



Greene County Hazard Mitigation and Resilience Plan

January 2016 Draft

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Action Worksheets

Action worksheets for each mitigation action by town are included here.

List of Acronyms

ACS	American Community Survey
AECOM	AECOM Corporation
BFE	Base Flood Elevation
BOVPN	Branch Office Virtual Private Network
CDBG	Community Development Block Grant
CEO	Code Enforcement Officer
CFA	Consolidated Funding Application
CFR	Code of Federal Regulations
ClimAID	Responding to Climate Change in New York State
CRS	Community Rating System
CWC	Catskill Watershed Corporation
DHS	Department of Homeland Security
DR	Disaster Relief
DVA	Department of Veterans Affairs
EF	Enhanced Fujita
EMS	Emergency Medical Services
EOC	Emergency Operations Center
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GCEOC	Greene County Emergency Operations Center
GCSWCD	Greene County Soil & Water Conservation District
GIS	Geographic Information Systems
HMP	Hazard Mitigation Plan
IA	Individual Assistance
ICS	Incident Command System
IT	Information Technology
LEPC	Local Emergency Preparedness Committee
LFA	Local Flood Analysis
MERITS	Medical Emergency Response Inventory Tracking System
MPH	Miles Per Hour
MRC	Medical Reserve Corps
MSMA	Mountaintop Supervisors and Mayors Association

NCDC	National Climatic Data Center
NESIS	Northeast Snowfall Impact Scale
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NPDP	National Performance of Dams Program
NWS	National Weather Service
NYCRR	New York Codes, Rules and Regulation
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
PA	Public Assistance
PHEP	Public Health Emergency Preparedness
POC	Preparedness and Outreach Coordinator
REMO	Regional Emergency Medical Organization
RL	Repetitive Loss
RPS	Regional Planning Study
SFHA	Special Flood Hazard Area
SHELDUS	Spatial Hazard Events and Losses Database for the United States
SUNY	State University of New York
SWAC	Schoharie Watershed Advisory Committee
USGS	U.S. Geological Survey
VA	Veterans Affairs
WAP	Watershed Assistance Program
WCT	Wind Chill Temperature

Executive Summary

Although this plan is an update to the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*¹, it is a new chapter in the County's hazard mitigation planning efforts. Since Hurricane Irene, Tropical Lee, and Superstorm Sandy hit, Greene County and its municipalities are thinking about hazard mitigation in its true proactive sense, and are ready to take action.

The *Greene County Hazard Mitigation and Resilience Plan* represents the work of several County departments, numerous Town and Village representatives, and other elected and appointed government officials who collaborated to develop this blueprint to protect community assets preserve the economic viability of the community, and save lives.

Greene County residents and assets are at risk from various hazards, experiencing several heavy winter storms almost every year, and numerous flooding events every year. This plan provides a long-term approach to reducing the likelihood that a natural hazard will turn into a disaster. The plan uses updated data for assessing vulnerabilities and presents updated strategies for making Greene County a safer and more sustainable community.

This plan will help the County to implement mitigation projects instead of only responding to and recovering from hazard events. With this plan update the County not only aims to maintain eligibility for federal mitigation project funding (under Disaster Mitigation Act of 2000) but apply for diverse sources of funding. The plan is a step towards the County becoming more resilient, i.e. able to withstand and quickly recover from a natural hazard event. Therefore the plan is renamed *Greene County Hazard Mitigation and Resilience Plan*.

The hazard mitigation planning process used to create this plan consisted of meeting directly with stakeholders and the Planning Committee, gathering and analyzing data publically available from various sources, and receiving stakeholder input and date via email. Greene County's Geographic Information Systems (GIS) data were critical in identifying the numbers of structures and critical facilities located in hazard-prone areas, such as floodplains. County officials and representatives of local jurisdictions proposed and evaluated strategies that might be effective in mitigating the negative effects of natural hazards. As a result, this plan contains over 100 mitigation actions ranging from public education and outreach projects to structural projects, such as elevating critical facilities like waste water treatment plants, increasing culvert sizes, and replacing bridges.

By adopting this updated plan, the County and its 19 towns and villages commit to working with each other to make their communities safer.

¹ <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

1.0 Introduction

Greene County is located in southeast central New York State, just west of the Hudson River and south of Albany. Figure 1-1 shows the location of the County with respect to the rest of the state.

The County is part of the Upper Hudson Valley Region (capital district), located in the Catskill Mountains region which is known for its natural beauty. Catskill is a cultural and geographic region generally defined as those areas close to or within the borders of the Catskill Park, a 700,000-acre forest preserve protected from many forms of development under New York state law. According to the 2010 Census, the County has a population of 49,221 residents, bolstered by second-home ownership on weekends and in the summer, and visitors to the Park's campgrounds and resorts.



Figure 1-1: Location of Greene County in New York



(Source: AECOM)

Figure 1-2: Catskill Region

This document, the *Greene County Hazard Mitigation and Resilience Plan* (hereafter referred to as “plan”), is an update of the *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan* (hereafter referred to as the “2009 HMP”) that was developed and adopted for implementation by Greene County, NY, and its jurisdictions in 2009. However, this plan’s planning process and document were conducted as a fresh new process, and treated as a brand new document.

Greene County is at risk of damage from a variety of natural hazards: flooding, heavy snow or ice, hail and thunderstorm, earthquake, and landslide. In the last 5 years, Greene County has experienced numerous natural hazard events, including floods, thunderstorms, hail, snow, and extreme cold (refer to Chapter 4 for more information on hazards). Tropical Storm Lee,

Hurricane Irene, and Superstorm Sandy are all still fresh in the residents' memory and parts of the County are still recovering from the damage inflicted during these events (see Figure 1-3).

This plan includes a rigorous analysis of the potential effects of these natural hazards on the structures and infrastructure within Greene County (refer to Chapter 4 Risk Assessment) and proposes actions to reduce the risk of a natural hazard leading to a disaster with property loss, business disruption, or even loss of life (refer to Chapter 5 Mitigation Strategy).



(Source: FEMA Photo Library)

Figure 1-3: Damage from Hurricane Irene in Town of Prattsville

1.1 Purpose of the Plan

The emergency management community, citizens, elected officials, and others in Greene County recognize the potential impacts of natural hazards on their community and in response have developed this plan, the *Greene County Hazard Mitigation and Resilience Plan*, to help mitigate the risk from natural hazards.

Hazard mitigation actions are defined as actions that reduce the potential for loss of life and destruction of property. Mitigation actions are taken in advance of the occurrence of a potential hazard and are essential for breaking the disaster cycle of damage, reconstruction, and repeated damage.

The mitigation actions of this plan are linked to other community plans, programs, and policies to inform and influence community decisions about growth and development. One of the goals of this plan is for mitigation to become a way of doing business in the community. Every decision – from new construction to bridge replacement to culvert repair – should consider its effect on reducing risk.

Adoption of this plan ensures that Greene County and participating jurisdictions continue to be eligible to apply for and receive certain Federal grant funds that are administered by the New York State Department of Homeland Security and Emergency Services (NYS DHSES) for the Federal Emergency Management Agency (FEMA). This plan complies with the requirements of the Disaster Mitigation Act of 2000 and its implementing regulations published in Title 44 of the Code of Federal Regulations (CFR) Section 201.6, as updated in 2011 and 2014.

Resilience

The National Mitigation Framework defines resilience as the state of being able to adapt to changing conditions and then withstand and rebound from the impacts of disasters and incidents. The definition of community resilience as an inclusive, informed process that addresses social, economic, natural, cultural, technical, and organizational dimensions within a community - resonates with the hazard mitigation planning process followed to prepare this plan and the goals and actions of this plan.

1.2 Organization of the Plan

The sections of this plan are:

- **Chapter 1 – Introduction** explains the purpose and organization of this plan.
- **Chapter 2 – Planning Process** describes the jurisdictions that have participated in plan development, how they participated, and the steps followed for developing this plan. This section also describes how each section of this plan is updated from the previous plan, and includes information sources used to develop this plan.
- **Chapter 3 – Community Profile and Capability Assessment** discusses existing conditions, including development trends and current County government capabilities related to hazard mitigation, including actions completed in last 5 years.
- **Chapter 4 – Risk Assessment** identifies the natural hazards that may affect Greene County, describes their location, extent, previous occurrences and likelihood of future occurrences, and overall summary of vulnerability and potential impact of each identified hazard.
- **Chapter 5 – Mitigation Strategy** includes goals, alternative mitigation actions available and summary of actions in progress or proposed for the next five years. This section explains how actions were prioritized and how they will be implemented, and incorporated into other plans.
- **Chapter 6 – Implementation and Maintenance** explains how mitigation actions will be implemented and monitored and how the plan will be evaluated and updated.
- **Chapter 7 – References and Resources** provides references for documents cited in this plan as well as resources used.
- **Appendices** that include detailed descriptions of hazards and past occurrences, planning process documentation (meeting invitations, agenda, sign-in sheets, etc.), contact list and phone/email log, mitigation actions list, and potential funding sources.
- **Jurisdictional Annexes** that provide an introduction to each participating jurisdiction and summarize the vulnerabilities, capabilities and mitigation actions of each.
- **Action Worksheets** that describe details of the implementation strategy for each mitigation action identified in this plan.

2.0 Planning Process

Both the 2009 HMP and this *Greene County Hazard Mitigation and Resilience Plan* represent the work of citizens, elected and appointed government officials, community leaders, and organizations who have worked together to develop a blueprint for protecting community assets, preserving the economic viability of the community, and saving lives.

The 2009 HMP process was different from the current process in that it was led by Greene County Planning and Economic Development and the consultants conducted workshop-style meetings. The 2015-16 planning process was led by Greene County Emergency Services and consultants followed the feedback that emails were the preferred mode of input, so the person attending the meeting took information back, consulted with other community members and then sent information back. Therefore, Planning Committee and regional meetings were conducted, followed by several emails and phone calls to individual jurisdictions.

Figure 2-1 depicts the planning process presented at the meetings, illustrating that the planning process continues beyond the creation and adoption of the plan document.

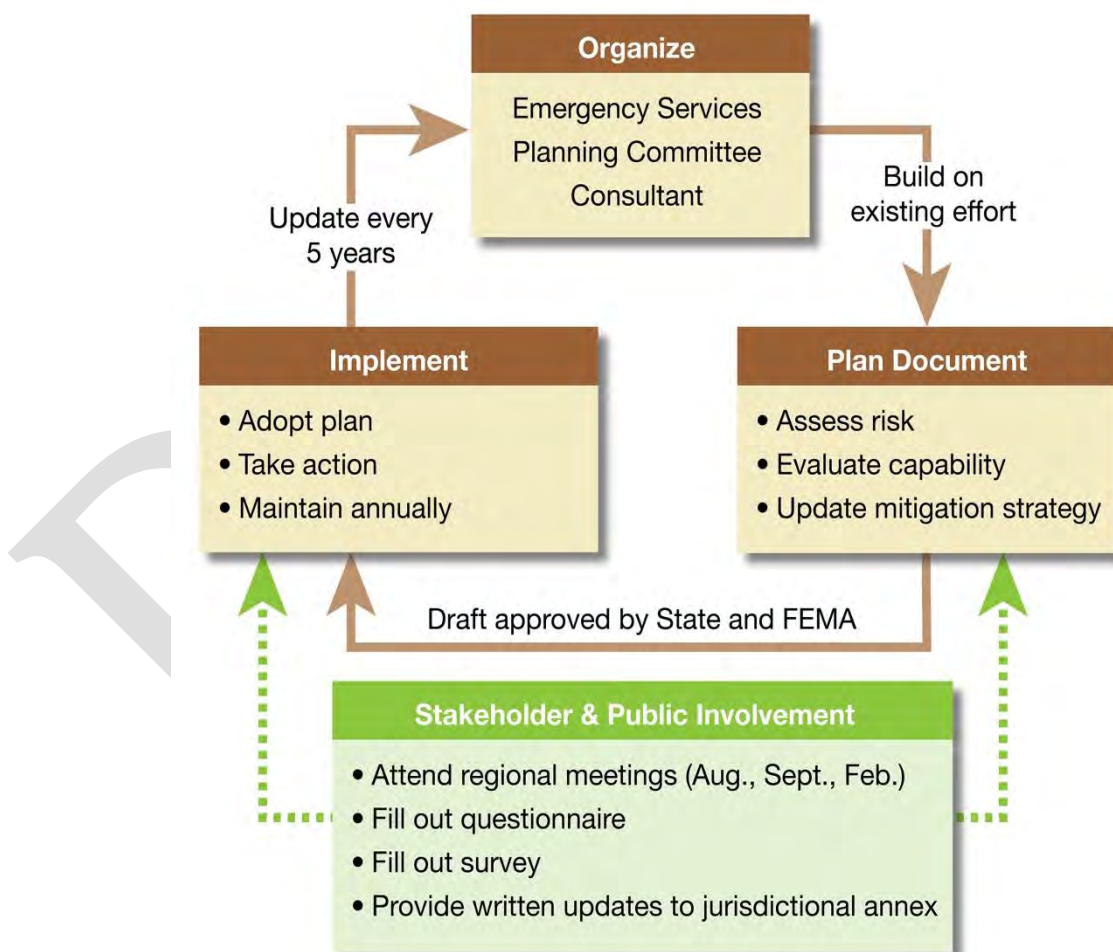


Figure 2-1: Greene County Hazard Mitigation and Resilience Planning Process

The guiding principles for this plan's development process were:

- Use of a collaborative and grassroots-based planning process - Each jurisdiction had multiple opportunities to participate in the planning process, were contacted in several different ways (individual emails, phone calls), and had several different avenues for participation (participated in meetings, provided written input, provided input by email or phone or through other members of their community who were participating).
- Development of a concise and focused plan document - It is critical that the plan can actually be used by each jurisdiction to implement actions. For this reason, the jurisdiction-specific Annexes begun in the 2009 HMP were continued so that towns and villages can easily find and use the part of the plan that specifically addresses their issues and actions. The 2009 HMP Annexes were used as a starting point for engaging the municipalities, but were heavily revised and edited as part of this plan process. The entire plan document was revised and kept as brief as possible; detailed information was moved to Appendices for readers who desire those details.

2.1 Planning Committee

During 2015-2016, the development of this plan was led by a Planning Committee. As the lead agency of this plan, Greene County Emergency Services selected its members. Member selection was based on who would be able to participate and contribute to the development of the plan, both by providing input at Committee meetings and taking back information to their and other communities for discussion. The Committee was representative of stakeholders as well as participating jurisdictions. A few members were involved in the previous planning process for the 2009 HMP as well. Planning Committee members for this plan are shown in Table 2.1.

Table 2.1: Greene County 2015 Hazard Mitigation Planning Committee

Planning Committee Member	Affiliation
John Farrell	Greene County Emergency Services Emergency Services Director
Dan King	Greene County Emergency Services Emergency Management Specialist
Alan VanWormer	Town of New Baltimore Emergency Services
Joe Ellis	Village of Coxsackie Trustee
Donna Bernard	Town of Jewett Chair Planning Board
Alan White	Town of Halcott Town Supervisor
Christian Pfister	Village of Athens Mayor
Paul Macko	Town of Greenville Town Supervisor
Tom Hoyt	Town of Windham Windham Highway Superintendent

To aid in developing the plan, the County contracted the services of AECOM Corporation, a consulting firm with expertise in hazard mitigation planning. AECOM engaged a local planning firm, Planning4Places, LLC to support the plan development meetings, jurisdictional participation, and preparation of this plan document.

2.2 Jurisdictions Represented in the Plan

All 19 towns and villages that participated in the 2009 HMP participated in the development of this 2016 plan except Sleepy Hollow Homeowners Association, who participated in 2009 but decided not to participate this time as they cannot apply for mitigation funding independently.

Table 2.2 shows the municipalities in Greene County, organized by the three geographic regions of the County (see Figure 2-2) that participated in the mitigation planning process, will adopt this plan, and will authorize municipal government staff to carry out the proposed actions.

