mobility, and infrastructure improvements to address repetitive flood conditions.

These project types were all supported by the community during outreach efforts.

ADDITIONAL BENEFIT

In addition to the benefits described, this project can positively impact additional areas of community health and wellness.

Project Readiness

The scope of this project and presence of few challenges will allow for expedited implementation and completion.

Project Cost-Benefit Analysis

Improvements to core infrastructure systems benefit overall community resilience against future storms, ensuring the protection of the Town’s assets and the safety of its residents. In particular, the improved crossing structure will help to ensure access to the Hamlet of Maplecrest and a critically important flood control dam during flood events. This project will result in longer periods of time to support evacuations and to enhance the ability of first responders to conduct emergency operations by having better access to areas of the Town that have traditionally been cut off during

flood events. It will also reduce future infrastructure damages and preserves access to one of the Town’s flood control dams during flood events to allow for monitoring and operational control.

Based on available information and preliminary designs, the proposed project would have a net benefit on Community safety and health by improving property protection, resident safety, and mobility. The reduction in floodwater on a critical thoroughfare, continued access to the dam, and improvement of undersized infrastructure, all for a relatively small investment with few challenges, collectively position the Town to benefit considerably from this project.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of bid documents, review of responses, and the completion of construction work is expected to occur over about a six-month period.

REGULATORY REQUIREMENTS

Completion of the proposed project will require regulatory and permitting approvals from appropriate agencies, such as a NYS DEC Article 15 Permit, a NYS DOT Highway Work Permit, and local construction and building permits.

JURISDICTION

The Town of Windham has jurisdiction of this Proposed Project.



SUMMARY

Route 56 Culvert Upgrade (Proposed Project)

- Investment: \$170,000
- Flood Level Reduction: reduced inundation for properties and infrastructure along Route 56
- Assets Protected: 0 secured; reduced risk for numerous properties and infrastructure systems
- Potential Future Loss Prevented: future flood damage avoided
- Jobs Created: construction: 1.2 FTE Total: 1.4 FTE
- Strategies Supported: 2
- Other Benefits:
 - Relatively small investment for significant gain
 - Water quality and ecology improvement
 - Ensures access to flood control dam during flood events

** The FTE construction jobs were estimated based on a methodology developed by the U.S. 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.*



Back-up Generators for Critical Facilities (Proposed Project)

Project Background

Critical facilities and infrastructure in the Town of Windham provide vital services to residents on a day-to-day basis, but are also crucial components of emergency preparedness, response, and hazard mitigation. Several key community facilities in Town currently do not have back-up power capability, which limits the provision of essential services during a disaster.

This project aims to obtain and install permanent back-up power sources for critical facilities and infrastructure in the Town. This is particularly important for specific facilities that serve vulnerable populations who would otherwise rely on emergency services and responders during large-scale power outages.

CONNECTION TO THE DISASTER

Prolonged power outages during Hurricane Irene, and a lack of back-up power generation at municipal facilities, compromised the Town of Windham’s ability to deliver essential services and efficiently respond to the disaster. The facilities addressed by this project serve vital roles during emergencies and disasters, and are severely limited in their mission capacity when power is interrupted.

DESCRIPTION OF PROJECT

The Committee proposes the purchase and installation of fixed back-up generators for four local facilities to ensure service and emergency capability during and after disaster events. The Committee proposes the installation of one generator at each of the two Windham well water pump stations, one at the Town of Windham Town Hall, and one at the Town Highway Garage.

This project will: provide the necessary power supply for critical facilities during emergencies to ensure an uninterrupted supply of clean drinking water to residents; improve disaster operations and emergency



Shown is an example of a fixed generator. Photo is courtesy of FEMA.

response capability; and enable the continuation of other essential municipal functions.

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 \$343,000. This cost is distributed as follows:

- Water Pump House 1: \$ 62,717
- Water Pump House 2: \$ 62,717
- Highway Garage: \$108,783
- Town Hall: \$108,783

Project Benefits

This critical facility improvement and emergency response project would provide safety benefits by ensuring uninterrupted provision of critical services to the Community at all times.

IMPROVED SAFETY, CONTINUITY OF EMERGENCY SERVICES

This project will help to ensure that the Town of Windham’s critical facilities can operate during emergencies and disasters. Installation of the generators at Town water supply wells will help to ensure the uninterrupted supply of clean drinking water to



Shown is an example of a FEMA generator. Photo is courtesy of FEMA.

residents. The Windham Town Hall is critical to the Town's coordination of disaster operations, and an emergency power source will greatly enhance the ability of Town officials and responding agencies to conduct emergency operations.

ANTICIPATED REDUCTION OF RISK

A lack of back-up power at critical local facilities places the Town at significant risk during emergencies. Without power during disaster events, the Town's essential services may shut down, including clean water supplies, sheltering facilities, emergency response operations, and Town operational functions.

Provisions of back-up power would enhance safety, evacuation, and emergency procedures for residents and visitors.

As a result of these improvements, the risk for interruption of essential Town services is greatly reduced.

ECONOMIC

This project is intended to strengthen local infrastructure to make the Town more resilient to future disasters. Investing in back-up power generation capabilities at critical facilities would demonstrate a commitment to the future of the Town, its residents, and its workforce. This investment can create greater

confidence for private investors. Ensuring local restaurants and businesses have reliable access to clean water also supports normal business operations and the Town's economy.

These improvements could also provide economic stimulus through the creation of construction and support-related jobs from labor, materials, equipment, and other sales for suppliers and support industries. This project would create approximately 2.9 total FTE jobs, including 2.5 FTE construction jobs, potentially creating employment for local and regional contractors, in addition to 0.4 FTE jobs from increased materials and equipment sales for suppliers and support industries.

ENVIRONMENTAL

Completion of this project will allow the Town of Windham to continue to provide safe drinking water from the Town water supply well. An additional environmental benefit could result if the permanent generators are designed to use alternative fuel sources, such as natural gas.

PUBLIC SUPPORT

The project has the potential to increase public safety and improve emergency response capabilities. These types of resiliency projects received overwhelming support among residents.

ADDITIONAL BENEFITS

Health Benefits

Ensuring that critical facilities, such as water and sewer infrastructure, can continue to operate during and after a disaster, the Town is ensuring water safety.

Project Readiness

The nature and extent of this project would likely allow for prompt implementation.



Project Cost-Benefit Analysis

The addition of reliable back-up power generation at critical facilities creates immediate health and safety benefits at a relatively low cost. The assurance of essential services and municipal operations during a disaster are critical for long-term resilience. This project has few challenges for implementation. It will improve safety, ensure continuity of emergency services provide an uninterrupted supply of clean drinking water, and support Town operations during a disaster.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of bid documents, review of responses, and the completion of construction work is expected to occur over an approximate three to four month period.

REGULATORY REQUIREMENTS

Completion of the proposed project will require regulatory and permitting approvals from appropriate agencies, such as a NYS DEC, a NYS DOT Highway Work Permit, and local construction and building permits.

JURISDICTION

The Town of Windham has jurisdiction of this Proposed Project.