Table 2.2: Greene County Participating Municipalities, by Geographic Region

Geographic Region	Name
Mountaintop Towns	<ul style="list-style-type: none"> • Town of Prattsville • Town of Halcott • Town of Lexington • Town of Ashland • Town of Jewett • Town of Windham • Town of Hunter • Village of Hunter • Village of Tannersville
River Towns	<ul style="list-style-type: none"> • Town of Catskill • Village of Catskill • Town of Athens • Village of Athens • Town of Coxsackie • Village of Coxsackie • Town of New Baltimore
Valley Towns	<ul style="list-style-type: none"> • Town of Durham • Town of Greenville • Town of Cairo

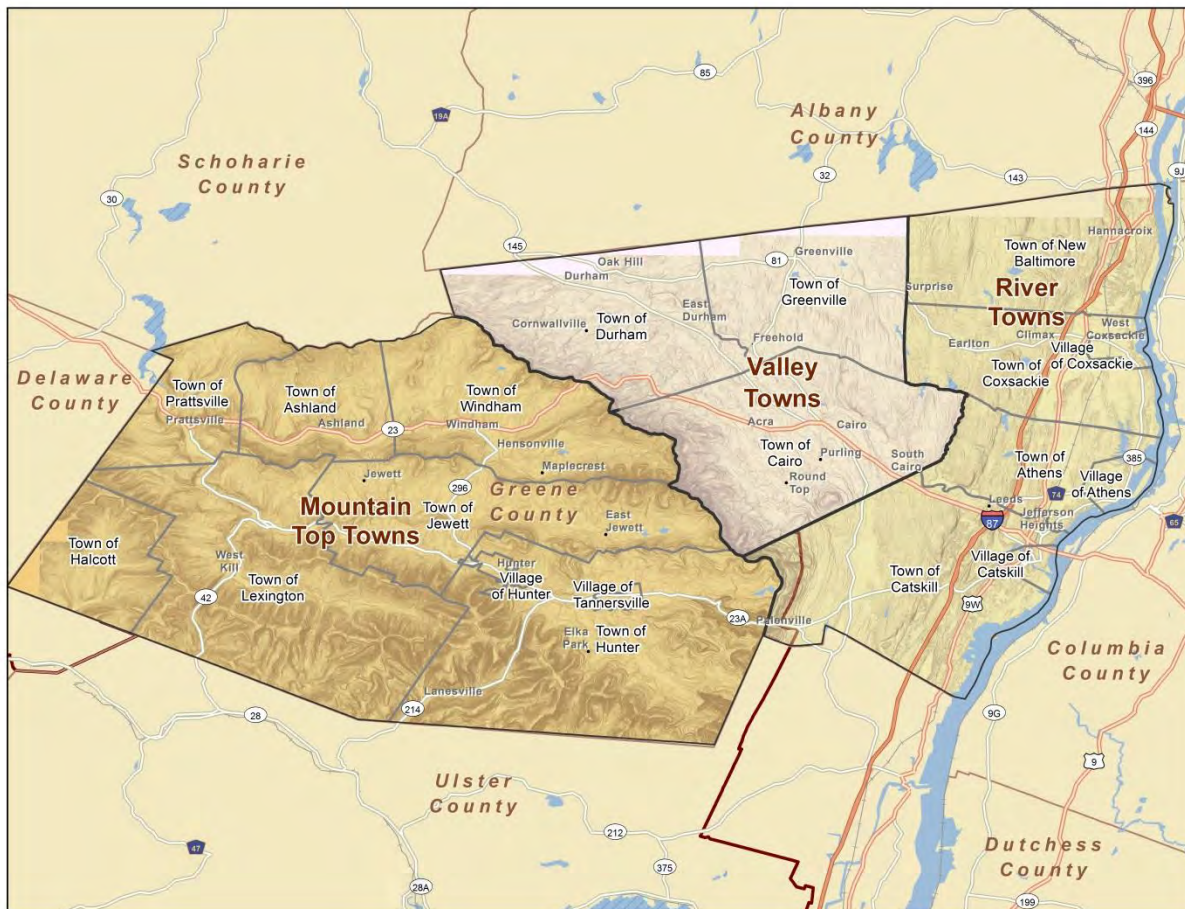


Figure 2-2: Participating jurisdictions by geographic regions of the County

2.3 Jurisdictional and Stakeholder Participation

The planning process was designed to reach and receive input from not only County officials and the Planning Committee, but all participating towns and villages. Since the plan is to be adopted and implemented by each municipality, multiple attempts were made to obtain participation from each municipality and various avenues were made available for all stakeholders to truly participate.

All meeting invitations, agendas, sign-in sheets, notes, completed questionnaires, survey results, and other samples of input received throughout the planning process are included in Appendix B. Complete documentation of phone calls and emails, by jurisdiction, is included in Appendix C. Both the Appendices are not released in the public copy of the plan to keep emails and phone numbers private.

2.3.1 Initial Planning Committee Meeting in July

The first Planning Committee meeting, held on July 27, 2015, covered the overall scope of the plan, concepts of mitigation and resilience, risk assessment steps the consultant planned to take, mitigation goals and range of actions, and information requirements for the plan (for example, actions completed since the 2009 HMP). An important element of the initial meeting was to obtain initial feedback on the desired planning process. To obtain feedback, the consultant asked attendees

to fill out a questionnaire that asked about hazard events in the last 5 years, vulnerable areas and assets, completed and current mitigation activities, capabilities, and potential actions. The results of the questionnaire were then discussed at the meeting to clarify the desired planning process.

Based on feedback obtained during the first meeting, it was clear the Planning Committee preferred email communication over workshop-style meetings. The reason cited was that workshops are heavily dependent on the availability of community representatives and can result in the person participating in the meeting providing limited information. Instead, the Planning Committee stated a preference for regional meetings, open to the public and stakeholders, followed by detailed email summaries and requests for information (sent to each Town/Village representative who attended the meeting, or whoever they said to include in the emails). This method would thus provide information to each town or village, each of which had a small team to discuss hazard mitigation and the information needed as part of this planning process, and the community representative would then return the results to the Planning Committee as a cohesive contribution.

Table 2.3 lists all jurisdiction and stakeholder representatives involved in the planning process. Each person identified on the table received several notifications about the planning process; some of them were Planning Committee members and others may have attended regional meetings or provided written input. The main point of contact for each jurisdiction or stakeholder is identified by an asterisk on Table 2.3.

Table 2.3: Jurisdiction and Stakeholder Representatives Involved in the Planning Process

Jurisdiction or Stakeholder	Name	Title
Town of Ashland	Richard Tompkins* Larry Tompkins Tom Cross	Town Supervisor Ashland Highway Superintendent Ashland Code Enforcement Officer (CEO)
Town of Athens	Joseph Iraci* Robert Butler John J. Farrell	Town Supervisor+ (former) Town Supervisor Town Highway Superintendent
Town of Cairo	Ted Banta III* Daniel A. Benoit Robert Hempstead Debra Sommer	Town Supervisor+ (former) Town Supervisor Town of Cairo Hwy Supervisor Town of Cairo Deputy Highway Superintendent
Town of Catskill	Joseph M. Leggio* Doreen P. Davis Patrick McCulloch Richard Praetorius	Town Supervisor+ (former) Town Supervisor Deputy Highway Superintendent Engineer
Town of Coxsackie	Richard K. Hanse* Michael Tighe	Town Supervisor Town Highway Superintendent
Town of Durham	William A. Carr, Jr. * Joe van Holestyn	Town Supervisor Town Highway Superintendent
Town of Greenville	Paul Macko* Victor Cornelius Richard Hempstead	Town Supervisor Grant Writer Town of Greenville Highway Superintendent

Table 2.3: Jurisdiction and Stakeholder Representatives Involved in the Planning Process

Jurisdiction or Stakeholder	Name	Title
Town of Halcott	Alan White* Russell Bouton	Town Supervisor Town of Halcott Highway Superintendent
Town of Hunter	Daryl Legg* David Kukle Jim Boyle John Farrell	Town Supervisor Councilperson CEO/Floodplain Manager Town of Hunter Highway Superintendent
Town of Jewett	Jim Pellitteri* Donna Bernard Mike McCrary Robert Mallory	Town Supervisor Chair Planning Board Deputy Supervisor Town of Jewett Highway Superintendent
Town of Lexington	Dixie Baldrey* John W. Berger, Jr. Adam Cross Frank Hermance	Town Supervisor+ (former) Town Supervisor CEO/Floodplain Manager Lexington Highway Superintendent
Town of New Baltimore	Alan VanWormer* Nick Dellisanti Denis Jordan	Emergency Services Town Supervisor Town Highway Superintendent
Town of Prattsville	Kory O'Hara* Adam Cross William Sutton	Town Supervisor CEO/Floodplain Manager Highway Superintendent
Town of Windham	Tom Hoyt* Don Murray Stacy Post Robert J. Pelham Dominick Capareso	Councilman Town Supervisor + (former) Town Supervisor Windham Highway Superintendent CEO and Floodplain Manager
Village of Athens	Christian Pfister* Gail Lasher Michael Ragaini	Mayor Trustee CEO
Village of Catskill	Betsy Cothren* Vincent Seeley Nancy Richards Michael Ragaini	Clerk-Treasurer Village President Community Development Coordinator/Secretary to the Planning/Zoning Boards CEO
Village of Coxsackie	Joe Ellis* Marc Evans Diane Ringwald Pat Maxwell Peter Willis Paul Sutton Michael Ragaini Robert DeLuca	Trustee Mayor Trustee Planning Board Chair, Zoning Board Trustee CEO Village Highway Superintendent
Village of Hunter	William Maley* Dominick Capareso Charlie Sweet	Mayor CEO and Floodplain Manager Superintendent of Highways
Village of Tannersville	Lee McGunnigle*	Mayor

Table 2.3: Jurisdiction and Stakeholder Representatives Involved in the Planning Process

Jurisdiction or Stakeholder	Name	Title
	Dominick Capareso Wes Thorington	CEO and Floodplain Manager Tannersville Highway Superintendent
Greene County Buildings & Grounds	Timothy Hoover*	Superintendent
Greene County Emergency Services	John Farrell Dan King* Randy Ormerod	Director Emergency Manager Specialist Deputy Director
Greene County Planning & Economic Development	Warren Hart* Ed Diamante	Director
Greene County Highway	Gary R. Harvey*	Superintendent
Greene County Public Health Department	Alyssa Benjamin*	Emergency Preparedness Coordinator
Greene County Soil & Water Conservation District	Jeff Flack Michelle Yost* Joel DuBois	Executive Director Watershed Assistance Program Coordinator Conservation District Program Specialist

#Town Supervisors have changed in January, 2016

* Main point of contact for jurisdiction or stakeholder agency

2.3.2 Risk Assessment and Regional Meetings in Fall 2015

After the initial Planning Committee meeting the consultant conducted a thorough research of national, regional and local information for occurrences of hazard events in the last 5 years, and magnitude and impact of those events. They also conducted GIS and Hazus analysis (details and results in Chapter 4) and presented preliminary results at the regional meetings.

Four regional meetings were conducted in August and September of 2015 to explain the planning process and solicit input from towns and villages. The meetings were held in four different locations to make it convenient for attendees. Prior to the regional meetings, each participating jurisdiction was sent the 2009 HMP annex specific to their town or village. At each regional meeting, the consultants explained the planning process, asked for information, and recorded comments and inputs on vulnerable areas and assets. To increase participation by communities, Planning Committee members were asked to talk about the mitigation planning process and upcoming regional meetings at other meetings and occasions, to encourage municipal and public participation at the regional meetings. In conjunction with the regional meetings, participating jurisdictions were contacted via several rounds of emails and phone calls in September and October.

The first regional meeting held in Lexington (August 24), to which the Mountaintop Towns were invited, was well attended and resulted in active discussion of natural hazard vulnerabilities (Figure 2-3). The second regional meeting, held in Catskill (August 25), had low attendance. The third meeting was held in Coxsackie on September 16 (Figure 2-5), followed by the fourth meeting in Cairo on September 17 (Figure 2-6). Meeting invitations, agenda, sign-in sheets and notes are included in Appendix B.

The regional meetings brought up several issues, e.g. the Town of Halcott’s critical facilities are located outside the County, and the Town of Hunter gets cut off due to blocked roads in a snow and/or flood event. It was also decided that wastewater treatment plants would be included in critical facilities (in addition to the critical facilities defined by the 2009 HMP).



Figure 2-3: Regional public meeting in Lexington (August 24, 2015)



Figure 2-4: Regional public meeting in Coxsackie (September 16, 2015)



Figure 2-5: Regional public meeting in Cairo (September 17, 2015)

After the meetings the consultants followed up by emails and phone calls and received revised annexes from seven communities and other information (by email) from eight communities. Jurisdictions provided information on events and damages in the last 5 years, problem areas and vulnerable assets, status of 2009 HMP mitigation actions, and current and proposed mitigation actions.

2.3.3 Planning Committee Meeting in December

A meeting of the Planning Committee was held on December 4, 2015, at the Greene County Emergency Services building. The meeting was well-attended. Several County department representatives attended the meeting. The focus of the meeting was to discuss proposed actions but since there were several attendees present that had not been at the initial meeting in July, the consultant summarized the material from the first meeting before presenting the results of the risk



Figure 2-6: Planning Committee meeting in Cairo (December 4, 2015)

assessment. Representatives from participating jurisdictions reviewed and commented on the mitigation actions list; there was good discussion about actions with each County representative.

2.3.4 Presentation of Draft Plan

In early February, 2016 each jurisdiction and stakeholder received a copy of the draft plan along with a message requesting their review and input in terms of modifications for improved accuracy, and missing information for the Jurisdiction Annexes and Action Worksheets, particularly regarding priorities for identified action items.

Throughout February and March 2016, Greene County Emergency Services Director, John Farrell and Emergency Management Specialist, Dan King approached the communities by either talking about the draft plan at regular town meetings or calling them by phone (dates and location of meetings and calls included in Appendix B of the Final Draft). Table 2.4 shows the communities that reviewed the draft plan.

Besides jurisdictions and County departments, the draft plan was shared with neighboring Delaware County, Catskill Watershed Corporation, American Red Cross and Greene County Chamber of Commerce through the Emergency Services website and individual emails requesting input.

2.3.5 Summary of Jurisdictional and Stakeholder Participation

As described, the planning process used to develop this plan included many opportunities for jurisdictions and stakeholders to participate in the planning process. Opportunities included the participation of jurisdiction representatives on the Planning Committee, regional meetings open to all stakeholders and public, as well as follow up emails and phone calls conducted by the consultant. A summary of jurisdiction and stakeholder participation is shown in Table 2.4.

Table 2.4: Summary of Jurisdiction and Stakeholder Participation

Jurisdiction or Stakeholder	Attended Planning Committee meeting (July 27)	Attended Regional meeting (Aug, Sep)	Attended Planning Committee meeting (December 4)	Modified their Annex and/or emailed their input	Filled out Questionnaire	Provided input on Mitigation Actions	Reviewed the Draft Plan <i>(to be filled in Final Draft)</i>
Town of Ashland		✓		✓		✓	
Town of Athens						✓	
Town of Cairo			✓			✓	
Town of Catskill						✓	
Town of Coxsackie			✓			✓	
Town of Durham	✓		✓		✓	✓	
Town of Greenville	✓	✓	✓	✓		✓	
Town of Halcott	✓	✓		✓	✓	✓	
Town of Hunter		✓		✓		✓	
Town of Jewett	✓	✓		✓	✓	✓	
Town of Lexington		✓		✓	✓	✓	
Town of New Baltimore	✓		✓		✓	✓	
Town of Prattsville				✓		✓	
Town of Windham		✓	✓	✓	✓	✓	
Village of Athens		✓	✓	✓	✓	✓	
Village of Catskill		✓			✓		
Village of Coxsackie	✓	✓	✓	✓	✓	✓	
Village of Hunter						✓	

Jurisdiction or Stakeholder	Attended Planning Committee meeting (July 27)	Attended Regional meeting (Aug, Sep)	Attended Planning Committee meeting (December 4)	Modified their Annex and/or emailed their input	Filled out Questionnaire	Provided input on Mitigation Actions	Reviewed the Draft Plan <i>(to be filled in Final Draft)</i>
Village of Tannersville						✓	
Greene County Buildings & Grounds			✓			✓	
Greene County Emergency Services	✓	✓	✓			✓	
Greene County Planning & Economic Development			✓			✓	
Greene County Highway			✓			✓	
Greene County Public Health Department			✓		✓	✓	
Greene County Soil and Water Conservation District		✓	✓		✓	✓	

All meeting invitations, agendas, sign-in sheets, notes, completed questionnaires, survey results, and other samples of input received throughout the planning process are included in Appendix B. Complete documentation of phone calls and emails, by jurisdiction, is included in Appendix C. Both the Appendices are not released in the public copy of the plan to protect individual email and phone numbers.

2.4 Public Involvement

To facilitate public participation in the drafting of the plan, a notice about the ongoing update of the hazard mitigation plan was posted on the Greene County Emergency Services web site beginning August, 2015, along with a link to the 2009 HMP, a link to the survey instrument, and a link to the flyer for the regional meetings (see Figure 2-7). Residents of Greene County and neighboring communities who might be interested in participating in the process were invited to contact Dan King, Greene County Emergency Management Specialist.

The County posted messages on their Facebook page at different stages of the process – the kickoff meeting of the Planning Committee, the regional meetings, and during the open comment period on the draft. A press release inviting review and comment on the plan was sent to the local newspaper, Daily Mail, in 2015 but it was not printed.

Additionally, Planning Committee members were encouraged to spread the word through different avenues, to encourage the public to attend regional meetings as well as comment on the draft. The meetings where the draft plan was discussed in February and March were open to the public as well.



Figure 2-7: Flyer to encourage public participation at the regional meetings

The results of the surveys filled out are included in Appendix B along with other public comments received (*so far there's none*).

A press release was printed in the local newspaper, Daily Mail on _____ informing the public about the open comment period for the draft plan. An invitation to the public to review and comment on the draft plan was posted on the Greene County Emergency Services web site from _____ through _____. A screen shot of the Web page is displayed in Appendix B. A copy of the press release is displayed in Appendix B.

Greene County received [*actual number to be inserted*] comments; the Planning Committee reviewed these comments and modified the draft of the plan accordingly, before the plan was adopted by the jurisdictions.