SUMMARY

Back-up Generators for Critical Facilities (Proposed Project)

- Investment: \$343,000
- Flood Level Reduction: N/A
- Assets Protected: 4
- Potential Loss Prevented: avoids future facility damages associated with prolonged power outages
- Jobs Created: construction: 2.5 FTE ,Total: 2.9 FTE
- Strategies Supported: 2
- Other Benefits:
 - Relatively small investment for significant gain
 - Project readiness

** The full-time equivalent (FTE) construction jobs were estimated based on a methodology developed by the U.S. 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.*



New Trails And Connections (Proposed Project)

Project Background

Outdoor recreation plays a driving role in the local economy and quality of life for residents and visitors of the Town of Windham. The ample natural resources and scenic beauty provide numerous opportunities to promote healthy lifestyles, encourage tourism, offer alternate transportation options, and grow local jobs and business. The Committee identified the importance of supporting new recreational amenities and improving existing assets to increase local health into the future.

CONNECTION TO THE DISASTER

In addition to economic and lifestyle advantages, trail systems that link population centers and other regional assets and facilities provide mobility and safety enhancements during disasters. During Hurricane Irene, numerous local and county roads were inundated with floodwater which prevented safe mobility. The creation of additional redundant transportation options provides improved evacuation options for residents and access routes for emergency responders during disaster events. If main roads are impaired with floodwaters,



The Windham Path Trail Head. Photo is courtesy of Raymond Adams.

these secondary transit options may become pivotal as alternative routes to ensure evacuations and emergency response capability.

DESCRIPTION OF PROJECT

The proposed project would support the ongoing Windham Path project by developing new sections of trails that will continue to connect hamlet centers and their residents with other local assets and critical facilities.

This project will develop new trail sections for residents and visitors to safely travel by foot, bicycle, or other means, and will provide unique access to the Town's beautiful landscapes and natural resources. This project will provide new recreational opportunities to increase quality of life, capitalize on eco-tourism potential, grow the local economy, and provide transportation redundancy in emergency situations.

Specific project work would include:

- Miles of new trails for multiple types of users;
- Pedestrian bridges;
- New signage; and
- Additional trail amenities.

COST ESTIMATE

The estimated total project cost is \$300,000.

Project Benefits

This recreation improvement, alternate transportation and economic development project provides multiple benefits to the Town of Windham, including safety improvements and economic and social benefits.

PUBLIC SAFETY AND EMERGENCY RESPONSE IMPROVEMENT

With limited access into and out of many areas of the Town, it is essential to ensure mobility during disasters, including flood events.



Additional trail development would enhance public safety and mobility by providing new and safe transportation options to facilitate evacuation for residents and access for emergency responders.

While not traditionally thought of as evacuation routes, a comprehensive network of trails that are safe from flooding, and which connect population centers, provides unique safety benefits during emergencies. By connecting residents and visitors with other commercial centers and critical facilities, these trails create new and critically important means of mobility and access during disasters.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

This project will develop new trail sections for residents and visitors to safely travel by foot, bicycle, or other means by providing transportation redundancy to facilitate evacuation for residents and access for emergency responders.

ECONOMIC DRIVER

Already a major driver of local revenue, job creation, and tourism, the recreation industry will be bolstered by the addition of new trails.

These improvements will provide economic growth and benefit the Town of Windham by supporting the Town’s strong eco-tourism and recreation economy.



Cyclists along The Windham Path. Photo is courtesy of Nick Bove.

An improved trail system increases options for outdoor enthusiasts and connects populations with commercial and retail centers, and restaurants. In addition, projects that encourage tourism and year-round activity will drive additional job creation and retention. This can alleviate many current challenges faced by business owners who now operate in a seasonal economic environment. This project greatly supports the Town’s commitment to a four-season economy and expanded tourism potential.

These improvements will also provide economic stimulus through the creation of construction and support-related jobs from labor, materials, equipment, and other sales for suppliers and support industries. This project would create approximately 2.5 total FTE jobs, including 2.1 FTE construction jobs, potentially creating employment for local and regional contractors, in addition to 0.4 FTE jobs from increased materials and equipment sales for suppliers and support industries.

Funds injected into construction supply lines will also promote additional induced spending on local goods and services. In addition, this project will also have a financial benefit by increasing infrastructure resiliency, thus reducing any future maintenance or repair costs associated with flood damage.



Pictured here is Windham Path view of mountains and ski slopes in fall. Photo is courtesy of Raymond Adams.



ENVIRONMENTAL

The project will result several distinct environmental benefits:

- An expanded trail network will encourage fewer vehicular miles and help to lessen emissions; and
- Unique access to landscapes and natural resources increases environmental education and highlights the importance of environmental protection.

PUBLIC SUPPORT

This project provides economic growth and increased public safety and resilience, which were among the most significant areas of investment expressed by people in the Town of Windham during Public Engagement Events.

ADDITIONAL BENEFITS

This project can also positively impact additional areas of community health and wellness, such as:

Leverage Current Investments

Local efforts to expand the trail network have been completed in recent years. By supporting the expansion of this effort, the Town may be able to leverage past investments to provide even greater economic, recreational, and safety benefits;

Project Readiness

Portions of this project have completed preliminary design work, and the nature and extent of all project work will simplify implementation

Project Synergy

This project creates new sections of the Windham Path, which can traverse through the passive recreation feature proposed in the South Street Stormwater Collection System project. New paths will also complement additional recreational and trail access created by the Silver Lake Project.

Ensures Ongoing Scenic and Recreational Value

This project promotes continued scenic and recreational value of the Town's numerous environmental resources.

Project Cost-Benefit Analysis

The expansion of Windham's trail network creates multiple community benefits that support the Committee's diverse resiliency strategies. New trails and connections capitalize on the Town's strong tourism and outdoor recreation markets to support a four-season economy. Expanded eco-tourism opportunities during off-peak months will help to draw additional visitors and revenue for local businesses. In turn, this will alleviate the workforce and revenue challenges of the seasonal economy. In addition, new trails provide necessary transportation redundancy that can be utilized for evacuations during emergencies, if main thoroughfares are inundated or impassable.



Shown is The Windham Path along grasslands. Photo is courtesy of Nick Bove.



The challenges related to this project include required easements, permitting, and accommodation for steep terrain, however, these do not represent major implementation risks. The Windham Area Recreation Foundation (WARF) and the Town of Windham have secured similar easements in earlier path phases and preliminary authorization from property owners for trail construction has already been received.

The Town is well positioned to gain a positive net-benefit from the implementation of this project at a relatively low cost.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of bid documents, review of responses, and the completion of construction work is expected to occur over an approximate 6 to 8 month period.

REGULATORY REQUIREMENTS

Completion of the proposed project will require private property easements, as well as regulatory and permitting approvals from appropriate agencies, such as a NYS DEC Bridge Permit, and local construction and building permits.

JURISDICTION

The Town of Windham has jurisdiction of this Proposed Project.

SUMMARY

Back-up Generators for Critical Facilities (Proposed Project)

- Investment: \$300,000
- Flood Level Reduction: N/A
- Assets Protected: 0
- Potential Future Loss Prevented: Helps to avoid isolated and stranded residents and associated health and safety risks
- Jobs Created: construction: 2.1 FTE; Total: 2.5 FTE
- Strategies Supported: 2
- Other Benefits:
 - Economic growth and additional tourism attraction
 - Lifestyle and health benefits
 - Greater connectivity throughout Town
 - Potential synergy with South Street Stormwater Collection System project
 - Project readiness

** The FTE construction jobs were estimated based on a methodology developed by the U.S. 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.*



Communications Improvements (Featured Project)

Project Background

The Town of Windham is a community that thrives on its remoteness and rural character, despite the challenges these characteristics can present. One major challenge is the Town's limited communications infrastructure. The recreation and eco-tourism industry is a major economic driver for the Town, due to an abundance of natural resources that are ideal for skiing, snowboarding, mountain biking, hiking, fishing, kayaking, birding, and related outdoor activities.

Despite the success of the local tourism industry, the absence of much-needed telecommunications infrastructure puts the Town at a great disadvantage, compared to other tourism-based communities. Communication deficiencies also deter business growth in most other industries and sectors by limiting exposure, convenience and discouraging startups. In addition, the lack of reliable communications information threatens emergency response efforts during disasters, and limits residents' ability to access help and connect with loved ones.

CONNECTION TO THE DISASTER

The terrain and rural character associated with the Town's geographic location drives the local economy, but also poses communications challenges that hinder emergency response, economic growth, and quality of life. The remote location presents a tremendous challenge in developing effective telecommunications infrastructure that is necessary to provide reliable cellular phone and broadband Internet services. Perhaps most importantly, the lack of infrastructure limits emergency response capability during events, such as the devastating impacts experienced during and after Hurricane Irene and Tropical Storm Lee.

During Hurricane Irene, residents of Windham were physically isolated by high water and impassable roads

and bridges. First responders had extremely limited information concerning the status of some residents, as a result of the lack of cell phone service and damage to the existing ground-based phone network. Enhancements to the telecommunications system are critically needed to support greater public safety and emergency response capabilities during disasters, while encouraging economic growth and improved quality of life.



Example of a communications tower by the lake. Courtesy of FEMA.

DESCRIPTION OF PROJECT

This project would support cellular telephone and broadband Internet service extension in the Town of Windham, bringing much needed communications services.

The extension being proposed would address the critical lack of communications infrastructure for specific areas in Town, including the Hamlet of Maplecrest and the Big Hollow area. These areas, in particular, were completely



Pictured here are two busy men who are a part of Windham's Emergency Operations Center during Hurricane Irene. Photo is courtesy of Bridget Pelham.

isolated physically and in terms of communications capability during Hurricane Irene and Tropical Storm Lee. This caused serious safety risks and prevented full emergency response capabilities. Specific project work is likely to include the purchase and installation of a new communication tower(s) and/or improvements to existing towers, and the installation of related telecommunications infrastructure.

COST ESTIMATE

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

Project Benefits

This communications infrastructure improvement and emergency response project would provide multiple benefits to the community, including risk and safety improvements, and economic and social benefits.

IMPROVED SAFETY AND CONTINUITY OF EMERGENCY SERVICES

Emergency services rely heavily on communications to ensure that essential resources are distributed to those most in need. During emergencies, the need for reliable communications increases. This project would contribute to the overall communications structure for emergency responders in the Town of Windham, thus ensuring that vital emergency services and critical asset network capabilities are not disrupted during disasters.

In addition, reliable communications capability would enable residents and visitors to directly reach out for assistance and to contact loved ones.

ANTICIPATED REDUCTION OF RISK

Because cellular phone service in parts of Windham are unreliable or non-existent, emergency responders are often at a huge disadvantage when trying to communicate with each other and outside assistance providers. Enhanced cellular phone and broadband connectivity would enable first responders to enhance safety, evacuation, and emergency procedures.

ECONOMIC DRIVER

The provision of cellular telephone and broadband Internet services would help to promote business, support entrepreneurs and start-up companies, and increase both the economic vitality and quality of life in this rural community. To promote the development or relocation of new or existing business to this area, potential investors should be assured that communications capacity is strong and secure, and would enable them to compete.



Windham's Emergency Operations Center requires adequate and consistent communications at all times, particularly during major storm events. Photo is courtesy of Bridget Pelham.

These improvements would also provide economic stimulus through the creation of construction and support-related jobs from labor, materials, equipment, and other sales for suppliers and support industries.



This project would create approximately 8.4 total FTE jobs, including 7.1 FTE construction jobs, potentially creating employment for local and regional contractors, in addition to 1.3 FTE jobs from increased materials and equipment sales for suppliers and support industries.

ENVIRONMENTAL

This project has the potential to create a more secure and reliable information network for the Town. This will improve the response time to emergencies, including those that immediately affect the environment.

PUBLIC SUPPORT

The project has the potential for increased economic growth, public safety, and improved emergency response capabilities, which were all publically-supported resiliency project types among Windham public respondents.

ADDITIONAL BENEFIT

This project can positively impact additional areas of community health and wellness.

Support Ongoing Local and Regional Efforts

Local efforts to increase emergency response communications infrastructure are currently being pursued. By leveraging this potential initiative, the Town of Windham may be able to expand the scope and impact of this project to provide even greater emergency communications capabilities with greater access to cellular and broadband Internet services.

Project Cost-Benefit Analysis

It is essential to ensure that emergency operations can perform and effectively coordinate during disasters. Such capacity provides important safety benefits, which are no less important than repairing failing infrastructure or other public safety projects.

Reliable communications are a major challenge for emergency responders in Windham, and hinder capabilities during emergencies. Lack of cellular phone and Internet access for parts of Town also prevent residents from contacting help or loved ones. Improved communications will also increase daily quality of life for residents and visitors, support business growth and start-ups, and bolster the tourism economy. As such the potential benefit is clear.

There are challenges to implementing this project, including site acquisition and permitting in a region with pristine wilderness, high peaks, and deep valleys, and publicly owned natural areas are among design and feasibility challenges. Upon completion, this project will also need to structure an ownership and operational agreement with potential service providers for cellular and Internet broadband services.

Despite these challenges, the importance of this project for regional emergency response, economic health, and quality of life outweigh the financial costs of the project.

IMPLEMENTATION TIME FRAME

Implementation time frame is to be determined.

REGULATORY REQUIREMENTS

Completion of the proposed project will require regulatory and permitting approvals from appropriate agencies, such as a NYS DEC, NYC DEP, and local construction and building permits.

JURISDICTION

The Town of Windham has jurisdiction for this project.



SUMMARY

Back-up Generators for Critical Facilities (Proposed Project)

- Investment: \$1,000,000
- Flood Level Reduction: N/A
- Assets Protected: 0
- Potential Future Loss Prevented: Helps to avoid isolated/stranded residents and associated health risks
- Jobs Created: construction: 7.1 FTE; Total: 8.4 FTE
- Strategies Supported: 3
- Other Benefits:
 - Provides for communications capability during emergencies
 - Supports emergency response efforts
 - Economic growth and additional tourism attraction
 - Increased quality of life

** The FTE construction jobs were estimated based on a methodology developed by the U.S. 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.*



Mad Brook Hydraulic Feasibility Study (Featured Project)

Project Background

Historic and repetitive flooding in Windham is caused primarily by the Village's proximity to the Batavia Kill and its tributaries, including the Mad Brook. Risk of flood damage is increased by a number of obstructions located in the floodplain that constrict and impede flow during flood events.

The Mad Brook watershed drains from north to south and empties into the Batavia Kill after crossing Main Street, near Mill Street in Windham. The watershed is partially regulated by the Mitchell Hollow Dam, located 1.6 miles north of Main Street, off Mitchell Hollow Road. The 54-foot tall dam was built in the early 1970s and holds approximately 4.05 inches of runoff from the 6.8-square mile watershed.