[*Grey highlighted text is about the steps that will be completed in the final draft*]

2.5 Review of Existing Data and Documents

The County requested data for structures that have been damaged repeatedly by flooding and FEMA Region II sent the data on repetitive flood losses. NYS DHSES also sent mitigation actions that were submitted by the County after Superstorm Sandy. Other national, state, regional and local data sources that were used to develop this plan, especially Chapter 3. County Profile and Capability Assessment and Chapter 4. Risk Assessment, are listed in Chapter 7. References.

2.6 Adoption Resolutions

All participating jurisdictions will adopt the plan after FEMA Region II determines that this plan is approvable pending adoption. An approvable plan meets planning requirements specified in 44 CFR Section 201.6. A plan is fully approved after it is adopted. Signed adoption resolutions will be included with the plan when the plan is submitted for final approval by FEMA Region II.

3.0 County Profile and Capability Assessment

The following section provides a brief overview of Greene County and its capabilities relating to hazard mitigation.

3.1 County Profile

Greene County is located in the mid-eastern part of New York State in the northern end of the Catskill Mountains and part of the Upper Hudson Valley Region. The northern and eastern parts are mostly low-lying flatlands, while the southern and western parts rise sharply into the Catskill Mountains. Along the Hudson River, the lowest elevation is at sea level. The County is bordered to the south by Ulster County, to the east by Columbia County and the Hudson River, to the north by Albany and Schoharie Counties, and to the west by Delaware County.

According to the U.S Census, the County has a total area of 658.05 sq. mi., 647.16 sq. mi. of which is land and 10.89 sq. mi. of which is water. According to the 2010 Census, Greene County had a population of 49,221 people, a population density per square mile of 76.1, and a housing density per square mile of 45.1. To put this in perspective, the Village of Catskill (the County seat) has a population density of 1,790.3 and housing density of 890.1, while the Town of Catskill has a population density of 194.8 and a housing density of 101.1.

Greene County includes 19 local jurisdictions, and this plan includes an Annex for each one, as shown in Table 3.1: 5 villages and 14 towns. The jurisdictions are divided into three specific geographic areas: River Towns, Valley Towns, and Mountaintop Towns (refer to Table 2.2). The location of the jurisdictions is shown in Figure 2-2. The Town of Catskill is the county seat.

Table 3.1: Greene County Towns and Villages, by Annex Number

Towns	Villages
Annex I: Town of Ashland	
Annex II: Town of Athens	Annex III: Village of Athens
Annex IV: Town of Cairo	
Annex V: Town of Catskill	Annex VI: Village of Catskill
Annex VII: Town of Coxsackie	Annex VIII: Village of Coxsackie
Annex IX: Town of Durham	
Annex X: Town of Greenville	

County Contact Information

PRIMARY POINT OF CONTACT:

John Farrell - Director, Emergency Services
25 Volunteer Drive
Cairo, NY 12413
518.622.3643
Email: jfarrell@discovergreene.com

ALTERNATIVE POINT OF CONTACT:

Warren Hart - Director, Economic
Development, Tourism and Planning
411 Main Street
Catskill, NY 12414
518.719.3290
Email: whart@discovergreene.com

Towns	Villages
Annex XI: Town of Halcott	
Annex XII: Town of Hunter	Annex XI: Village of Hunter Annex XVI: Village of Tannersville
Annex XII: Town of Jewett	
Annex XIII: Town of Lexington	
Annex XIV: Town of New Baltimore	
Annex XV: Town of Prattsville	
Annex XVII: Town of Windham	
<i>Annexes for each jurisdiction are attached to this plan, numbered as shown in this table</i>	

3.1.1 Physical Features

Physical features include geography, demographics, building stock, and land use.

3.1.1.1 Geography

There are numerous ponds, lakes, creeks, and rivers in Greene County. The major bodies of water and waterways within Greene County include the following:

- Hudson River
- Schoharie Reservoir
- Schoharie Creek (Main Stem)
- Manor Kill
- Batavia Kill
- West Kill
- East Kill
- Stony Clove Brook
- Broadstreet Hollow Brook
- Catskill Creek
- Hollister Lake
- Kaaterskill Creek
- Shingle Kill
- Potic Creek
- Hans Vosen Kill
- Sleepy Hollow Lake.

All of these features are within three major watersheds (which are further located within the Hudson River Basin): the Middle Hudson Watershed, Schoharie Watershed, and the East Branch Delaware Watershed. The Hudson River Basin, which includes the Upper Hudson, Middle Hudson, Lower Hudson and Mohawk River sub-basins, is one of the largest drainage basins in the eastern United States. The Hudson River Basin encompasses approximately 13,300 square miles in parts of New York State, Vermont, New Jersey, Massachusetts, and Connecticut.

The Middle Hudson Watershed, with a total drainage area of 2,401 square miles and 1,965 miles of streams, is located in both New York and Massachusetts. It covers 10 counties including Greene County and includes 30 different bodies of water including the Hudson River, Catskill Creek, and Stony Clove Brook. The Schoharie Watershed, with a total drainage area of 930 square miles and over 930 miles of streams, covers seven counties, including Greene County, and drains into the Mohawk River. Thirteen different bodies of water are located within the watershed including the Schoharie Creek, Batavia Kill, and East Kill. Finally, the East Branch Delaware Watershed has a total drainage area of 836 square miles and approximately 560 miles of streams in both New York and

Pennsylvania. It covers five different counties, including Greene County, and includes eight different bodies of water.

3.1.1.2 Demographics

Demographics, or the statistical analysis of the population and population specific data, provides insight into trends and changes in a given geographic area. Based upon a review of the 2010 U.S. Census, Greene County had a total population of 49,221 people in 2010, an increase of just over 2% from the year 2000. Table 3.2 shows population and housing unit statistics for Greene County and the municipalities within it based on the 2000 and 2010 U.S. Census data.

Table 3.2: Population and Housing Unit Statistics

Jurisdiction	Census Population		Housing Units	
	2000	2010	2000	2010
Greene County	48,195	49,221	26,544	29,210
Town of Ashland	752	784	603	679
Town of Athens	2,296	2,421	1,179	1,363
Village of Athens	1,695	1,668	793	885
Town of Cairo	6,355	6,670	3,392	3,654
Town of Catskill	7,457	7,694	3,652	4,083
Village of Catskill	4,392	4,081	2,048	2,029
Town of Coxsackie	5,989	6,105	1,482	1,673
Village of Coxsackie	2,895	2,813	1,307	1,324
Town of Durham	2,592	2,725	1,642	1,807
Town of Greenville	3,316	3,739	1,694	1,901
Town of Halcott	193	258	288	312
Town of Hunter	1,783	1,691	1,696	1,753
Village of Hunter	490	502	639	642
Village of Tannersville	448	539	505	557
Town of Jewett	970	953	1,026	1,182
Town of Lexington	830	805	854	895
Town of New Baltimore	3,417	3,370	1,406	1,508
Town of Prattsville	665	700	406	506
Town of Windham	1,301	1,703	1,580	2,457

Source: *Census 2010 (U.S. Census Bureau)*. Counts above for Towns with Villages within their borders do not include the Villages – numbers use the “remainder of” count provided by the U.S. Census.

3.1.1.3 Building Stock

The U.S. Census identified 19,823 households and 29,210 total housing units in Greene County in 2010. Of the 29,210 total housing units in the County, the 2010 U.S. Census put the number of

occupied housing units at 19,823 with 72.5 percent owner-occupied and 27.5 percent renter occupied. Based on the Census, vacant housing units in the County totaled 9,387; of these, 6,790 were considered seasonal, recreational, or occasional use. More recent numbers from the 2014 ACS 5-year estimate calculated the total number of housing units in the County as 29,260, an increase of just 50 units. Those same estimates indicate the number of vacant units has grown significantly. The median price of a single family home in Greene County was estimated at \$92,400 in 2000 (U.S. Census, 2000) and increased to \$174,200 by 2014 (ACS 5-year estimate).

3.1.1.4 Land Use and Development Trends

Greene County is a combination of small urban centers, suburban areas, and rural development, but is predominantly rural in nature. It includes the built environment, the Catskill Mountains, river valley flatlands, waterbodies (including many rivers and streams), farmland, forest, brush land, and fields. Much of the County's forested areas were cleared in the mid-nineteenth century for use in forest and wood-based products and replaced with pastureland used to grow and keep livestock. However, as farming became more mechanized, hillside farms were abandoned in favor of the level farmland in the valleys, some of which remains in production today. In recent decades, some of the former pasture lands have been developed as residential housing and supportive commercial, employment, and industrial uses.

Land uses in Greene County are found in Table 3.3. Residential, vacant, and wild/forested/conservation lands/public lands are the top three land use categories within the County. This is also visible in Figure 3-1 which is created using current GIS data for land use from the County.

Table 3.3: Land Use Statistics for Greene County

Land Use Classification	Acreage
Residential	144,492
Vacant	114,345
Wild, Forested, Conservation Lands, and Public Parks	101,354
Agricultural	17,092
Commercial	7,039
Recreation and Entertainment	6,902
Community Services	5,584
Industrial	5,070
Public Services	2,597
TOTAL	404,475

Source: Greene County GIS, 2015

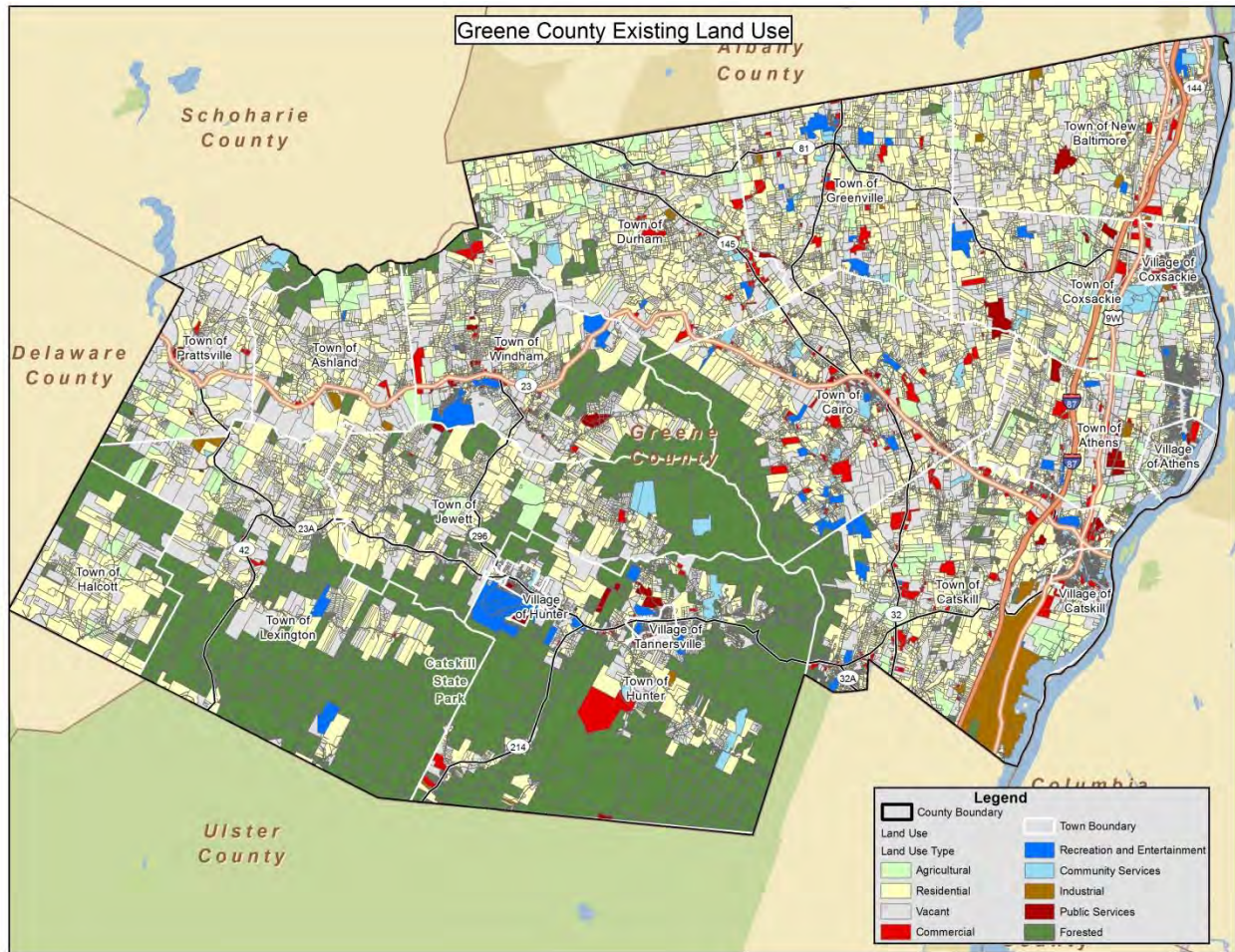


Figure 3-1: Greene County Land Use Map

3.1.2 Economy

The economy and economic well-being of the County is directly tied to housing, employment, income, land use, and tourism within the County. These are not only vital to the County and have a direct effect on activities taking place within the County's borders, but are vital to adjacent counties and the entire Hudson Valley and Catskill State Park region.

Tourism, as a specific component of the economy, is vital to the economic stability and well-being of the County. Residents, businesses, employees, and governments all rely on tourism-related spending and activity. According to a 2013 presentation titled *Economic Impact of Tourism in New York* (available on the Greene County website), traveler spending in Greene County increased by 2.7 percent and local taxes increased by 4.3 percent from 2011 to 2013. Tourism accounted for 15 percent of employment in the Catskills, equating to just over 17,000 jobs, and was second only to the Adirondacks.

Traveler spending in the Catskills accounted for approximately \$1.1 billion in 2013, an increase over the previous 2 years and accounted for nearly half a billion dollars in labor income. In Greene County, these numbers translated into \$148 million in traveler spending, over \$64 million in labor income impact (approximately \$3.8 million in direct tourism labor income) and employment of over

3,000 (direct, indirect, and induced) individuals (nearly 2,200 jobs directly from tourism). Tourism also has a significant impact on local government taxes, bringing in nearly \$10 million in local taxes. According to the presentation, if not for tourism-generated state and local taxes, households in Greene County would need to pay an additional \$953 annually to maintain the same level of government revenue.

Clearly, tourism is a major component of Greene County's economy. From a hazard mitigation planning perspective related to safety of tourists, it is vital to consider the potential needs of tourists. Considerations include how to locate and provide for the immediate needs of an unknown number of visitors, how to determine what is needed to keep them safe during a hazardous event should they be required (or forced) to shelter in place, and how to evaluate how and when they can safely return home. Given the importance of tourism on the economy of Greene County, additional consideration must be given to re-opening impacted areas to tourism as quickly as possible to minimize potential negative financial impacts on communities.

3.1.3 Evacuation Routes and Shelters

Evacuation routes are detailed in the County Comprehensive Emergency Management Plan. There is no county-wide evacuation plan except for dam specific routes detailed in the evacuation plan for each dam. Evacuation and sheltering are regularly discussed at Local Emergency Planning Committee meetings that occurred four times a year till 2015.

Greene County has 20 formally identified shelter locations. All but two locations are operated by the American Red Cross. Table 3.4 shows a list of shelter locations in the County, as of December 2015. Of special note is that the Cossackie Campus and Edward J. Arthur Elementary School in Athens have generator hookups.

Table 3.4: Summary of Shelter Locations as of December 2015

Shelter Name	Address	Agency Operating Shelter
Ashland Fire House - Town Hall	12094 Route 23 Ashland, NY 12407	American Red Cross
Athens Fire Department	39 Third St Athens, NY 12015	American Red Cross
Cairo-Durham Middle/High School	1301 Route 145 Cairo, NY 12413	American Red Cross
Cario-Durham Intermediate School	424 Main Street Cairo, NY 12413	American Red Cross
Catskill Elementary School	770 Embought Rd Catskill, NY 12414	American Red Cross
Catskill Masonic Lodge #468	8831 Rte. 9W Catskill, NY 12414	American Red Cross
Cossackie Campus	24 Sunset Blvd Cossackie, NY 12051	American Red Cross
Durham Elementary School	4099 Route 145 Durham, NY 12422	American Red Cross

Shelter Name	Address	Agency Operating Shelter
Edward J. Arthur Elementary School	51 3rd St Athens, NY 12015	American Red Cross
Greenville Christian Life Center	11693 Route 32 Greenville, NY 12083	American Red Cross
Greenville Middle & High School	4972 Rte. 81 Greenville, NY 12083	American Red Cross
Huntersfield Christian Training Center	251 Huntersfield Road Prattsville, NY 12468	Other
Hunter - Tannersville Elementary School	7794 Main St Hunter, NY 12442	Other
Jewett Presbyterian Fellowship	53 Church Street Jewett, NY 12444	American Red Cross
New Baltimore Fire House Station 1	77 Gill Road New Baltimore, NY 12124	American Red Cross
Oak Hill-Durham Volunteer Fire Company	103 County Route 22 Oak Hill, NY 12460	American Red Cross
Tannersville Fire And Rescue Building	21 Park Lane Tannersville, NY 12485	American Red Cross
Town of Windham Highway Garage	83 County Route 21 Windham, NY 12496	American Red Cross
Windham Ski Lodge	19 Resort Dr Windham, NY 12496	American Red Cross
Windham Town Wastewater Treatment Plant	491 County Rte 12 and South St. Windham, NY 12496	American Red Cross

Source: *Greene County Emergency Services*

3.2 Capability Assessment

A capability assessment helps determine the ability of a jurisdiction to implement a mitigation strategy. Being a county-wide Hazard Mitigation Plan, this capability assessment is focused at the County level, since Greene County is the lead implementation agency for this plan.