The existing conditions hydraulic model for Mad Brook that was provided by the Federal Emergency Management Agency (FEMA) does not accurately represent the observed site conditions, including the low concrete wall on the west bank of the Brook. The Brook was observed to contain a large bed load



Pictured here is a raging Mad Brook alongside a house during Hurricane Irene. Photo is courtesy of Jeff Luckey.

with sediment transport of large cobbles. Significant aggradation of the bed was apparent south of Main Street, where a large stacked stone wall on the east bank failed, creating a blockage.

Although the hydraulic model predicts that Main Street overtops frequently during storm events, the Town of Windham municipal staff indicated that Main Street floods only during rare events, such as Hurricane Irene. It is likely that the existing dam is providing a significant level of flood protection that may not be accurately reflected in the hydraulic model

CONNECTION TO THE DISASTER

Repetitive flooding from past storm events, including Hurricane Irene and Tropical Storm Lee, is a significant challenge the Town of Windham must address to provide sustainable resiliency. This project responds directly to impacts from the most recent disaster, by identifying long-term solutions to areas of chronic flood risk to ensure public safety and create confidence in the future of the Town.

DESCRIPTION OF PROJECT

Based on eyewitness accounts and field visits, it was determined that a focused approach, including more detailed hydraulic modeling and an evaluation of all flood mitigation opportunities, is needed to establish a long-term strategy and potential improvements.

This project would involve detailed hydrologic, hydraulic, and sediment transport analyses of Mad Brook. The hydrologic analysis will study the entire watershed, and the hydraulic analysis will include the section from Mountain View Road to the confluence with the Batavia Kill. The study will require a detailed stream survey and verification of the dam flood pool, primary and emergency spillways, sediment characterization, and calibration data based on historic floods.

The study will be used to better define the flooding and channel stability risks of the current channel configuration, and evaluate options to restore channel capacity, improve flood conveyance, and reduce sediment transport, while improving water quality and habitat conditions.



Pictured here is the Mad Brook retaining wall and dry culvert. Photo is courtesy of Tetra Tech, Inc.

Specific project work includes surveying, hydrologic modeling, hydraulic modeling, sediment characterization, options analysis, and preparation of a final report.

COST ESTIMATE

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

Project Benefits

This flood mitigation project provides multiple benefits to the Town of Windham, including risk and damage reduction, and economic and social benefits.

FLOOD PROTECTION AND SAFETY

The outcome of this additional analysis and study may present opportunities to substantially reduce flood risk and improve mobility and safety in the Town. Reduced flooding of Main Street has the potential to create considerable improvements in public safety, property protection, and access to healthcare, and can create greater mobility and effectiveness for emergency responders.

ANTICIPATED REDUCTION OF RISK

Hydrologic Engineering Center - River Analysis System (HEC-RAS) analysis was conducted to compare water surface elevations for several potential actions, including upgrading the Main Street Bridge. However,

as a result of limitations in available data, resources, and timing, further analysis is recommended. Additional analysis will determine both feasible alternatives, as well as those that will create the greatest potential flood risk reduction and future benefits for Town residents, businesses, and other assets.

The outcome of this additional analysis, including any identified actions, will need to comprehensively consider the full range of land use, real estate, economic, flood safety, and all other factors. When completed, this study will present opportunities to substantially reduce flood risk in the Hamlet of Windham.

ECONOMIC DRIVER

The long-term protection of Town assets, including homes and businesses in downtown Windham, is essential to economic health. This is made possible with the retention of residents and the tax base, and support for commercial growth. These factors are essential to maintaining the Town's role as a regional tourism and economic center.

ENVIRONMENTAL

While the direct environmental benefits of this project will be limited because it is a planning initiative, the Town of Windham stands to achieve significant environmental benefits when an identified project is implemented in the future. The project also has the potential to improve stream conditions and functionality through potential bank restoration, debris removal, and by increasing the capacity of Mad Brook to move potential floodwaters. In addition, improvements will likely help to improve water quality, and will create a more reliable flow source to support aquatic life.

PUBLIC SUPPORT

This project will provide the tools necessary to improve stream function. Additionally the project will enable the infrastructure improvements to address repetitive flood conditions. These project types were ranked high in importance among participants at Public Engagement Events.

Project Cost-Benefit Analysis

Additional planning and analysis to identify improvements to core infrastructure will benefit overall community resilience to weather future storms. This will help to ensure the protection of the Town’s assets and the safety of its residents. The cost of this project is very low, when compared to the value of the lives and property that might be saved by identifying additional long-term flood safety improvements.

Furthermore, this investment could save costly repairs in the future by providing science-backed recommendations to reduce future losses from flood damage. As a decision making tool, the completion of this study will also benefit the community for years to come. This project has the potential to greatly reduce chronic flooding throughout Windham, and can be justified by the relatively low cost.

IMPLEMENTATION TIME FRAME

Implementation for this project would occur over a 3 to 6-month time frame.

REGULATORY REQUIREMENTS

It is anticipated that the completion of this proposed project will not require any regulatory or permitting approvals.

JURISDICTION

Jurisdiction for this Featured Project is with the Town of Windham.



Additional planning and analysis to identify improvements to core infrastructure will benefit overall community resilience to weather future storms. Image of stack of files is courtesy of Tetra Tech, Inc.

Section 5

Additional
Materials



Photo is courtesy of Raymond Adams.



Section 5: Additional Materials

Additional Resiliency Recommendations

TABLE 5.1 – ADDITIONAL RESILIENCY RECOMMENDATIONS

Strategy	Project Name	Short Project Description	Estimated Cost	Regional Project (Y/N)
Strategy 3	Residential and Commercial Resiliency Improvements	Flood mitigation improvements for residential and commercial properties to enhance structural resilience, preserve the tax base, and improve safety for occupants. Possible improvements to include elevation/flood-proofing and voluntary acquisitions/buyouts.	Dependent on number of structures	N
Strategies 1, 5	Disaster Preparedness Planning and Coordination	Improved emergency preparedness planning, outreach, and training to better coordinate before, during, and after storm events, and to ensure residents have access to safety and emergency information. Outreach and training will provide additional information on emergency procedures, sheltering, and available resources, among other emergency-related educational programs.	\$25,000	Y
Strategies 1, 3	Additional Stream Gauges and Monitoring	Installation of additional stream gauges and monitoring techniques to provide early warnings and notification of rising floodwaters.	\$50,000	N
Strategy 2	Dam Improvements or Upgrades	Conduct analysis for three dams and determine potential cost as well as feasibility, and implement improvements to three flood control structures/dams to upgrade capacity to hold additional water during major flood events.	\$7,000,000+	N
Strategies 2,3	Flood Control Berm/Levee and Floodplain Restoration Downstream of Church Street	Create a flood control levee or berm and/or floodplain restoration downstream of Church Street in the Hamlet of Windham (behind Center Church, Windham-Ashland-Jewett Central School, among others).	\$1,000,000+	N
Strategies 2, 4, 5	Windham Transit Improvements	Provide improved transit systems between downtown Windham and local assets, including Windham Mountain.	TBD	N
Strategies 4, 5	Marketing and Branding Initiatives	Improve marketing and branding initiatives, including improved websites, signage, and support for new community events, among others.	\$40,000	Y