The hazard mitigation planning process is intended to identify what mitigation projects are desired and needed, and to then prioritize the projects according to those that are most needed, warranted, or feasible. The actions taken to develop this capability assessment helped to determine what mitigation actions are likely to be implemented based on the capacity of the lead agency, in this case the County, and municipalities within the County to carry out the prioritized mitigation actions. Specifics on the capacities of each municipality are provided in the Jurisdiction Annexes attached to this plan.

This capability assessment also provides an opportunity to identify, assess, and understand the existing conditions as they are documented in various County plans, policies, and processes

currently in place. This plan includes a summary of the measures already in place and the efforts currently underway.

3.2.1 Floodplain Administrators

Each jurisdiction in the County participates in the National Flood Insurance Policy program and has a local floodplain administrator. In many cases, several jurisdictions share floodplain administrators.

Table 3.5: Floodplain Administrators for Jurisdictions *(please provide information)*

Jurisdiction	Floodplain Administrator Name	Title
Town of Ashland	Tom Cross	Code Enforcement Officer
Town of Athens		
Town of Cairo		
Town of Catskill		
Town of Coxsackie		
Town of Durham		
Town of Greenville		
Town of Halcott	John Mathiason	Code Enforcement Officer
Town of Hunter	Jim Boyle	Code Enforcement Officer
Town of Jewett	Richard Shippee	Code Enforcement Officer
Town of Lexington	Adam Cross	Code Enforcement Officer
Town of New Baltimore		
Town of Prattsville	Adam Cross	Code Enforcement Officer
Town of Windham	Dominick Capareso	Code Enforcement Officer
Village of Athens	Michael Ragaini	Code Enforcement Officer
Village of Catskill	Michael Ragaini	Code Enforcement Officer
Village of Coxsackie	Michael Ragaini	Code Enforcement Officer
Village of Hunter	Dominick Capareso	Code Enforcement Officer
Village of Tannersville	Dominick Capareso	Code Enforcement Officer

3.2.2 Greene County Department/Agency Capabilities

Four capability assessment areas were analyzed at the County level (the same analysis was conducted for each municipality – see Jurisdictional Annexes). These four areas are relevant for reducing long-term vulnerabilities through mitigation planning and include: planning (legal) and regulatory, administrative and technical, financial, and education and outreach.

- **Planning (legal) and Regulatory:** This assessment area refers to the capability of County departments to plan and provide regulatory oversight within County borders.

- **Administrative and Technical:** This assessment area refers to the staffing resources and technical capabilities of the County government.
- **Financial:** This assessment area generally refers to the financial capability and ability to provide resources in the event of an emergency or hazardous event. For the purposes of a County level assessment, this assessment area highlights programs and grants administered by the County that could be relevant to hazard mitigation planning.
- **Education and Outreach:** This assessment area refers to the education and outreach efforts undertaken by departments and agencies in the County government.

Each of these four capability assessment areas were evaluated by department or agency, described in Section 3.2.2. Given that the County covers a large geographic area and has a multi-faceted governmental structure with significant professional staffing and coordination capabilities, each assessment areas is generally well supported and covered by one or more departments.

Using the most recent available County department annual reports for the years 2012-2014, information from existing conditions documents, plans and websites, information obtained during the Planning Committee and regional meetings, and results of the questionnaire distributed as part of this HMP update process, the following section details department-specific (non-infrastructure) activities, achievements, and accomplishments relevant to hazard mitigation since the 2009 HMP update. Infrastructure-related hazard mitigation actions that were completed or are in progress are described in Chapter 5.

Based on the 2014 Financial Report² for Greene County, there were 576 employees on the payroll. County departments who participate to some degree in hazard mitigation and resilience planning are described below:

3.2.2.1 Emergency Services Department

The Emergency Services Department includes 911 Dispatching, E-911 Addressing and Field Coordination, Emergency Medical Services, Emergency Management, and the Office of the Greene County Fire Coordinator. The Department provides training for first responders and works with the New York Department of Homeland Security and Emergency Services (DHSES), the NY State Office of Fire Prevention and Control (OFPC), and the Regional Emergency Medical Organization (REMO). The recent annual reports from the Emergency Services Department show they have been quite active over the last several years in activities within the four assessment areas.

Emergency Management Documents

- ✓ *Hazardous Cargo Plan (2015-)*
- ✓ *Comprehensive Emergency Management Plan (2014)*
- ✓ *Radio Communication Study (2012)*
- ✓ *County Emergency Operations Plan (2012)*
- ✓ *Shelter Plan (2014)*

² <http://greenegovernment.com/public-notice/annual-reports/>

Planning (legal) and Regulatory

Some updates were made to the County's *Comprehensive Emergency Management Plan* in 2014, including the addition of a sheltering annex and public health annex. (Source: Greene County Emergency Services 2014 Annual Report).

The Emergency Services Department is currently participating in a hazardous cargo plan with 20 other counties. The plan will go into effect in March 2016 and the State will provide supplies and training to assist with implementing the plan.



Source: Planning4Places, LLC

Figure 3-2: Emergency Services Building

Administrative and Technical

The Emergency Services Department continues to participate in the Catskill Interoperable Communications Consortium, Greene County EMS Council, and the Greene County Local Emergency Preparedness Committee (LEPC).

The Department Organization Chart (Figure 3-3) shows current staffing levels. As of 2015, there are 22 full time, 1 part time, and 2 per diem staff members.

Financial

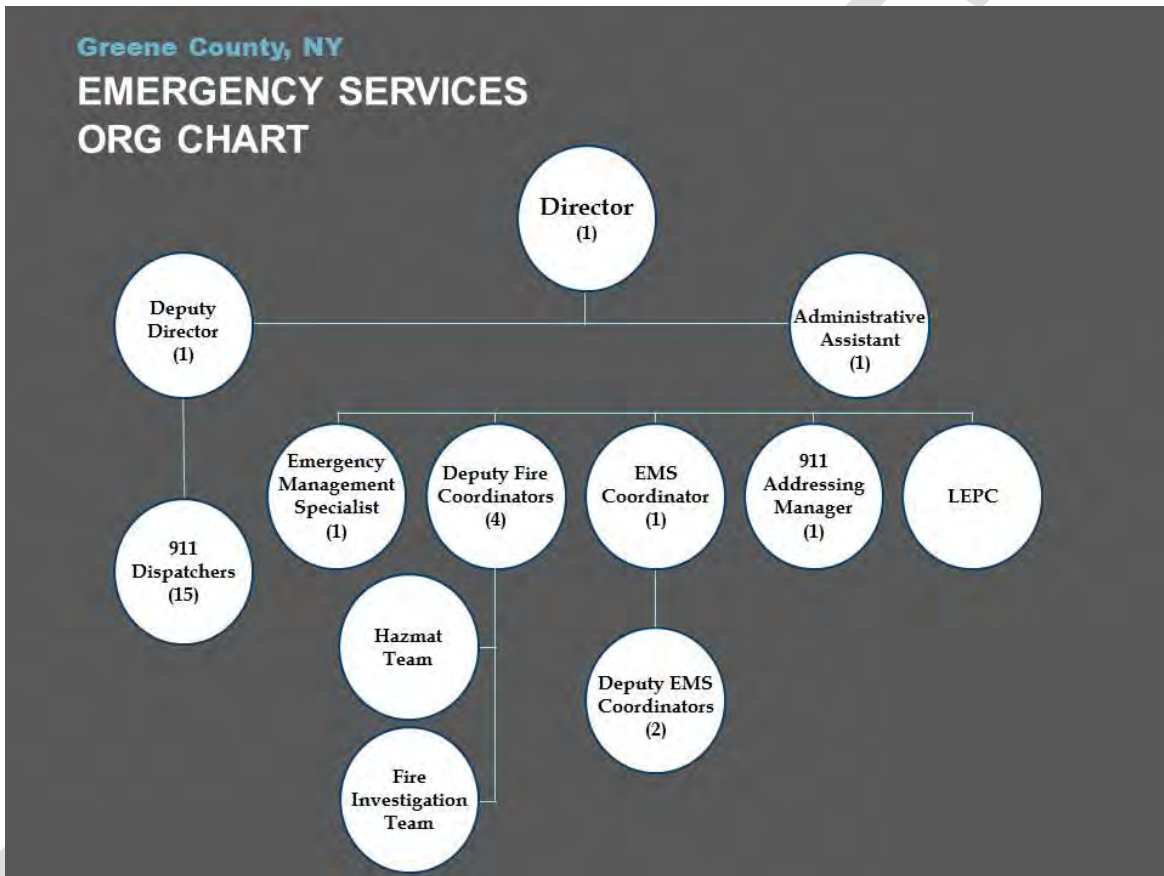
The Emergency Services Department has been successful in securing grants for the emergency phone system in the 911 Center, the communications infrastructure upgrade project, and for this plan.

Education and Outreach

The Department has been active in providing and participating in education and outreach efforts. A summary of the activities identified include:

- FEMA professional development series, Social Media, GIS for the Public Safety Answering Point, Hurricane Preparedness, national annual conference and training session, and Medical Reserve Corp. trainings
- Lockdown drills in County Office Buildings and Communications Failure Exercises
- Regional and Hazmat trainings
- Fire training program
- Continued education regarding emergency preparedness and planning through radio interviews and attendance at events like the Greene County Youth Fair
- Participation of department staff in the GreeneNY Medical Reserve Corps (MRC) orientation

- Participation in the National Incident Management System/Incident Command System (NIMS/ICS) training to maintain 97 percent compliance for existing employees
- Collaboration of Emergency Services staff with the Public Health Department in the administering WebEOC, including training of county staff and programming the system to meet the public health and emergency preparedness needs of Greene County
- Provision of Incident Command System training to county employees in conjunction with the Public Health Department



Director: Oversees all aspects of the department.

Deputy Director: Acts as director in the former’s absence. Additionally oversees all operations of the 911 center

Administrative Assistant: Assists director and deputy director in day to day functions

Emergency Management Specialist: Training, Planning, Exercises, EOC operations, grants administration, preparedness activities, community outreach and stakeholder coordination.

Deputy Fire Coordinators: Field response to large scale events for coordination activities

EMS Coordinators: Field response to large scale events for coordination activities

911 Addressing Manager: Assigns 911 addresses in county, assists with GIS mapping and property issues during events.

LEPC: Local Emergency Planning Committee- multifaceted planning committee related to HazMat

911 Dispatchers: First line of emergency response.

Hazmat Team: Field response to hazardous materials incidents

Fire Investigation Team: Field response to investigate cause of fires

Figure 3-3: Emergency Services Department Organization Chart (Courtesy of Greene County Emergency Services)

3.2.2.2 Planning, Economic Development, and Tourism Department

The Department provides planning, transportation, housing, economic, and community development support and staffs several county-level boards. The Department plays a role in hazard mitigation planning through its property acquisition of floodprone properties, administration of disaster recovery projects, and involvement in planning for the County.

Planning (legal) and Regulatory

Since the 2009 HMP, the Department has enacted a few plans including the *Trail Based Tourism Plan* and the draft *Telecommunications Plan*.

The County Planning Board provides local governments with advisory reviews of zoning and comprehensive plan amendments; special use permits; variances; and site plans within 500 feet of specified county or municipal boundaries, county or state-owned lands, roadways, stream channels, and farm operations within New York State-certified Agricultural Districts under NYS GML 239-n. It is anticipated that subdivision reviews will continue to be reviewed only at the local level and only be referred to the County in instances when 239-n applies. This action from the 2009 HMP will not be included in this Plan for this reason.

Administrative and Technical

The Planning, Economic Development and Tourism Department, in coordination with the Greene County Soil & Water Conservation District (GCSWCD), has been managing the FEMA Hazard Mitigation Acquisition Program discussed in section 3.2.2.3. The Department staffs the Tourism Advisory Committee, the Business Advisory Committee, the Planning Board, and the Agriculture and Farmland Protection Board. The Department also operates the County's public transportation system, which will transfer to the Office of Human Services (Aging) in April 2016. As of 2015, there were 10 full-time and 2 part-time staff.

Financial

The Department administers several grant programs for municipalities including:

- The Main Street Revitalization Program
- A number of the Disaster Relief projects

The Department provides technical assistance for many agencies, organizations, and municipalities to assist them in their grant administration. The Department is also involved in several loan programs including the Quantum Fund and Microenterprise Assistance Program (MAP). Additionally, the Department obtains various economic development grants for economic development projects and infrastructure projects from CDBG and CFA sources. The Department has a Business Attraction Program (Buy in Greene, Invest in Greene).

Planning and Economic Development Documents

- ✓ *Trail Based Tourism Plan (2014)*
- ✓ *Greene County Draft Telecommunications Plan (2010)*
- ✓ *Greene County Transportation Needs Assessment (2010)*
- ✓ *Housing Action Plan (2008)*
- ✓ *Comprehensive Economic Development Plan (2007)*
- ✓ *Hudson River Corridor Study (2008)*
- ✓ *Water Dependent Use Study (2008)*
- ✓ *Open Space Plan (2002)*
- ✓ *Ag & Farmland Protection Plan (2002)*

Education and Outreach

The Department participates in microenterprise training and Buy Local events. Past events where the Department participated include the Watershed Economy Workshop (2010) and the County Planning Board sponsor training seminars for local officials on planning and zoning related topics.

Local Flood Analysis (LFA) flood hazard mitigation projects

3.2.2.3 Greene County Soil & Water Conservation District

GCSWCD is a county-level, political subdivision dedicated to the management of natural resources. It develops diverse conservation programs providing assistance to local municipalities, landowners, state, and federal agencies. The District plays a direct and significant role in hazard mitigation planning through its conservation programs and projects including stream management, restoration, and protection, stormwater retrofitting projects, property acquisition of floodprone properties, education, and training related to conservation and protection of the natural environment.

After devastating flooding in 2011, a framework was developed for funding flood hazard mitigation in the NYC West of Hudson watersheds. Project recommendations generated through an approved LFA may be eligible for flood hazard mitigation funding available through the Stream Management Implementation Program (administered by the GCSWCD), the Catskill Watershed Corporation's Flood Hazard Mitigation Implementation Program, or the NYCDEC Land Acquisition Floodplain Buyout Program. Rules governing flood hazard mitigation project priorities and eligibility are issued separately for each of these funding streams.

Source: http://catskillstreams.org/wp-content/uploads/2015/01/LFA_Rules.pdf

Planning and Regulatory

GCSWCD has assisted with the *Mountaintop Community Resource Strategy* and the *Hunter Corridor Regional Planning Study*, plus numerous Local Flood Analysis (LFA) studies, discussed in the Jurisdictional Annexes.

The District provides resources on low impact development, stormwater retrofits, riparian buffers, and stream restoration. It also develops stream management plans. The *Schoharie Basin Stream Management Program Action Plans* are prepared every 2 years.

GCSWCD organizes monthly meetings of the Mountaintop Supervisors and Mayors Association (MSMA) to discuss topics of mutual concern and foster intermunicipal cooperation. The District also participates in monthly Coalition of Watershed Towns (CWT) meetings, the Schoharie Watershed Advisory Committee (SWAC), the Mountain Cloves Scenic Byway, and the Catskill Park Advisory Committee. GCSWCD is a member of:

- NYSDEC Citizens Flood Mitigation Advisory Committee
- NYS DHSES Hazard Mitigation Grant Program Review Board
- NYS Disaster Preparedness Commission Advisory Committee
- NYS Association of Floodplain and Stormwater Managers

- Batavia Kill Watershed Protection District Board of Directors

Administrative and Technical

GCSWCD is managing the Watershed Assistance Program (WAP). They also manage numerous stream restoration, stabilization, and stormwater retrofit projects.

Together with the Planning, Economic Development and Tourism Department (see Section 3.2.2.3), GCSWCD has been managing the FEMA Hazard Mitigation Acquisition Program. The District has also been working with municipalities to implement Local Flood Analysis (LFA) projects. The Catskill Watershed Corporation, with GCSWCD, is implementing a Flood Hazard Mitigation Implementation Program that will acquire, relocate, and mitigate properties that are detailed in LFAs (see text box).

Financial

As described in the “Administrative and Technical” description above, GCSWD manages several grant programs. In addition to those, the GCSWD’s Catskill Streams Buffer Initiative provides funding for technical assistance and Riparian Corridor Management Plans. Other grant resources are listed on the GCSWCD website³.

Education and Outreach

The WAP includes a number of public outreach and education projects including the Annual Water Quality Summit, Schoharie Watershed Month (and the Schoharie Watershed Summit), Erosion and Sediment Control Training. The District also participates in the Hudson Valley Regional Envirothon and Environmental Awareness Days. In addition, past events organized by GCSWCD include: the Mountaintop Better Site Design Workshop, the Batavia Kill Stream Celebration, Riparian Landowner Workshops, and Post-Flood Stream Emergency Training. GCSWD also provides information on agricultural programs and has a Stream Ecosystem Data Repository for the Upper Schoharie Creek Watershed on its website.

3.2.2.4 Public Health Department

In their 2014 report, the Public Health Department describes all of the activities and services they provide. Specific details are provided regarding emergency preparedness and response. The report lists accomplishments and highlights including several directly related to non-virus hazard mitigation planning within the four assessment areas. These activities are described herein.

Planning (legal) and Regulatory

The Department continued to revise public health emergency response plans as required by guidance from the New York State Department of Health.

Relevant Documents & Ordinances

- ✓ *Mountaintop Community Resource Strategy*
- ✓ *Hunter Corridor Regional Planning Study*
- ✓ *Schoharie Basin Stream Management Program Action Plan* (multiple plans, from 2007-2009 up to 2015-2017)

³ <http://www.gcswcd.com/>

Administrative and Technical

The Public Health Department participates in the GreeneNY Medical Reserve Corps (MRC). The Public Health Department worked with a SUNY School of Public Health intern to develop the County's MRC, called the GreeneNY MRC, reported as the largest change to the Public Health Emergency Preparedness (PHEP) program in Greene County. With the creation of the MRC, a major program goal was to improve preparedness capabilities and be able to magnify both preparedness and day-to-day public health activities within the County. Prior to this, volunteers had been minimally utilized on an ad hoc basis in response to emergencies only.

The Department also collaborated with the Department of Emergency Services (see also Section 3.2.2.1) to assist with administering WebEOC, including training county staff and programming the system to meet the public health and emergency preparedness needs of Greene County. The use of WebEOC expanded throughout the Public Health Department during 2014.

Another accomplishment is the expanded utilization of the Medical Emergency Response Inventory Tracking System (MERITS) for tracking supplies and equipment inventory through enhanced tracking of PHEP inventory. This is an ongoing inventory entered into MERITS. Staff are being trained on this system.

Due to the extensive outreach requirements of both Public Health and Emergency Preparedness, the position of Public Health Emergency Preparedness and Safety Coordinator was renamed Public Health Emergency Preparedness and Outreach Coordinator.

The Public Health Department's organizational chart is shown in Figure 3-6. As of 2015, there are 14 full-time staff and 2 per diem staff. In addition, there is 1 part time Medical Director, 10 full-time and 1 part-time Family Planning staff, 5 full-time Early Intervention staff, and 1 full-time Emergency Medical Service staff member.

Financial

The Public Health Department received annual funding from the Centers for Disease Control and Prevention (CDC) through its Public Health Emergency Preparedness (PHEP) grant. Funding averaged just over \$50,000 for the prior 2 years.

Education and Outreach

The Department conducted numerous education and outreach activities, including:

- Conducted Greene County MRC orientation for members at the Greene County Emergency Operations Center (GCEOC).
- The Public Health Preparedness program facilitated necessary National Incident Management System/Incident Command System (NIMS/ICS) training to maintain 97 percent compliance for existing employees.
- Co-Chaired the Volunteer Committee with the Hospital Emergency Preparedness Consortia (HEPC) for the Capital District Region.

- Provided Incident Command System training to county employees in conjunction with the GCEOC.
- Continued to participate as an active member on the Greene County EMS Council and the Greene County Local Emergency Preparedness Committee (LEPC).
- Participated in monthly preparedness webinars and meetings in compliance with Public Health Emergency Preparedness deliverables.
- Met the goal of conducting planning of emergency preparedness drills and exercises to test and validate current emergency management plans along with the Department of Emergency Services (see also Section 3.2.2.1), including meeting the Ebola plan for Greene County.
- Continued to provide relevant training to Greene County employees, volunteers, and the general public relevant to public health emergency preparedness activities.

3.2.2.5 Buildings and Grounds Department

Though the Buildings and Grounds Department is not necessarily involved in hazard mitigation planning, the roles and capabilities of staff could provide the County with technical expertise to assist with efforts and needs planning related to buildings and grounds, assessment of physical damage to structures and property, potential for repairs or need to rebuild, etc. The Department's 2014 Annual Report describes the Department's activities, services provided, and needs for County properties. Some of the activities potentially relevant to hazard mitigation planning include those described below.

Administrative and Technical

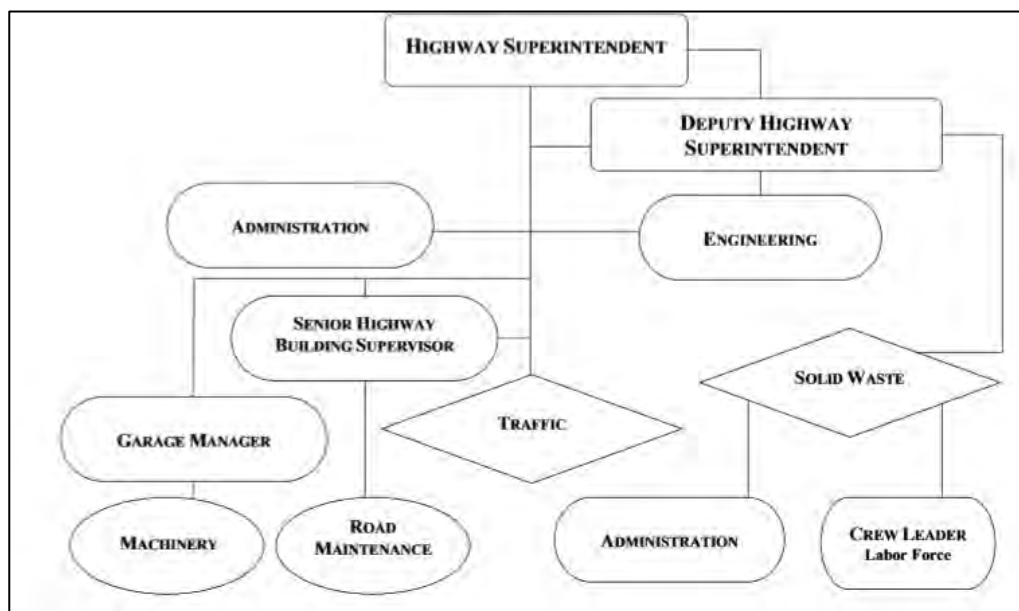
The Building and Grounds Department staff are adept at undertaking numerous different jobs to help keep County facilities in good working order. Some of the types of projects undertaken in recent years include renovating interior office space, constructing desk stations, performing electrical work including replacing lights and installing a generator, performing structural work on buildings, including roofing and siding, and assessing the condition of buildings and determining needs. As of 2015, there are 19 full-time staff members.

3.2.2.6 Highway Department

The Highway Department is in charge of maintaining and clearing the roads and bridges as well as deconstructing and reconstructing roads and bridges.

Administrative and Technical

The Highway Department is responsible for paving, chip sealing, and overseeing bridge construction. Solid waste management is part of the Highway Department. The Department of Highway's organizational chart is shown in Figure 3-4. As of 2015, there are 55 full-time Highway and 17 full-time Solid Waste staff members.



Source: 2014 Annual Report

Figure 3-4: Highway Department Organization Chart

According to the 2014 Annual Reports⁴, the Highway Department continues to work with communities and GCWSCD to upgrade culverts, and repair and construct bridges and roads damaged during Hurricane Irene.

Financial

The Department manages Federal aid and State aid funding for road and slope repair, and bridge construction projects.

3.2.2.7 Ulster-Greene Association of Retarded Citizens (ARC)

According to their 2014 Annual Report, the ARC serves the largest group of individuals with intellectual and development disabilities, including autism, in Greene County. The ARC's services for a segment of the County's vulnerable population that relies on them for transportation and assistance, particularly in rural areas, makes them an important part of the hazard mitigation planning process.

Administrative and Technical

The Ulster-Greene ARC provides transportation, particularly in rural areas of the County, for those in need of their services. Transportation is provided by either having a job coach pick residents up at their home or enlisting help from the Agency's Transportation Department. The Transportation Department operates seven vehicles per day, Monday-Friday, to the communities of Athens, Cairo, Catskill, Cocksackie, Durham, Earlton, Greeneville, Leeds, New Baltimore, Palenville, and Round Top. The total miles driven in 2014 was just over 188,000.

⁴ <http://greenegovernment.com/public-notice/annual-reports/>

In April 2016, the Greene County Office of Human Services (see Section 3.2.2.12) and Ulster-Greene ARC will take over management of the transportation system. They will provide 10 buses. When the 911 Center is activated, the buses will be available for use for emergency transportation needs.

3.2.2.8 Information Technology Department

The Information Technology Department is responsible for providing information technology services, web and application services, infrastructure, and data center services to Greene County departments and agencies. The role of the IT Department in Greene County is significant. This Department works closely with all departments and agencies, particularly Emergency Services (see Section 3.2.2.1), making them a vital part of the hazard mitigation planning process.

Administrative and Technical

The following summarizes the pertinent responsibilities of the IT Department:

- Responsible for updating and refreshing the greenegovernment.com websites.
- Supports all Greene County agencies and departments.
- Responsible for working closely with, and supporting the needs of, the Emergency Services Department including: computer aided dispatch, mapping, telecommunications, radio systems and networks.

Recent accomplishments of the Department related to hazard mitigation include the build-out of Branch Office Virtual Private Network (BOVPN) network to the Sheriff, Mental Health, Highway, and 411 main; a complete revamp of the greenegovernment.com website completed in 2013; and it support with the redesign of the Greene Web Map to bring it up to the current ESRI software and Microsoft Server.

3.2.2.9 Real Property Tax Service

In accordance with NYS real property tax law, the Real Property Tax Service provides assessment and taxation related services, including maintaining tax maps and ownership information; tax roll files for schools, towns, and the County; and calculating tax rates for the County, towns, and special districts.

Administrative and Technical

An essential responsibility of this Service is maintaining the real property system (RPS) software that provides a broad range of information such as assessments, property ownership, sales, building inventory, exemptions, and land use and size. The Service also provides Image Mate online, which is an online system providing information on land, inventory, improvements, assessed values, tax maps and imagery for properties within the County. As of 2015, there were four full-time staff.

Financial

The Service compiles and stores information summarizing town budgets for all towns within the County.

3.2.2.10 Greene County Veterans Service Agency

The ability for veterans to access needed medical care and the ability to identify those in need during a potential hazard situation could be vital to their safety and well-being. Having information available regarding veterans in need and their location is an important component of planning for hazard mitigation and response efforts. The 2014 Annual Report describes all activities related to supporting veterans in Greene County. Specific to hazard mitigation planning, there are some important services and data that are vital to consider as part of the overall comprehensive approach to mitigation planning.

Administrative and Technical

The U.S. Department of Veterans Affairs (DVA) estimates the veteran population at just over 4,000 individuals—over 12 percent of the population in Greene County. The Greene County Veterans Service Agency runs a Veterans Van Service program. This program served 1,387 veterans in 2014, an increase of 158 from just 2 years earlier (2010). The 2014 Annual Report states that the Agency continues to expand its Van Service program, which provides transportation to and from Veterans Affairs (VA) medical treatment facilities for medical appointments to low-income, elderly, and disabled veterans in need. The Agency anticipates adding a wheelchair-accessible van to its fleet. As of 2015, there are three full-time and one part-time staff.

3.2.2.11 Fire Departments/Police Departments

Greene County has 27 fire departments, 18 EMS providers, and 13 police departments/stations.

Administrative and Technical

Fire Departments: The Greene County Fire Departments have mutual aid agreements with Columbia, Albany, Schoharie, and Delaware Counties. Additionally, the Fire Departments have a mutual aid agreement with Columbia County for supplies and resources during a disaster (for signs and light towers).

The 911 Centers back up each other in the event call center backup is needed.

3.2.2.12 Office of Human Services (Youth & Aging)

According to their 2014 Annual Report, the Office of Human Services is composed of two distinct and separate departments: the Department for the Aging (also known as the Area Agency on Aging or AAA), and the Youth Bureau.

The **Department for the Aging** provides a network of distinct services, from six locations throughout the County, designed to meet the needs of older residents of Greene County.

The **Youth Bureau** helps coordinate youth services for children and young people in Greene County up to the age of 21. It provides technical assistance to municipalities, private agencies, and groups in program development, evaluation, financial planning, program management, and training.

Administrative and Technical

Department for the Aging – As of 2015, the Office has 16 full-time, 12 part-time, and 16 per diem employees. The 2014 Annual Report notes there are approximately 200 active volunteers that help provide services to the County’s citizens. The Office has a fleet of nine vehicles used to transport seniors, food, and staff. The Office provides a home delivered meal program.

As described in Section 3.2.2.7, the Office of Human Services (Aging) and Ulster-Greene ARC will take over management of the transportation system in April 2016.

Youth Bureau – In 2014, the Office had one Youth Service Worker and a policymaking Board of Directors.

Education and Outreach

Youth Bureau – In addition to working from the office, the Youth Bureau often conducts efforts within the six school districts in Greene County.

Department for the Aging – The Office of Human Services plays a direct role in the lives of the young and seniors and has a direct link to both of these populations. The Department of Aging has a transportation and support role that is vital to seniors depending on them and makes the Office an important part of the hazard mitigation planning process.

3.3 Summary of County Capabilities

Overall, there have been a number of initiatives underway that Greene County is conducting related to hazard mitigation planning. Following Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy, a number of projects were undertaken to repair damages, remove structures from the floodplain, and prepare for future storms. In the future, the County can assist local jurisdictions (who in some cases have limited technical capacity) in implementing their individual municipal mitigation actions and encouraging hazard mitigation and resilience planning. Details of County Mitigation Actions and mitigation actions for individual communities are found in Action Worksheets and in summary fashion in Appendix D (the list starts with the County actions).

4.0 Risk Assessment

The risk assessment includes hazard identification, a description of the methodology used to estimate damage, and a description of the main hazards, including floods, severe storms, severe winter storms/extreme cold, earthquakes, and landslides.

The risk assessment for this plan used GIS analysis, information obtained from meetings, questionnaires, etc. and Hazus v2.2 to produce countywide profiles and estimate losses for three hazards (floods, severe storms and earthquakes) at the jurisdictional level. The risk assessment for this plan improves on the analysis completed in 2007, which used Hazus MR-3. Hazus v2.2 was used to estimate potential losses from hurricane winds and riverine flooding using Hazus default building stock inventory data. The results of the Hazus model analysis include annualized loss estimates for each municipal jurisdiction in Greene County so that potential loss values throughout the County can be compared (see Section 4.3).

Hazus is FEMA's standardized loss estimation software program and is built on an integrated GIS platform. The analysis is on a regional level (i.e., not on a structure-by-structure basis). The Hazus risk assessment methodology is parametric in that distinct hazard and inventory parameters (e.g., wind speed, building types) are modeled to determine the impact (i.e., damage and loss) on the built environment.

Section 4.1 describes the hazard identification and Section 4.2 profiles the identified hazards and assesses vulnerability.

4.1 Hazard Identification

Greene County collected and analyzed data on the natural hazards that have affected the County since the last update of the *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan* in 2009 to determine the natural hazards that have affected the area and that present the greatest potential for a natural disaster.

The identification of natural hazards involved the following:

- Input from the County
- Input from the jurisdictions participating in the plan
- Review of the *2014 New York State Hazard Mitigation Plan* (NYS HMP) (State of New York, 2014) and 2009 HMP hazard identification efforts
- Review of local, state, and federal information on the frequency, magnitude, and costs associated with the various hazards that have affected the region
- Qualitative or anecdotal information on natural hazards and the perceived vulnerability of the County's assets to them

Table 4.1 summarizes the process that was used to identify the natural hazards of concern for further evaluation.

The Planning Committee grouped the natural hazards by similar impacts, as follows:

- **Flooding** – Riverine and flash flooding due to rainfall and flooding caused by an ice jam or dam failure.
- **Severe storm** – Windstorms, thunderstorms, hail, tornados, and hurricanes or tropical storms. While there is no history of a full-force hurricane in Greene County, residual tropical storms impact the County as Severe Storm events and are therefore included in this hazard category.
- **Severe winter storm** – Heavy snow, blizzards, sleet, freezing rain, ice storms, Nor’easters, and extreme cold.

The Planning Committee determined that flooding, severe storms, and severe winter storms could lead to a disaster in the County.

The Planning Committee identified two additional hazards for this plan—earthquakes and landslides—and determined that neither hazard is likely to lead to a disaster in the County and that both therefore present a low risk.