Master Table of Projects

TABLE 5.2 – MASTER PROJECT TABLE

Strategy	Project Name	Short Project Description	Project Category	Estimated Cost	Regional (Y/N)
Strategies 1, 4, 5	Silver Lake Project	This proposed project would create access to new passive and active recreational opportunities, an emergency shelter and multi-purpose community facility at Silver Lake and Camp Oh-Neh-Tah. The retrofit of several existing camp buildings will leverage the significance of this unique asset to serve multiple functions, including improved emergency sheltering, access to recreation, and additional resources and flexible space for local organizations, groups, and events.	Proposed	\$1,961,500	Y
Strategies 2, 3, 4	South Street Stormwater Collection System	This project is a proposed culvert improvement, wetland treatment system, and passive recreation project along South Street. It includes the creation of a stormwater collection system, wetland area, and retaining pond on a 44 acre New York State Department of Environmental Protection (NYS DEP) property at west end of South Street in the Hamlet of Windham. It would provide flood storage, and recreational use, and economic growth.	Proposed	\$2,500,000	N
Strategies 2, 3, 4	Mad Brook Retaining Wall Improvements	This project involves repairs/improvements to the Mad Brook retaining wall and drainage system to increase structural stabilization and ensure continued functionality and flood protection. Project work would include repairs to damaged sections of the wall and consideration for extending the length of the wall and gravel harvesting to better channel capacity.	Proposed	\$195,500 - \$362,500	N
Strategies 2, 3	Route 56 Culvert Upgrade	This project involves the upgrade and improvement of an undersized, four-foot corrugated metal pipe culvert on Route 56 with a larger 6-foot-by-6-foot box culvert to expand capacity, improve mobility, ensure access to the dam, and reduce localized flood impacts.	Proposed	\$170,000	N

TABLE 5.2 – MASTER PROJECT TABLE (CONT'D)

Strategy	Project Name	Short Project Description	Project Category	Estimated Cost	Regional (Y/N)
Strategies 1, 2	Back-Up Generators for Critical Facilities	Purchase and install fixed back-up generators for local facilities to ensure service and emergency capability during and after disaster events. Locations include one installed at each of the two Windham well water pump stations, one installed at Town Hall, and one installed at the Town Highway Garage.	Proposed	\$343,000	N
Strategies 4, 5	New Trails and Connections	Develop new trails and trail connections to expand the existing network, provide support for additional users, e.g., biking, hiking, horses, etc., and better link local and regional recreational assets. Expanded trail systems will also provide additional mobility options in emergency situations, and will create redundant access and evacuation routes.	Proposed	\$300,000	N
Strategies 2, 3	Mad Brook Hydraulic Feasibility Study	This project would conduct detailed hydrologic, hydraulic, and sediment transport analyses of Mad Brook from Mountain View Road to the confluence with the Batavia Kill. The study will be used to better define the flooding and channel stability risks of the current channel configuration, and will evaluate options to restore channel capacity, improve flood conveyance, and reduce sediment transport, while improving water quality and habitat. This study will complement the recently completed Local Flood Analysis to jointly pursue long-term solutions to flood conditions.	Featured	\$80,000	N
Strategies	Communications Improvements	This project would provide for communications infrastructure upgrades to improve emergency response capabilities, as well as personal cellular and broadband Internet service to increase quality of life and to promote economic growth.	Featured	\$1,000,000	N



TABLE 5.2 – MASTER PROJECT TABLE (CONT'D)

Strategy	Project Name	Short Project Description	Project Category	Estimated Cost	Regional (Y/N)
Strategies 1, 5	Disaster Preparedness Planning and Coordination	Improved emergency preparedness planning, outreach, and training to better coordinate before, during, and after storm events, and to ensure that residents have access to safety and emergency information. Outreach and training will provide additional information on emergency procedures, sheltering, and available resources, among other emergency-related educational programs.	Additional Resiliency Recommendation	\$25,000	Y
Strategies 1, 3	Stream Gauges and Monitoring	This project would involve the installation of additional stream gauges and monitoring techniques to provide early warning and notification of rising floodwaters.	Additional Resiliency Recommendation	\$50,000	N
Strategy 2	Dam Improvements or Upgrades	This would include conducting an analysis of three dams and determining potential cost and feasibility of improvements to upgrade capacity to hold additional water during major flood events.	Additional Resiliency Recommendation	\$7,000,000	N
Strategies 2,3	Flood Control Berm/Levee and Floodplain Restoration Downstream of Church Street	Create a flood control levee or berm and/or floodplain restoration downstream of Church Street in the Hamlet of Windham (behind Center Church, Windham-Ashland-Jewett Central School, among others).	Additional Resiliency Recommendation	\$1,000,000+	N
Strategies 2, 4, 5	Windham Transit Improvements	Provide improved transit systems between downtown Windham and local assets, including Windham Mountain.	Additional Resiliency Recommendation	To be determined	N
Strategies 4, 5	Marketing and Branding Initiatives	Improve marketing and branding initiatives, including provisions for improved websites, signage, and support for new community events, among others.	Additional Resiliency Recommendation	\$40,000	Y



Public Engagement: A Vital Process For Valuable Input

A Grassroots-Driven Plan

Public engagement and the information it yielded played a dynamic role in the development of the Town of Windham’s NYRCR Plan and its strategic recommendations for resiliency. The outreach strategy that guided the public engagement process identified the most effective ways to encourage engagement among residents, homeowners, non-resident property owners, business owners, and community and social service organizations across both the public and private sectors.

Where and how people live provides a predictable gauge to understanding how they acquire and share information about community happenings, such as Town of Windham NYRCR Committee Meetings and Public Engagement Events. A multi-faceted outreach campaign in Windham was based on print and electronic messaging, broadcast media through public service announcements and paid advertising, newspaper advertising (both print and online), and posters and flyers deliberately placed in venues with a high degree of foot traffic.

The Committee solicited information and public opinions about community issues, needs, and opportunities relative to storm recovery and building resiliency. Public input about these needs and opportunities, in light of available community resources, critical assets, and essential redundancies, was instrumental to the development of Proposed and Featured Projects, and Additional Resiliency Recommendations.

REGULAR PLANNING COMMITTEE MEETINGS

Beginning in early summer 2014, the Committee—composed of local residents, businesspeople, and community organizational stakeholder—met biweekly to discuss critical issues, qualitative and quantitative data, prospective projects, and the outreach processes.

All Committee Meetings were advertised on the NYRCR Program website, along with many business, community, and civic organizations, particularly those where Committee Members have influence.

Held at Windham Town Hall, Committee Meetings were guided by meeting agendas, and the public was invited to participate in all meetings. Meeting summaries were prepared, and posted on the NYRCR website for public review following each meeting.



The Town of Windham NYRCR Planning Committee met biweekly to discuss issues, vet opportunities, and gather public opinions about how to make the Town more resilient to future storm damage. Photo of meeting is courtesy of Raymond Adams.

SURVEYS, INTERVIEWS, INTERACTIVE EXERCISE

Surveys were distributed at community-wide Public Engagement Events to query those in attendance about storm damages, critical needs and opportunities, and prospective mitigation and resiliency measures. Among the chief concerns identified were:

- Lack of emergency alert systems;
- Lack of sheltering;
- Lack of WiFi in the Plan Area;
- Limited transportation options for non-drivers;
- Need for debris clearing in streams; and
- Need for improved post-disaster communications.

Additionally, with support from the Committee, the Consultant Team interviewed first responders in the Community to identify needs and opportunities for improvements in response and recovery efforts.



The qualitative information gathered corroborated the input provided by the general public.

GETTING THE WORD OUT

A variety of outreach methods were used to address the variety of ways the people of Windham receive information and messages about community events. A communications strategy was developed that used a multimedia approach to encourage public participation during four Public Engagement Events. Message delivery “channels” included:

- A Town of Windham NYRCR Committee social media page
- Committee Members’ social media
- Email blasts
- Informational flyers and posters
- Media alerts
- Newspaper ads (print and online)
- Personal invitations
- Radio advertisements
- Radio public service announcements (PSAs)
- Website notifications
- Yard signs

Public Engagement Events

Four community-wide Public Engagement Events were conducted between July 2014 and January 2015. These events, held at the Center Church (Windham Civic Center), typically drew as many as 50 to 100 people. Each Public Engagement Event was deliberately held at strategic points of the Town of Windham NYRCR Plan development, so the public could be apprised of the progress made to-date, and to gather their input about needs and prospective project ideas.

PUBLIC ENGAGEMENT EVENT #1

The first Public Engagement Event, held in July 2014, introduced the purpose and intent of the NYRCR Program; described how Windham was identified to participate and the geographic Plan Area; and reviewed

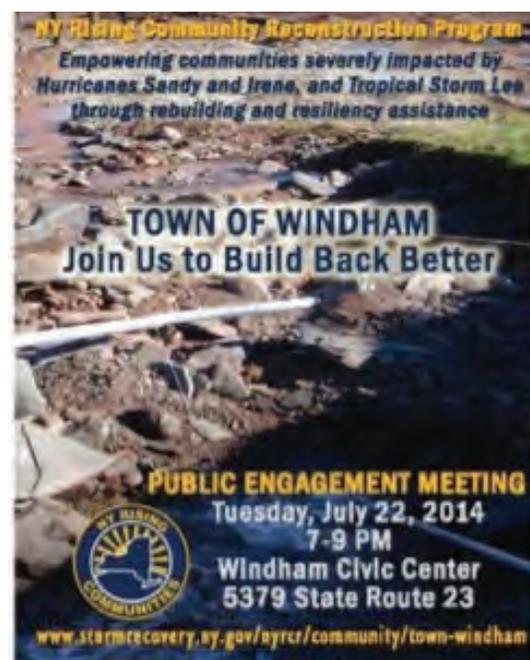
the vision and goals set forth by the Committee. Public discussion focused on the need for personal loss recovery, stream maintenance difficulties within the Town, major damage areas, communications and other emergency response issues, economic growth, and waterway recreational opportunities.

PUBLIC ENGAGEMENT EVENT #2

The second Public Engagement Event, held in September 2014, presented initial findings of ongoing analyses, including risk assessment and hydraulic modeling. Additional public input was also gathered on recovery issues, needs and opportunities, and how to shape the path toward greater resilience.

This second Public Engagement Event also included an interactive exercise, whereby attendees used “Windham dollars” to “vote” for the Federal Emergency Management Agency’s (FEMA) Recovery Support Functions they felt were most needed in the Town of Windham and where the NYRCR Program dollars for Windham should be allocated.

Results from these exercises are indicated in Figure 5.1, and align with other qualitative and quantitative information gathered during the planning process. Economic development, infrastructure, and cultural resources were among the top-ranked priorities.



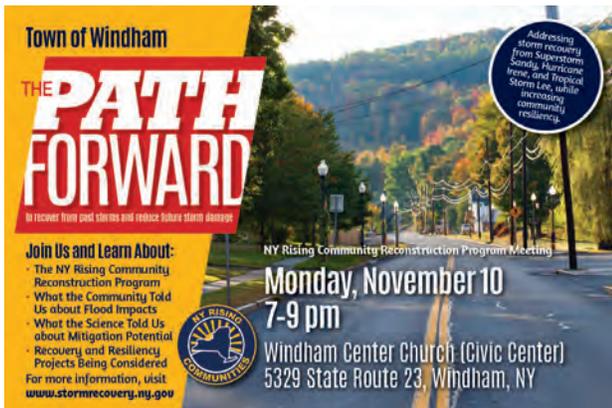
PUBLIC ENGAGEMENT EVENT #3

At Public Engagement Event 3, held in November 2014, Proposed and Featured Projects, and Additional Resiliency measures were shared with the attending public. At that time, the planning process that resulted in the identification and analytical vetting of these projects and measures was explained. All projects were corroborated by public input gathered through multiple means during the seven-month planning process.

The focus of this third Public Engagement Event was to present information on Proposed and Featured Projects in an open-house environment. Presentation boards were displayed around the room to highlight the projects. Committee Members fielded questions and discussed each project to solicit feedback.

PUBLIC ENGAGEMENT EVENT #4

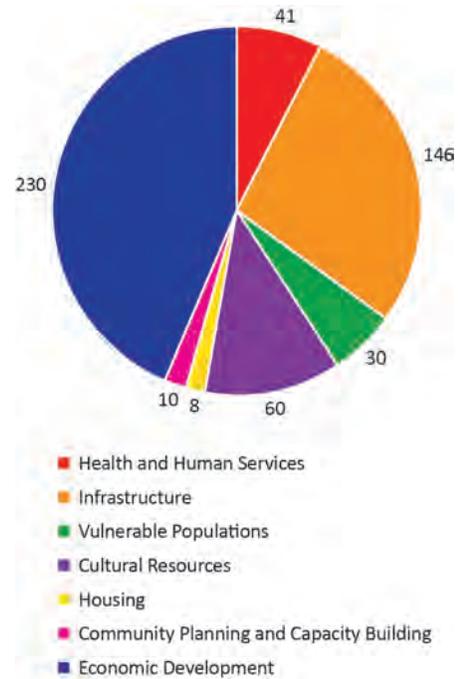
Public Engagement Event 4 was the capstone of the second round of the NYRCR Program, where the final Town of Windham NYRCR Plan was unveiled, replete with all the research, findings, and recommendations. Prospective projects were identified for potential implementation and funding.



Risk Assessment Methodology

The following section outlines the initial risk assessment for assets in the Town of Windham. 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.

FIGURE 5.1 – WINDHAM INTERACTIVE VOTING EXERCISE RESULTS



DATA SOURCES USED

New York State (NYS) Department of State (DOS) provided data included:

- Environmental Systems Research Institute (ESRI) (2010);
- Federal Communications Commission (2012);
- Insurance Services Office, Inc.;
- National Oceanic and Atmospheric Administration (NOAA);
- National Park Service (2011);
- National Pipeline Mapping System (2003);
- NYS Department of Environmental Conservation (2009);
- NYS Department of Health;
- NYS DOT;
- 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 provided by Greene County:

- Building data;
- Buy-out properties;
- Critical facilities;
- Damaged roadways;
- Depth grids;
- Flood Hazard Areas (FHA);
- Infrastructure;
- Land use;
- Natural resources;
- Parcels;
- Soils; and
- Tax data.