Table 4.1: Greene County Hazard Identification

Hazard	Risk	Determination	Source of Hazard Information
Flooding	High	<ul style="list-style-type: none"> • The Planning Committee considers flooding the natural hazard that poses the greatest risk to the County. • Since the last plan update, nine flooding events have occurred in the County. • Remnants of Hurricane Irene and Superstorm Sandy caused extensive flooding and damage in the County. 	<ul style="list-style-type: none"> • NOAA-NCDC • NWS • FEMA • Greene County • Planning Committee • 2014 NYS HMP • USGS • NY GIS Data Clearinghouse
Severe Storm	High	<ul style="list-style-type: none"> • The Planning Committee considers Severe Storms as posing a high risk to the County. • Since the last plan update, 27 Severe Storm events have occurred in the County. • Severe storms have occurred throughout the County, and most happen frequently. 	<ul style="list-style-type: none"> • NOAA-NCDC • NWS • FEMA • Greene County • Planning Committee • 2014 NYS HMP
Severe Winter Storm	High	<ul style="list-style-type: none"> • The Planning Committee considers severe storms as posing a high risk to the County. • Since the plan update in 2009, 62 Winter Storm events have occurred in the County. • Winter storm events have occurred throughout the County. 	<ul style="list-style-type: none"> • NOAA-NCDC • NWS • FEMA • Greene County • Planning Committee • 2014 NYS HMP
Landslide	Low	<ul style="list-style-type: none"> • The Planning Committee considers landslides as posing a low risk to the County. • There is no history of landslides leading to large amounts of damage or disruption in the County. 	<ul style="list-style-type: none"> • USGS • Greene County • 2014 NYS HMP

Hazard	Risk	Determination	Source of Hazard Information
Earthquake	Low	<ul style="list-style-type: none"> The Planning Committee considers earthquakes as posing a low risk to the County. No earthquakes have affected the County in the past 7 years. 	<ul style="list-style-type: none"> USGS FEMA NOAA 2014 NYS HMP

The Planning Committee determined that the following five hazards would be profiled and assessed for risk for this plan:

- Flooding
- Severe storm
- Severe winter storm/Extreme cold
- Landslide
- Earthquake

Forest fires were considered as an additional hazard, but because only two forest fires in the past 5 years were identified, both were minor and quickly controlled, and neither one was started by natural causes, the Planning Committee determined that forest fires would not be profiled for this plan. Assessing vulnerability will not have much meaning as large parts of the County are forested, and any mitigation actions are outside the purview of the County as the forested areas are regulated by the State.

4.2 Hazard Profiles and Vulnerability Assessment

This section contains the profiles of the five hazards that the Planning Committee selected for profiling: flooding, severe storm, severe winter storm, earthquake, and landslide. The profiles consist of information on location, extent, previous occurrences, probability of future events, role of global climate change in estimating probability, vulnerability and impact, and estimated potential loss. The flooding hazard profile includes information on the National Flood Insurance Program (NFIP).

4.2.1 Flooding

The Planning Committee has determined that of the natural hazards that are profiled, flooding poses the greatest risk to the County.

Flooding in Greene County can occur at any time of the year (Greene County, 2015), but most of the larger floods have occurred in late winter or in early spring when snowmelt adds to heavy spring rains. Flooding along the Greene County waterways may also be due to or exacerbated by ice jams or the result of dam failure.

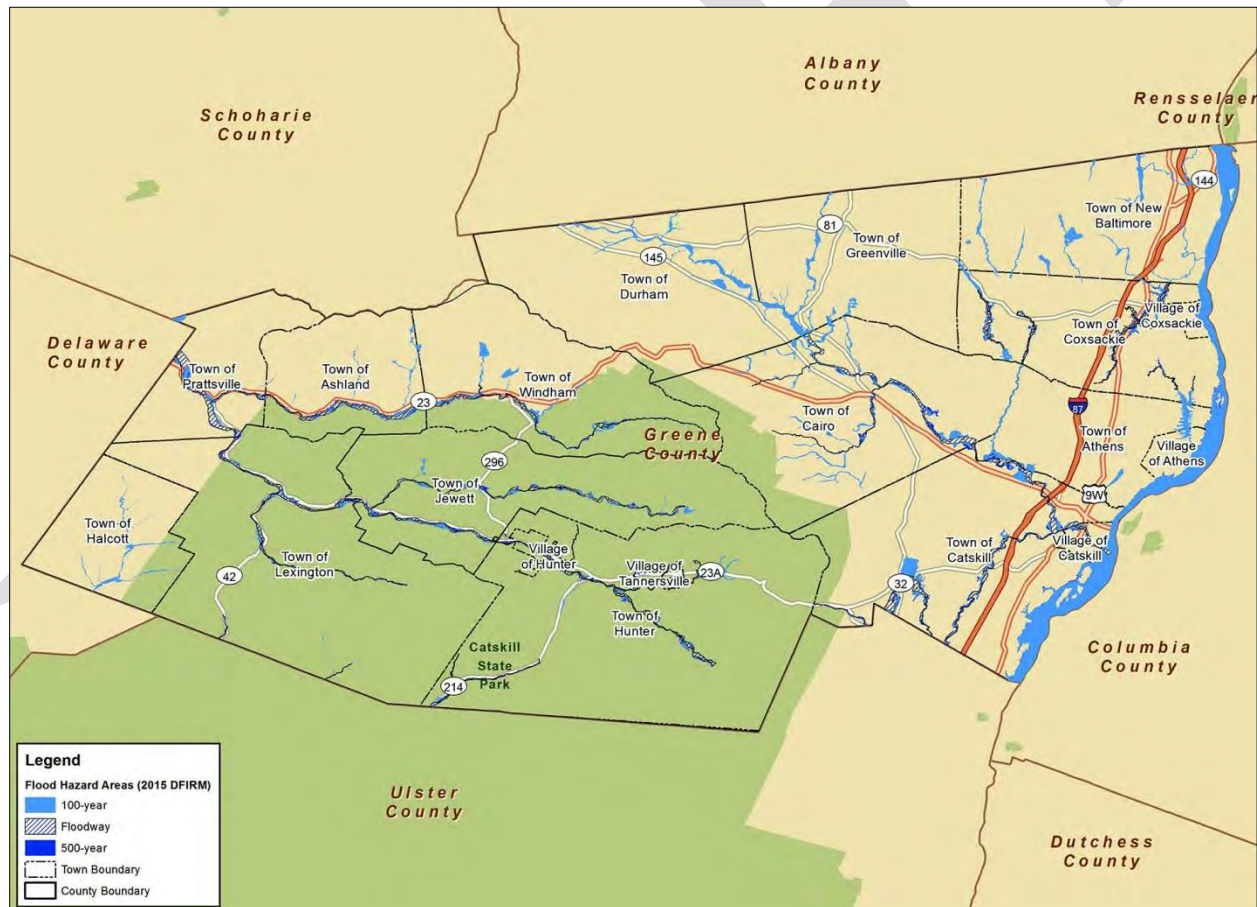
4.2.1.1 Location

The Mohawk River and Middle Hudson River subbasins of the Hudson River watershed extend through large portions of Greene County. These subbasins have many tributaries that experience frequent flooding. The tributaries in the Mohawk River Basin are the Schoharie Creek (Main Stem),

Manor Kill, Batavia Kill, West Kill, and East Kill. The tributaries in the Middle Hudson River Basin are the Stony Clove Brook, Broadstreet Hollow Brook, Catskill Creek, Coxsackie Creek, Hollister Lake, Kaaterskill Creek, Shingle Kill, Potic Creek, Hans Vosen Kill, and Sleepy Hollow Lake.

FEMA identifies areas with the highest risk of flooding as Special Flood Hazard Areas (SFHAs). SFHAs are determined using engineering modeling that is based on records of river flow and rainfall, information from the community, topographic surveys, and hydrologic and hydraulic analyses. Flood hazard zones, including SFHAs, are delineated on FEMA’s Flood Insurance Rate Maps (FIRMs). FIRMs indicate the base flood elevation (BFE), which is the elevation of floodwaters with at least a 1 percent chance of being equaled or exceeded in any given year. FIRMs also indicate the boundaries of the floodways that are needed to discharge floodwaters.

FEMA partnered with the NYSDEC to update the FIRMs for Greene County as part of FEMA’s nationwide Risk MAP Program. The updated FIRMs were adopted on June 2, 2015. Figure 4-1 illustrates the regulatory 100-year and 500-year floodplains in the County based on the County’s 2015 FIRMs.



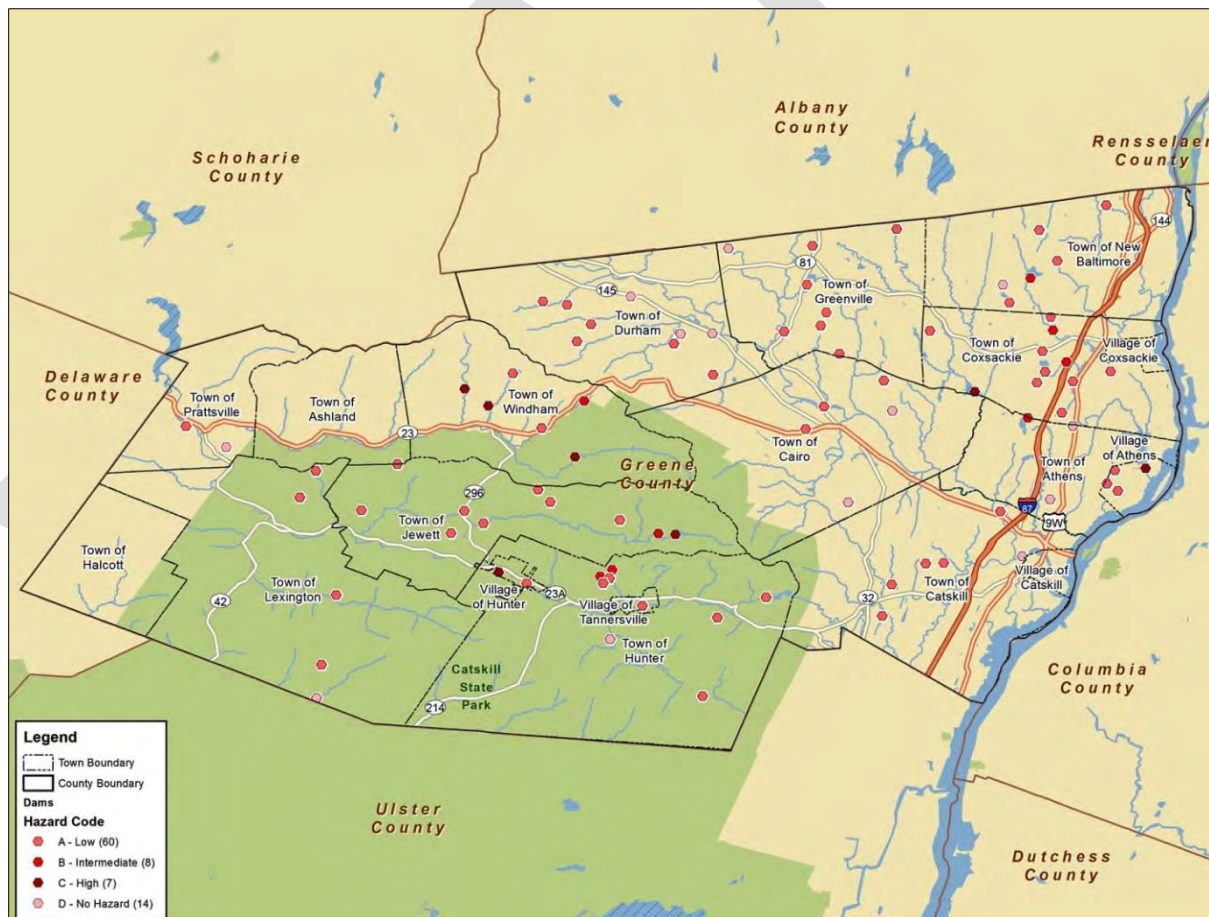
Source: FIRM (2015)

Figure 4-1: Greene County 100- and 500-year regulatory floodplains

As noted above, flooding along the Greene County waterways and drainage areas may be caused by dam failure. The hazard classification of a dam is assigned according to the potential downstream impact of a dam failure pursuant to 6 NYCRR Part 673.3. The hazard classifications are:

- Low Hazard (Class A) – Dam failure would affect isolated buildings, undeveloped lands, or township or county roads and/or would not cause significant economic loss or serious environmental damage.
- Intermediate Hazard (Class B) – Dam failure could damage isolated homes, main highways, and minor railroads; interrupt the use of relatively important public utilities; and/or cause significant economic loss or serious environmental damage.
- High Hazard (Class C) – Dam failure may cause loss of human life, serious damage to homes, industrial or commercial buildings, important public utilities, main highways or railroads, and/or cause extensive economic loss.

Greene County has 89 dams (NYSDEC, NPDP, 2015). See Appendix A for a list of the dams and their hazard classification, location, type, owner, and purpose. The hazard classifications of the 89 dams are Low (60), Intermediate (8), High (7), and No Hazard (14). Figure 4-2 shows the locations of the dams.



Source: NY GIS Clearinghouse (2015)

Figure 4-2: Locations of the 89 dams in Greene County

4.2.1.2 Extent (Magnitude or Severity)

The NWS categorizes the extent (magnitude or severity) of riverine and flash flooding in which a river has reached the flood stage as minor, moderate, and major. The categories are based on property damage and public threat and are as follows:

- Minor flooding – Minimal or no property damage but possibly some public threat or inconvenience.
- Moderate flooding – Some inundation of structures and roads near streams; some evacuations of people and/or transfer of property to higher elevations.
- Major flooding – Extensive inundation of structures and roads; significant evacuations of people and/or transfer of property to higher elevations.

The severity of a flood depends not only on the amount of water that accumulates within a certain period but also on the management of the water. The size of rivers and streams is important, and the capacity of land to absorb water is equally as important. Soil acts as a sponge when it rains. When the land is saturated or frozen, infiltration into the ground slows, and water that does not infiltrate flows as runoff.

Flood severity from a dam failure is measured as low, medium, or high:

- Low severity – No buildings are washed off their foundations; structures are exposed to depths of less than 10 feet (3.3 meters).
- Medium severity – Homes are destroyed but trees or mangled homes remain for people to seek refuge in or on; structures are exposed to depths of more than 10 feet (3.3 meters).
- High severity – Floodwaters sweep the area clean and nothing remains. Locations are flooded by the near instantaneous failure of a concrete dam, or an earthfill dam washes out in seconds rather than minutes or hours. In addition, the flooding caused by the dam failure sweeps the area clean and little or no evidence of the prior human habitation remains after the floodwater recedes.

Two factors that influence the potential severity of a full or partial dam failure are the amount of water that is impounded and the density, type, and value of downstream development and infrastructure.

4.2.1.3 Previous Occurrences

Table 4.2 summarizes the Presidentially Declared Disasters (Disaster Relief [DR]) and Emergency (EM) Declarations for flood events in Greene County from 1955 to 2015.

Between 1953 and 2015, Greene County had 95 flooding events (NCDC), leading to approximately \$15 million in property damage. Since the last plan update in 2009, there have been nine flooding events in the County. Table 4.3 summarizes the flooding events in the County between the last plan update in 2009 and 2015.

Table 4.2: Presidentially Declared Disasters for Flooding Events in Greene County, 1955 to 2015

Type of Event ⁽¹⁾	Date of Declaration	Declaration No.	Approximate Loss	Comments
Hurricane/Flooding	August 1955	DR-45	Unknown	—
Flooding	October 1955	DR-52	Unknown	—
Flooding	April 1987	DR-792	\$2 million	Damage to public infrastructure in the West Kill watershed
Severe Storms and Flooding	January 1996	DR-1095	\$10 million ⁽¹⁾	Greene County received approximately \$916,000 in Individual Assistance (IA) funds and \$4.4 million in Public Assistance (PA) funds.
Hurricane/Tropical Storm Floyd	September 1999	DR-1296	\$3 million ⁽¹⁾	Greene County received approximately \$121,000 in PA funds.
Severe Storms	September 2000	DR-1335	\$115,000 ⁽¹⁾	—
Severe Storms, Tornadoes and Flooding	August 2003	DR-1486	\$75,000 ⁽¹⁾	Most of the damage was in Catskill and Athens.
Severe Storms and Flooding	April 2005	DR-1589	\$1.3 million ⁽¹⁾	Greene County received approximately \$2.2 million in PA funds.
Severe Storms and Flooding	July 2006	DR-1650	Not Available	Greene County received approximately \$609,000 in PA funds
Severe Storms and Inland and Coastal Flooding (also identified as a Nor'easter)	April 2007	DR-1692	Not Available	Greene County received approximately \$111 million in IA funds and \$1.3 million in PA funds.

Source: FEMA except otherwise noted

(1) Type of event = disaster classification assigned by FEMA

(2) NOAA; SHELDUS

Table 4.3: Flooding Events in Greene County, 2009 to 2015

Date	Affected Location	Type	Deaths	Injuries	Reported Property Damage	Reported Crop Damage
7/29-31/2009	West Coxsackie	Flash Flood	0	0	0	0
	Catskill	Flash Flood	0	0	0	0
	New Baltimore	Flash Flood	0	0	0	0
1/25/2010	South Cairo	Flash Flood	0	0	0	0
	West Coxsackie	Flash Flood	0	0	0	0
	Kiskatom	Flash Flood	0	0	0	0
	Catskill	Flash Flood	0	0	0	0
10/1/2010	Prattsville	Flood	0	0	0	0

Date	Affected Location	Type	Deaths	Injuries	Reported Property Damage	Reported Crop Damage
12/1/2010	Cairo Sport Haven	Flash Flood	0	0	0	0
	Alsen	Flash Flood	0	0	0	0
	Windham	Flash Flood	0	0	0	0
	Palenville	Flash Flood	0	0	0	0
	Surprise	Flash Flood	0	0	0	0
	Jefferson Hgts	Flash Flood	0	0	0	0
	Leeds	Flash Flood	0	0	\$180,000	0
	Cairo	Flash Flood	0	0	0	0
	West Coxsackie	Flash Flood	0	0	0	0
5/20/2011	West Coxsackie	Flash Flood	0	0	0	0
8/28/2011	Lexington	Flash Flood	0	0	0	0
	Hensonville	Flash Flood	1	0	0	0
	Windham	Flash Flood	0	0	0	0
	Tannersville	Flood	0	0	0	0
	Lanesville	Flood	1	0	0	0
	Catskill	Flood	0	0	0	0
	Durham	Flood	0	0	0	0
	Kiskatom	Flood	0	0	0	0
	Hensonville	Flood	0	0	0	0
	New Baltimore	Flash Flood	0	0	0	0
	Haines Falls	Flood	0	0	0	0
	Jefferson Hgts	Flood	0	0	0	0
	Lexington	Flood	0	0	0	0
	9/7-8/2011	Lexington	Flood	0	0	0
Catskill		Flash Flood	0	0	0	0
9/18/2012	Jewett	Flash Flood	0	0	0	0
	Windham	Flash Flood	0	0	0	0
7/22/2013	Catskill	Flash Flood	0	0	0	0
	Leeds	Flash Flood	0	0	0	0
	Coxsackie	Flash Flood	0	0	0	0

Source: NCDC (2015)

Selected events that have occurred since the plan was updated in 2009 are described below. See Appendix A for descriptions of significant flooding events that affected Greene County before 2009.

July 22, 2013 – On the evening of Monday, July 22, 2013, a warm front was lifting northward from New Jersey into southern New York. Ahead of the warm front, a steady light-to-moderate rain was falling across the Catskills and Hudson Valley region. Embedded in the steady rain were pockets of heavy rainfall and thunderstorms that were moving north. The pockets of heavy rainfall and thunderstorms moved over the same locations across the mid-Hudson Valley as the warm front slowly lifted northward. As a result, very heavy rainfall repeatedly fell over the same locations over a several hours. The result was flash flooding across parts of eastern Greene County. Radar estimates and spotters reported 4 to 7 inches of rain across the region. Several roadways were closed as a result of the flooding and floodwaters covered a portion of the New York State Thruway. The water receded by early morning on Tuesday, July 23, as the rainfall tapered off across the region and the warm front continued to lift northward. Mansion Street in Coxsackie was closed due to flash flooding from heavy rainfall.

October 29, 2012 – Superstorm Sandy moved northward off the eastern seaboard of the United States during the last week of October 2012. Due to a very strong blocking ridge of high pressure over the Atlantic Ocean, the storm turned back to the northwest and rapidly strengthened as it moved toward the mid-Atlantic coast.

Although less than an inch of rain fell in valley areas, higher terrain areas of the northern and eastern Catskills received over an inch of rain. It was reported that 3.25 inches of rain fell in the Borough of Halcott Center, Greene County. Wind gusts of 40 to 60 mph were common from the afternoon of October 29 until the early morning hours of October 30. Wind gusts reached 50 mph in Greene County. Numerous trees were reported down throughout Halcott Center due to high winds.

The powerful storm also caused a storm surge that moved up the Hudson River from the New York City area. Record flooding occurred on the Hudson River at Poughkeepsie as the river reached 9.54 feet. The surge of water moved all the way up to Albany. Flooding occurred along the Hudson River in Greene County, causing damage to homes and businesses near the river.

Businesses were flooded from tidal flooding near the confluence of Hudson River and Catskill Creek in Catskill.

FEMA approved more than \$384,000 in Hurricane Sandy assistance to fund emergency efforts and help repair and rebuild public infrastructure in Greene County.

August 28, 2011 – Catastrophic flooding was reported throughout Greene County during Hurricane Irene, especially in the Catskill areas. Evacuations and rescues were widespread, along with widespread road closures and damage and houses that were swept away. Record flooding most likely occurred on the Schoharie Creek at Prattsville before the gage was lost in the flood. One death occurred in Maplecrest when a woman drowned when the house she was in was swept away by floodwaters. The combination of strong winds and extremely saturated soil led to numerous downed trees and power lines across the region and widespread, prolonged power outages. Approximately 18,000 people in Greene County were affected by power outages.

December 1, 2010 – A strong cold front swept across east-central New York on Wednesday, December 1, bringing strong and gusty winds and heavy rains to the area. With the passage of the cold front, winds quickly shifted from the south-southeast to the west, and temperatures rapidly dropped from the 50s into the 30s. Rain changed to sleet across the Mohawk Valley in the wake of the cold front, leading to minor traffic accidents.

Ahead of the cold front, a very strong south-to-southeast low-level jet resulted in wind gusts of up to 55 mph, and with the passage of the front, there were wind gusts up to approximately 50 mph. The strong wind gusts downed trees and power lines, resulting in power outages.

One to 3 inches of rain fell across the area with 5 to 7 inches of rainfall across the higher terrain of the eastern Catskills. Moderate to major flooding was reported in western Ulster and Greene Counties. Riverine flooding occurred in the eastern Catskills, southern Adirondacks, and Mohawk Valley. Urban and small stream flooding also occurred across the local area. Three planes, including one in route from Newfoundland to Newark Liberty International Airport, were forced to land at the Albany International Airport due to the extreme weather conditions along the East Coast.

Roads were closed because of flash flooding on Route 145 between Frank Hitchcock Street and Route 23, Snyder Lane, and Lincoln Drive in Cairo, and water was reported moving across Route 23.

4.2.1.4 National Flood Insurance Program

FEMA's National Flood Insurance Program (NFIP) maintains information on insured structures, including the number and location of flood insurance policies, number of claims per insured property, dollar value of each claim and aggregate value of claims, and repetitive flood loss properties.

Participation in the NFIP is based on an agreement between a community and the federal government. If a community adopts and enforces a floodplain management ordinance that will reduce flood risk to new construction and substantial improvements in floodplains, the federal government makes flood insurance available to residents of the community as a financial protection against flood losses. The insurance is designed to provide an alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by flooding.

Between the last plan and September 30, 2105, 85,447 NFIP flood insurance claims were filed in the State of New York. All of the towns and villages in Greene County participate in the NFIP. Between the last plan and September 30, 2105, Greene County filed 584 flood-related claims, and the payouts to the County totaled approximately \$18.5 million. The Town of Catskill filed 128 flood claims, the highest number of claims in any community in the County between the last plan and September 30, 2105, and received the highest payment (approximately \$4.7 million).

Table 4.4 provides the number of policies and claims and the claims payouts in Greene County by jurisdiction.

Table 4.4: Number of NFIP Policies, Number of Claims, and Total Claims Payouts in Greene County by Jurisdiction, 2009 to 2015

Jurisdiction		Number of Policies	Number of Claims	Total Claims Payouts
Town	Ashland	11	12	\$345,412
	Athens	6	6	\$168,639
	Cairo	43	43	\$560,908
	Catskill	56	128	\$4,717,860
	Coxsackie	6	3	\$11,390
	Durham	15	13	\$222,436
	Greenville	17	2	\$67,611
	Halcott	5	2	\$18,826
	Hunter	22	23	\$250,291
	Jewett	30	28	\$365,020
	Lexington	48	49	\$1,128,938
	New Baltimore	12	5	\$28,623
	Prattsville	39	97	\$4,267,739
	Windham	92	47	\$2,737,659
Village	Athens	17	21	\$547,484
	Catskill	59	38	\$2,370,029
	Coxsackie	16	15	\$251,480
	Hunter	78	25	\$285,872
	Tannersville	15	27	\$233,346
Total		587	584	\$18,579,563

Source: NFIP (2015)

The NFIP tracks Repetitive Loss (RL) properties, which are NFIP-insured properties that, since 1978 and regardless of any changes in ownership during that period, have experienced any of the following:

- Four or more paid losses in excess of \$1,000
- Two paid losses in excess of \$1,000 within any rolling 10-year period
- Three or more paid losses that equal or exceed the current value of the insured property

As of October 2015, Greene County had 51 RL properties, mostly in the Towns of Lexington (9), Catskill (7), and Hunter (6), and the Village of Catskill (5). Of the 51 properties, 36 were single-family homes, 6 were other residences, which include 2- to 4-family residences and condos, and 9 were non-residential. Table 4.5 provides a summary of RL properties in Greene County.

The Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premium rates are discounted to reflect the reduced flood risk resulting from community actions that meet the three goals of the CRS: (1) reduce flood losses, (2) facilitate accurate insurance rating, and (3) promote the awareness of flood insurance. The Town of Ashland has participated in CRS since October 1, 1991 (FEMA. 2015. *National Flood Insurance Program Flood Insurance Manual*).

4.2.1.5 Probability of Future Occurrences

Greene County and all of its jurisdictions will continue to experience flooding annually. With nine events in 6 years, the probability of future events is 1.5 floods per year or greater than a 100 percent chance of flooding in any given year.

4.2.1.6 Role of Global Climate Change in Estimating Probability

Global climate change poses risks to human health and to terrestrial and aquatic ecosystems. Important economic resources such as agriculture, forestry, fisheries, and water resources may also be affected. Warmer temperatures, more severe droughts, more storms and floods, and sea level rise could have a wide range of impacts. These stresses will add to the existing stresses on resources from population growth, land use changes, and pollution.

Climate is defined not simply as average temperature and precipitation but also by the type, frequency, and intensity of weather events. Human-induced climate change has the potential to alter the prevalence and severity of extremes such as heat waves, cold waves, severe storms, floods, and droughts. Though predicting changes in these types of events under a changing climate is difficult, understanding vulnerabilities to such changes is a critical part of estimating future climate change impacts on human health, society, and the environment.

Linking any one extreme event (e.g., flooding, hurricane) to climate change is not possible. However, climate change may increase the probability that ordinary weather events will reach extreme levels or that extreme events will become more extreme. The impact of global warming on extreme weather events is difficult to assess largely because the analysis depends greatly on the regional forecasts for global warming. Global warming will almost certainly have different effects on different regions of the Earth, so all areas will not be equally susceptible to increased or more intense extreme weather events. Regional climate forecasts are improving but still have some degree of uncertainty. Although there is uncertainty regarding magnitude or severity, many sources indicate that future weather patterns and increased intensities are anticipated as a result of climate change, along with atmospheric, precipitation, storm, and sea level changes.

Table 4.5: Repetitive Loss Properties in Greene County as of October 2015

Type of Property	Number
Residential	36
Other residential*	6
Non-residential	9
Total properties	51
Total claims payouts	\$6,598,703

Source: FEMA Region II

*2- 4-family residence or condo

According to the National Climate Change Viewer,⁵ precipitation in Greene County is expected to increase, which may lead to higher flood flows and water elevations in the future. By 2050, the County's average annual precipitation may increase by up to 7 percent and by 2100, by up to 13 percent. Precipitation patterns, such as individual storm intensity and duration, are also expected to be more extreme, which also would lead to more frequent and more severe flooding.

4.2.1.7 Vulnerability and Impacts

To understand its vulnerability to natural hazards, a community must determine which assets in the hazard area are exposed or vulnerable to a hazard. For the flood hazard, hazard areas include the 100- and 500-year floodplains.

Flooding is a significant concern for Greene County. To assess Greene County's vulnerability to the flood hazard, potential losses in the County were calculated for riverine flooding for 100-year and 500-year MRP flood events, regardless of whether the cause is rainfall, snowmelt, dam failure, or ice jams.

Potential impacts of flooding in Greene County include road closure, destruction or damage to structures and infrastructure, disruption of businesses and government services, power outages, evacuations, and fatalities.

4.2.1.8 Estimated Potential Loss from Flooding

A Hazus analysis was conducted for riverine and coastal flooding to estimate the potential loss from the flood hazard.

Hazus was used to estimate potential losses in Greene County resulting from potential riverine flood events. A Digital Elevation Model (1 arc second) was obtained from the U.S. Geological Survey (USGS) for the study area coordinates for input, and flood depth was estimated at the pixel level for affected areas, along with the proportion of the area affected within the census block. Hazus was used to estimate floodplain boundaries, potential exposure for each event frequency, and loss estimates based on probabilistic scenarios for 10-, 50-, 100-, 200- and 500-year flood events using a Level 1 analysis.⁶

Table 4.6 shows the estimated residential building losses in 100- and 500-year flooding event scenarios. Although Cairo and Town of Catskill have the greatest exposure (value of buildings in the floodplain) the Village of Catskill and the Town of Windham would suffer the greatest residential building losses from a 100-year event.

⁵ http://www.usgs.gov/climate_landuse/clu_rd/nccv/viewer.asp.

⁶ According to FEMA's Hazus website, "a Level 1 analysis yields a rough estimate based on the nationwide database and is a great way to begin the risk assessment process and prioritize high-risk communities."

Table 4.6: Estimated Potential Residential Building Loss from Flooding

Jurisdiction		Residential Building Exposure	100-Year Flood Residential Building Loss	500-Year Flood Residential Building Loss
Town	Ashland	\$225,050,000	\$2,520,000	\$3,102,000
	Athens	\$313,173,000	\$2,883,000	\$3,024,000
	Cairo	\$809,560,000	\$8,084,000	\$9,091,000
	Catskill	\$774,215,000	\$8,432,000	\$10,022,000
	Coxsackie	\$438,950,000	\$1,756,000	\$2,981,000
	Durham	\$372,483,000	\$5,147,000	\$6,297,000
	Greenville	\$343,703,000	\$2,138,000	\$4,664,000
	Halcott	\$50,585,000	\$397,000	\$486,000
	Hunter	\$464,424,000	\$5,777,000	\$7,293,000
	Jewett	\$481,936,000	\$5,891,000	\$7,109,000
	Lexington	\$205,858,000	\$3,662,000	\$4,870,000
	New Baltimore	\$309,597,000	\$1,227,000	\$1,521,480
	Prattsville	\$92,910,000	\$8,296,000	\$9,432,000
	Windham	\$597,976,000	\$11,958,000	\$15,021,000
Village	Athens	\$243,005,000	\$2,430,000	\$3,013,200
	Catskill	\$408,295,000	\$13,912,000	\$17,052,000
	Coxsackie	\$282,804,000	\$159,000	\$963,000
	Hunter	\$171,581,000	\$6,217,000	\$8,204,000
	Tannersville	\$207,076,000	\$188,000	\$209,000
Total		\$6,793,181,000	\$91,074,000	\$114,354,680

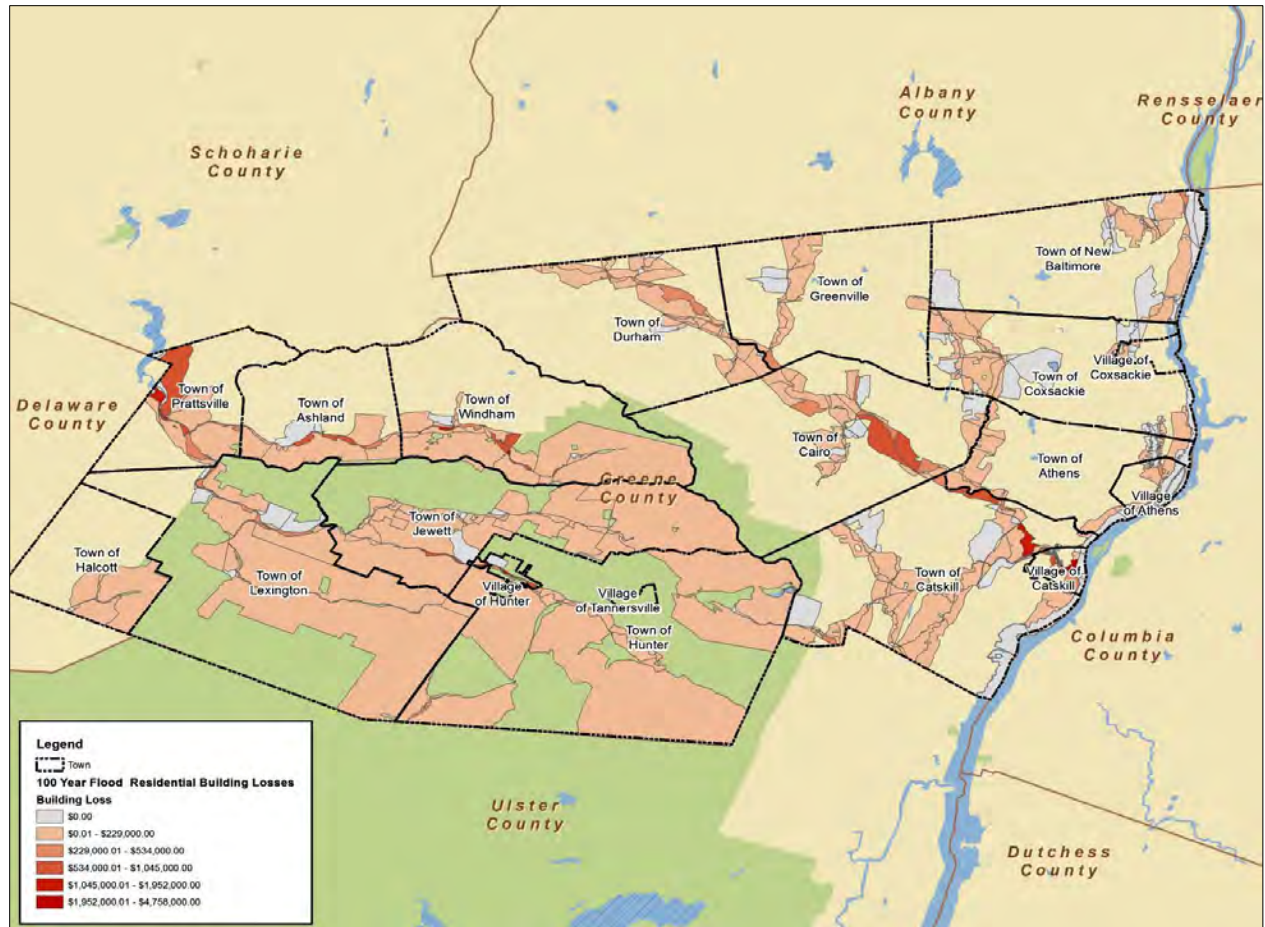


Figure 4-3: Potential residential building loss in Greene County from a 100-year flood

4.2.1.9 Critical Facilities

GIS analysis show that several critical facilities in the County are exposed to the 1-percent-annual-chance flood - 9 wastewater treatment plants, 2 Emergency Medical Services (EMS) facilities, and 4 fire stations (see Table 4.7). Damage to EMS facilities or fire stations can prevent emergency services from being able to reach populations in need.