COMMUNITY VALUE

The Committee worked with the Consultant Team to assign community value for the identified assets. Assigning community value allowed the Committee to get a geographic picture of where important community assets are located, and to understand potential impacts projects may have for assets of a given value. Community value did not, however, factor into the risk score of individual assets. Rather, the community value determination provided a more nuanced understanding of each asset and the relationship between risk, community value, and identified projects. The Committee assigned community value as follows:

High

- All infrastructures (other than hazardous waste material sites and mile markers);
- Culvert locations and major access routes;
- Critical facilities (fire stations, Emergency Medical Services buildings, shelters, Town Hall, school facilities, etc.);
- Health and social services, and supportive and special need housing;
- Downtown areas (economic polygon over the primary business districts);

- Three hamlets; and
- WRIP radio station.

Medium

- All other cultural and natural resource assets;
- All remaining housing assets; and
- All economic assets other than restaurants.

Low

- All restaurants and anything else that does not fall into the high or medium categories.

DESCRIPTION OF METHODOLOGY

The risk assessment for assets within 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) are determined by the asset’s location relative to mapped risk zones.

The hazard score of “3” was assigned for the hazard factor in the tool (100-year floodwater level occurring within a 100-year planning time frame).

The exposure score is 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, 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. The total exposure score was calculated for each asset by adding 0.5 point to the base score for each of the following conditions:

- **Defensive flood protection measures** – are absent, below base flood elevation (BFE), in poor condition, or lack maintenance commitment;
- **Elevation** – the asset site is below BFE;
- **Freeboard** – elevation of the habitable or occupied portion of the asset is less than two feet above BFE;

- **Point of Confluence** – asset is within an area subject to increased flood risk (based on the Consultant Team’s judgment or Committee guidance) because of a confluence of merging streams;
- **Stormwater Discharge** – asset is within an area subject to increased flood risk (based on the Consultant Team’s judgment or Committee

guidance) because of stormwater system discharge; and

- **Vegetated Stream Bank Buffers** – asset is within Floodway Fringe (FEMA definition).

Table 5.3 outlines the methodology, which accounts for an asset with a known length of time of service disruption or complete loss of service.

TABLE 5.3 – 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 of 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 permanently 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 of 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 of reduced service; services under severe pressure	Service loss for more than one month or permanently 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 for up to one month, or longer-term reduced service	Service loss for more than one month or permanently reduced capacity	Permanent loss of service of any one of the facilities listed
Natural and Cultural Resource 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 for up to one month	Permanent service interruption of more than one and less than six months	Service interruption of six or more months



The Committee, with assistance from the Consultant Team, developed a methodology 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 developed a tiered-factor approach to assess risk, generating risk scores that accurately reflect 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

- All buildings were assumed to be “5”.
- All garages storage buildings were assumed to be “4”.
- All transportation infrastructure and water treatment facilities were assumed to be “3”.



- All wells and springs were assumed to be “2”
- All natural and cultural resources other than buildings were assumed to be “2”

ASSETS IN THE “MODERATE” RISK AREA

Vulnerability

- All buildings were assumed to be “4”.
- All garages storage buildings were assumed to be “3”.
- All transportation infrastructure and water treatment facilities were assumed to be “2”.
- All wells and springs were assumed to be “1”.
- All natural and cultural resources other than buildings were assumed to be “2”.
- 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.

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 5.2. 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. See Table 5.3 for the risk score range descriptions.

- 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.
- All natural resources were assumed to be “1”.

RISK REDUCTION ANALYSIS

A risk reduction analysis was completed for those Proposed and Featured Projects that are intended to reduce the risk of flood damage to assets or public safety. Quantitative 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 Town. 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 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.

Landscape Attributes: Changes to these entries will be made if the hydraulic analyses indicated an improvement to these landscape attributes.

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.



Elevation: A change to this attribute was made if the HEC-RAS analysis indicates a reduction in water surface elevation on the assets site.

Freeboard: A change to this attribute was made for elevation projects where the measure increases freeboard to or above the standard.

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.

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.

Vegetated Streambank Buffer: If the asset is no longer in the floodway, a change to this entry will be made.

Vulnerability

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 5.4 – 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.	



TABLE 5.4 – RISK ASSESSMENT TOOL

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool 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
Windham Ambulance Service, Town of Windham	Not Applicable (N/A)	Health and Social Services	Emergency Operations/Response	Yes	Yes, Federal Emergency Management Agency (Fema)	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Family Medicine Clinic – Office of Dr. Samedov	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
Greene County Emergency Medical Services, Inc.	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
Windham Mountain	N/A	Natural and Cultural Resources	Parks and Recreation	Yes	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Town of Windham Town Hall	High	Health And Social Services	Government and Administrative Services	Yes	Yes, Fema	High	Yes	Yes	No	No	No	No	1	3	2.00	5	30	4	2.00	5	40
Hensonville Post Office	N/A	Health and Social Services	Government and Administrative Services	Yes	No	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Maplecrest Post Office	N/A	Health and Social Services	Government and Administrative Services	Yes	No	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0



TABLE 5.4 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool 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
Windham Post Office	High	Health and Social Services	Government and Administrative Services	Yes	No	High	Yes	Yes	No	Yes	No	No	1.5	3	2.50	5	38	4	2.50	5	50
Windham-Ashland-Jewett Central School	High	Health and Social Services	Schools	Yes	No, Locally Significant	High	Yes	Yes	No	Yes	No	No	1.5	3	2.50	5	38	4	2.50	5	50
Waste Water Pump Station 1	N/A	Infrastructure Systems	Wastewater	Yes	No	High	Yes	Yes	No	No	No	No	1	3	False	2	0	4	FALSE	2	0
Waste Water Pump House 1	Moderate	Infrastructure Systems	Wastewater	Yes	No	High	Yes	No	No	No	No	No	0.5	3	1.00	2	6	4	1.00	2	8
Pump House	N/A	Infrastructure Systems	Wastewater	Yes	No	High	Yes	No	No	No	No	No	0.5	3	False	2	0	4	FALSE	2	0
Town Water Pump House	High	Infrastructure Systems	Wastewater	Yes	No	High	Yes	Yes	No	Yes	No	No	1.5	3	2.50	2	15	4	2.50	2	20
Waste Water Pump House 2	N/A	Infrastructure Systems	Wastewater	Yes	No	High	Yes	Yes	No	No	No	No	1	3	False	2	0	4	FALSE	2	0
Waste Water Pump House 3	High	Infrastructure Systems	Wastewater	Yes	No	High	Yes	Yes	No	No	No	No	1	3	2.00	3	18	4	2.00	3	24
Storage Tank	N/A	Infrastructure Systems	Water Supply	Yes	No	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	FALSE	1	0
Hensonville 2 Water Wells	Moderate	Infrastructure Systems	Water Supply	Yes	No	High	Yes	Yes	No	No	No	No	1	3	1.50	1	5	4	1.50	1	6
Hensonville West Winds Well	High	Infrastructure Systems	Water Supply	Yes	No	High	Yes	Yes	No	No	No	No	1	3	2.00	2	12	4	2.00	2	16



TABLE 5.4 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool 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
Town of Windham Police Department	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
Batavia Kill Watershed Dam #1	Extreme	Infrastructure Systems	Water Supply	Yes	No	High	Yes	Yes	No	No	No	Yes	1.5	3	3.50	5	53	4	3.50	5	70
Batavia Kill Watershed Dam #4a	High	Infrastructure Systems	Water Supply	No	No	High	Yes	Yes	No	No	No	No	1	3	2.00	5	30	4	2.00	5	40
Batavia Kill Watershed Dam #3	High	Infrastructure Systems	Water Supply	Yes	No	High	Yes	Yes	No	No	No	No	1	3	2.00	5	30	4	2.00	5	40
Lake Heloise Dam	N/A	Infrastructure Systems	Water Supply	No	No	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	FALSE	3	0
Silver Lake Dam	N/A	Infrastructure Systems	Water Supply	Yes	No	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	FALSE	3	0
St. John Pond Dam	High	Infrastructure Systems	Water Supply	Yes	No	High	Yes	Yes	No	No	No	No	1	3	2.00	5	30	4	2.00	5	40
WRIP CH 250	N/A	Infrastructure Systems	Telecomm.	Yes	No	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	FALSE	1	0
School Bus Garage	Moderate	Infrastructure Systems	Transportation	Yes	No	High	Yes	Yes	No	No	No	No	1	3	1.50	4	18	4	1.50	4	24
Main Care Fuel Storage Center	N/A	Economic	Small Business	Yes	No	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	FALSE	3	0



TABLE 5.4 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool 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
Hensonville Hose Co.	N/A	Health and Social Services	Emergency Operations/ Resp.	Yes	No	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	FALSE	3	0
Windham Hose Co. #1	High	Health and Social Services	Emergency Operations/ Resp.	Yes	No	High	Yes	Yes	No	No	No	No	1	3	2.00	5	30	4	2.00	5	40
GC Transfer Station	N/A	Health and Social Services	Government and Admin. Services	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	False	2	0	4	FALSE	2	0
New York State Electric Substation	N/A	Infrastructure Systems	Power Supply	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	FALSE	1	0
Windham Wastewater Treatment Plant	High	Infrastructure Systems	Wastewater	Yes	No	High	Yes	Yes	No	No	No	No	1	3	2.00	5	30	4	2.00	5	40
Batavia Kill	Extreme	Natural and Cultural Resources	Water Bodies	Yes	No	Medium	Yes	Yes	No	No	No	Yes	1.5	3	3.50	2	21	4	3.50	2	28
NYC Watershed CE – Windham	N/A	Natural and Cultural Resources	Natural Habitats	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	False	1	0	4	FALSE	1	0
RA Greene 2 Mount Pisgah	N/A	Natural and Cultural Resources	Natural Habitats	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	False	1	0	4	FALSE	1	0
Greene Co./ Windham	N/A	Natural and Cultural Resources	Natural Habitats	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	False	1	0	4	FALSE	1	0



TABLE 5.4 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool 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
U.S. Deposit Fund Mort. 117	N/A	Natural and Cultural Resources	Natural Habitats	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	False	1	0	4	FALSE	1	0
Centre Church/Windham Civic Center	High	Natural and Cultural Resources	Community Centers	Yes	No, locally significant	Medium	Yes	Yes	No	Yes	No	No	1.5	3	2.50	5	38	4	2.50	5	50
St. Theresa's Catholic Church	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	Yes	No, locally significant	Medium	Yes	No	No	No	No	No	0.5	3	False	3	0	4	FALSE	3	0
United Methodist Parish	High	Natural and Cultural Resources	Cultural or Religious Establishments	Yes	No, locally significant	Medium	Yes	No	No	Yes	No	No	1	3	2.00	5	30	4	2.00	5	40
Living Faith Community Church	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	Yes	No, locally significant	Medium	Yes	No	No	No	No	No	0.5	3	False	3	0	4	FALSE	3	0
Hope Restoration Christian Fellowship	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	Yes	No, locally significant	Medium	Yes	Yes	No	No	No	No	1	3	False	3	0	4	FALSE	3	0
Highway Garage	N/A	Infrastructure Systems	Transportation	Yes	No, locally significant	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	FALSE	3	0
Masonic Lodge	High	Natural and Cultural Resources	Cultural or Religious Establishments	Yes	No, locally significant	Medium	Yes	Yes	No	Yes	No	No	1.5	3	2.50	5	38	4	2.50	5	50



TABLE 5.4 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool 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
Albergo Building	N/A	Economic	Small Business	Yes	No, locally significant	Medium	Yes	Yes	No	No	No	No	1	3	False	3	0	4	FALSE	3	0
GNH Lumber Yard	Extreme	Economic	Industrial, Warehousing and Manufacturing	Yes	No, locally significant	Medium	Yes	Yes	Yes	No	No	Yes	2	3	4.00	5	60	4	4.00	5	80
Hensonville Frozen Food Lockers, Inc.	N/A	Economic	Grocery/Food Suppliers	Yes	No, locally significant	Medium	Yes	No	No	No	No	No	0.5	3	False	3	0	4	FALSE	3	0
Alpine Garden Village (Retail Mall)	N/A	Economic	Downtown Center	Yes	No, locally significant	Low	Yes	Yes	No	No	No	No	1	3	False	3	0	4	FALSE	3	0
Windham Hamlet	Extreme	Economic	Downtown Center	Yes	No, locally significant	High	Yes	Yes	Yes	Yes	No	Yes	2.5	3	4.50	5	68	4	4.50	5	90
Maplecrest Hamlet	Extreme	Economic	Downtown Center	Yes	No, locally significant	High	Yes	No	Yes	No	No	Yes	1.5	3	3.50	5	53	4	3.50	5	70
Hensonville Hamlet	N/A	Economic	Downtown Center	Yes	No, locally significant	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	FALSE	3	0
Main Street Windham Business District	Extreme	Economic	Downtown Center	Yes	No, locally significant	High	Yes	Yes	Yes	Yes	No	Yes	2.5	3	4.50	5	68	4	4.50	5	90
Main Street Hensonville Business District	N/A	Economic	Downtown Center	Yes	Yes, FEMA	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	FALSE	3	0
Verizon Sub Station	High	Infrastructure Systems	Telecommunications	Yes	No, locally significant	High	Yes	Yes	No	Yes	No	No	1.5	3	2.50	5	38	4	2.50	5	50



GLOSSARY

ALS	Advanced Life Support
BFE	Base flood elevation
CDBG	Community Development Block Program Grant
CDBG-DR	Community Development Block Grant Disaster Recovery
cfs	Cubic feet per second
Committee	NYRCR Town of Windham Planning Committee
Community	Town of Windham Community
CMP	Corrugated metal pipe
DFIRM	Digital Flood Insurance Rate Map
EOC	Emergency Operations Center
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FHA	Flood hazard area
FTE	Full-time equivalent
HAZUS-MH	Hazards US-Multi-Hazard risk assessment model
HEC-RAS	Hydrologic Engineering Center - River Analysis System
HMGB	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HUD	U.S. Department of Housing and Urban Development
IA	Individual Assistance
N/A	Not applicable
NCDC	National Climate Data Center
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NYC DEP	New York City Department of Environmental Protection
NYRCR	New York Rising Community Reconstruction
NYRCR Plan	Town of Windham New York Rising Community Reconstruction Plan
NYS	New York State
NYS DEC	New York State Department of Environmental Conservation
NYS DOS	New York State Department of State
NYS DOT	New York State Department of Transportation
PA	Public Assistance
POC	Point of Confluence
RSF	Recovery support function
SART	State Agency Review Team
SEED	Girls' Quest's Summer Experiential Education and Development Program
SoVI	Social Vulnerability Index



GLOSSARY

SWMS	Stormwater management system
TBD	To be determined
Town	Town of Windham
USGS	United States Geological Survey
WARF	Windham Area Recreational Foundation
WWTP	Waste Water Treatment Plant



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