Table 4.7: Number of Critical Facilities Exposed to the 1-Percent-Annual-Chance (100-year) Flood

Jurisdiction	Wastewater Treatment Plant	EMS	EOC	Fire Station	Police Station	School
Town of Ashland	1					
Town of Athens	1					
Town of Cairo						
Town of Catskill						
Town of Coxsackie	1					
Town of Durham						
Town of Greenville						
Town of Halcott						
Town of Hunter	1					
Town of Jewett						
Town of Lexington		1		1		
Town of New Baltimore	1					
Town of Prattsville	1	1		1		
Town of Windham	1			1		
Village of Athens	1					
Village of Catskill	1					
Village of Coxsackie						
Village of Hunter				1		
Village of Tannersville						
Total	9	2		4		

Table 4.8: Number of Critical Facilities Exposed to the 0.2-Percent-Annual-Chance (500-year) Flood

Jurisdiction	Wastewater Treatment Plant	EMS	EOC	Fire Station	Police Station	School
Town of Ashland	1					
Town of Athens	1					
Town of Cairo						
Town of Catskill						
Town of Coxsackie	1					
Town of Durham						
Town of Greenville						
Town of Halcott						
Town of Hunter	1					

Jurisdiction	Wastewater Treatment Plant	EMS	EOC	Fire Station	Police Station	School
Town of Jewett						
Town of Lexington	1	1		1		
Town of New Baltimore	1					
Town of Prattsville	1	1		1		
Town of Windham	1			1		1
Village of Athens	1					
Village of Catskill	1					
Village of Coxsackie						
Village of Hunter				1		1
Village of Tannersville						
Total	10	2		4		2

There is a County building in Cairo, located very close to Emergency Services that houses GCSWCD and a mental health facility. As shown in Figure 4-4 the access road to the facility dips in elevation as the building is located in the Shingle Kill creek floodplain. The building is old and not in good condition as it experiences flooding every time it rains.



(Source: AECOM)

Figure 4-4: County building vulnerable to flooding

4.2.1.10 Summary of Vulnerability Assessment

Based on an analysis of the available data, flooding was determined to be a significant hazard with a high probability of occurring in any given year. Flooding events have caused numerous bridges be washed away and parts of several roads and Interstates have closed due to flooding. Many communities get cut off from supplies, electricity, and running water. Critical facilities located in the floodplain and repetitive loss properties are the best candidates for mitigation, to maximize benefits and save lives. Jurisdiction specific vulnerabilities are noted in the Jurisdictional Annexes of the plan.

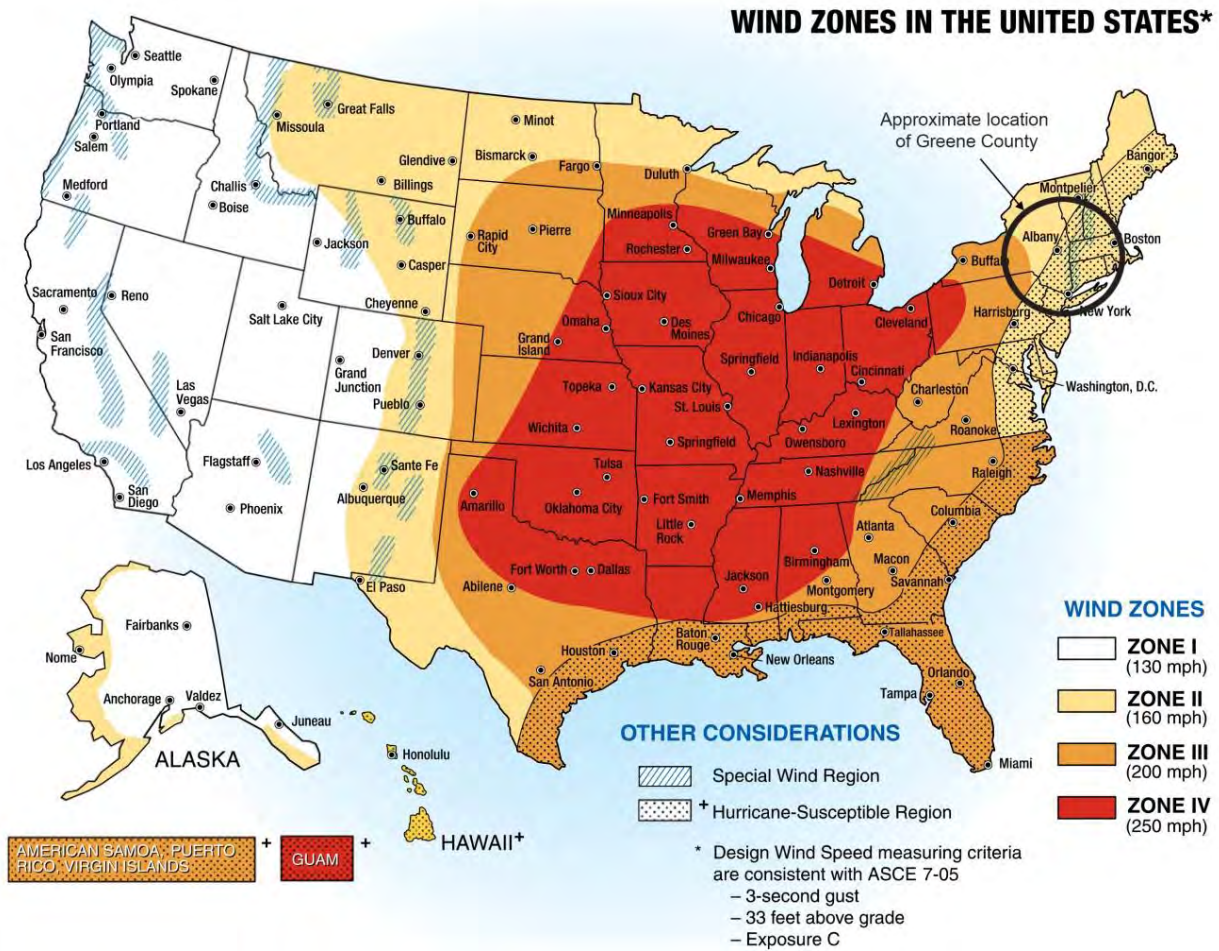
4.2.2 Severe Storm

As noted in Section 4.1, severe storms include windstorms, thunderstorms, hail, tornados, and tropical storms.

4.2.2.1 Location

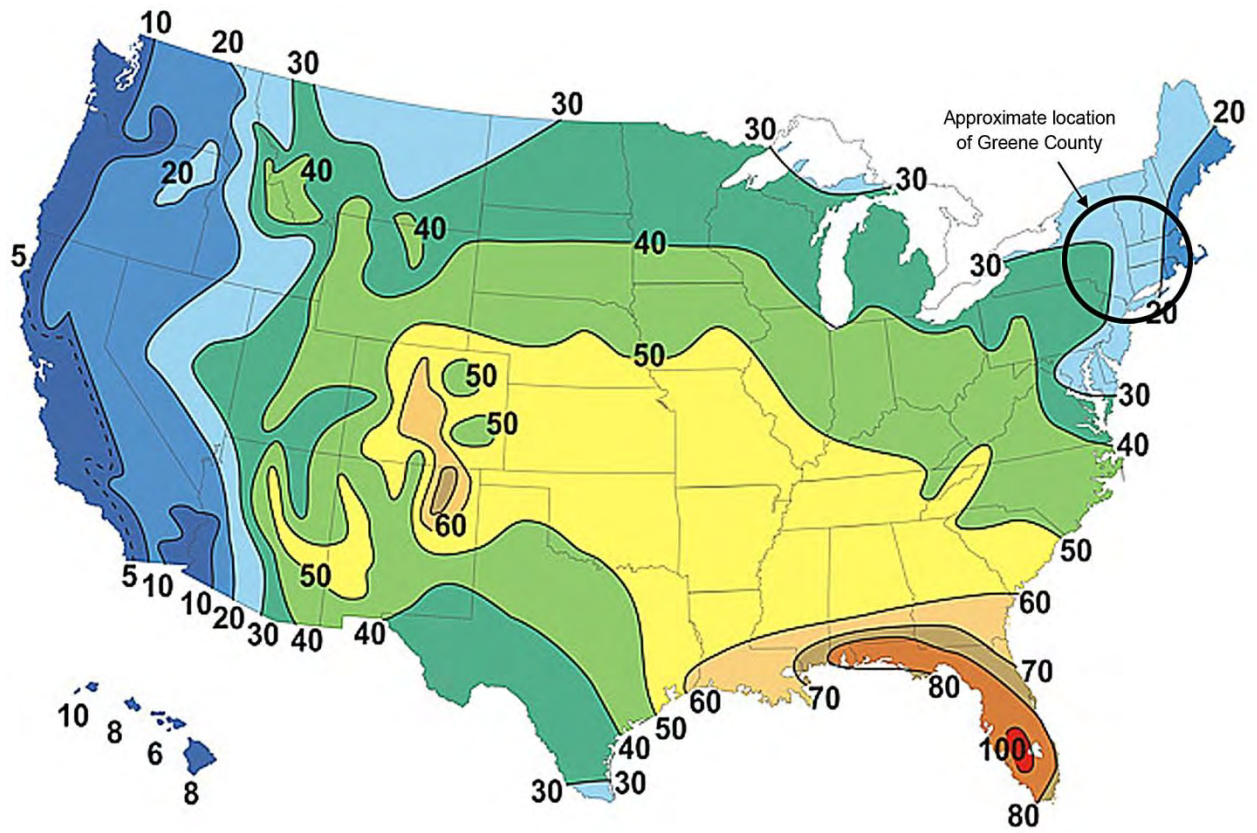
Severe storms are a common natural hazard in New York State. All of Greene County is susceptible to severe storms. The locations of hailstorms, windstorms, thunderstorms, tornados, hurricanes, and tropical storms are as follows:

- **Hailstorms** – Hailstorms can happen anywhere in the State, including Greene County (State of New York, 2014). Hail stones of up to 3 inches in diameter fell in Coxsackie in June 2011.
- **Windstorms** – Greene County is located in Wind Zone II in which wind speeds of up to 160 mph are possible and in the Hurricane Susceptibility Region, which extends along the northeastern coastline of the United States (see Figure 4-5). Figure 4-5 is based on 40 years of tornado history and 100 years of hurricane history.
- **Thunderstorms** – Thunderstorms typically affect relatively small localized areas. Thunderstorms can strike in all regions of the United States. Thunderstorms vary greatly in size, location, intensity, and duration and are considered frequent occurrences throughout the State and Greene County. Figure 4-6 shows the average number of thunderstorm days each year in the continental United States and shows that Greene County has an average of 20 to 30 thunderstorm days per year.
- **Tornado** – An average of 800 tornadoes affect the United States every year. Tornadoes result in an average of 80 deaths and over 1,500 injuries annually. Figure 4.7 shows tornado activity in the United States between 1950 and 2006. According to Figure 4-8, New York State experiences between 0 and 10 tornadoes annually. Greene County experiences between one and four tornadoes a year. Appendix A describes previous events in detail including Figure A-1 shows the path and damage from the 2003 tornado.
- **Hurricanes/Tropical Storms** – Greene County has experienced the indirect landward effects of hurricanes and tropical storms including high winds, heavy rains, and major flooding



Source: FEMA (2008)

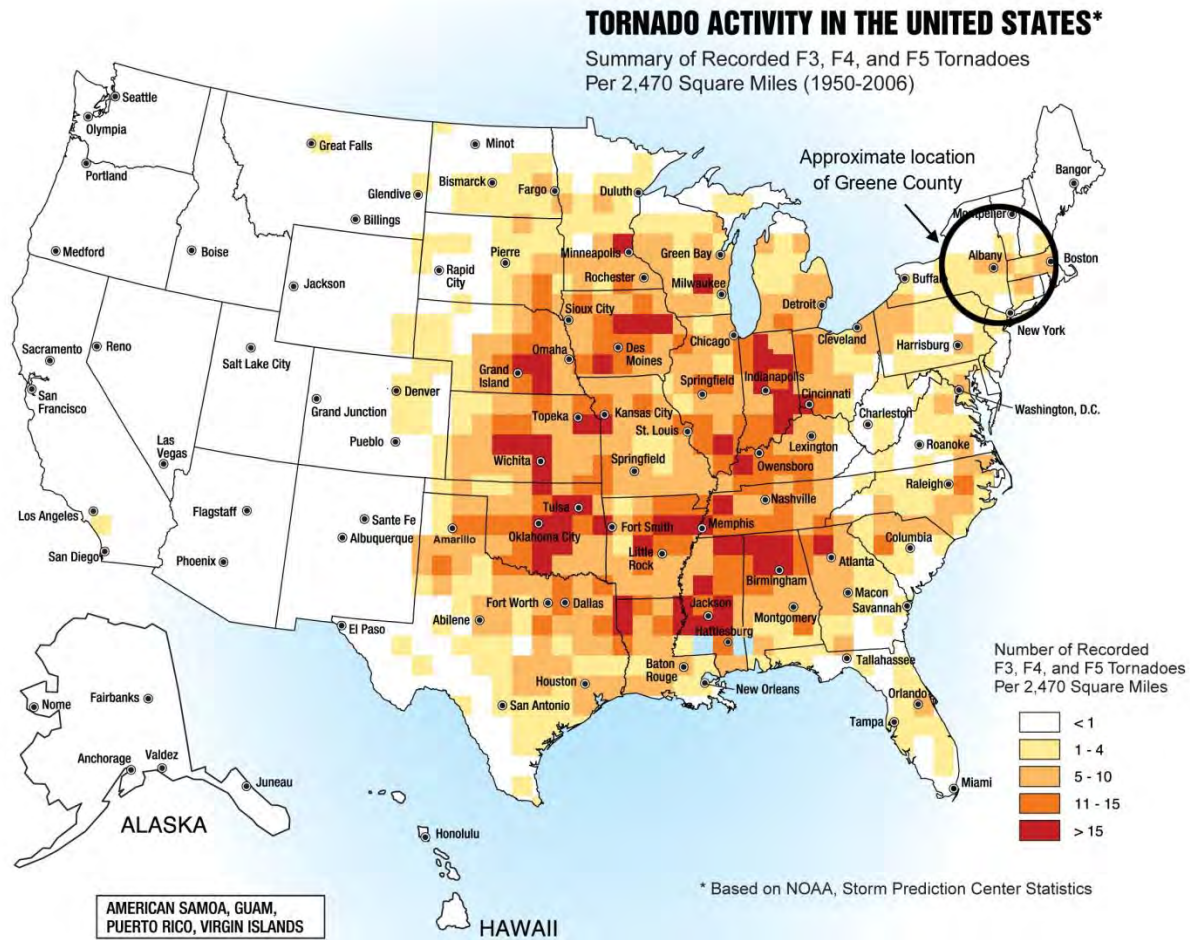
Figure 4-5: Wind zones in the Unites States



Source: NOAA

Figure 4-6: Average number of thunderstorm days per year in the United States (Alaska not shown)

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Source: FEMA (2008)

Figure 4.7: Tornado activity in the United States, 1950 to 2006

4.2.2.2 Extent (Magnitude and Severity)

The extent (magnitude and severity) of a severe storm depends largely on sustained wind speed. The straight-line winds that are typically associated with a thunderstorm, hurricane, or tropical storm can cause wind gusts that exceed 100 mph in Greene County. These winds are responsible for most of the wind damage.

The magnitude and severity of tornadoes and hurricanes are as follows:

- Tornado** – The Enhanced Fujita (EF) Scale is used to rate tornadoes based on estimated wind speeds and related damage. Tornado-related damage is compared to a list of Damage Indicators and Degrees of Damage to estimate the wind speeds produced by the tornado. The tornado is then assigned a rating from EF0 to EF5, representing increasing Degrees of Damage. The EF Scale was revised to better reflect tornado damage. The new scale is related to how most structures are designed and their potential for damage.

The intensity of a tornado in Greene County is expected to be limited to the EF0 category with only light damage anticipated. The EF Scale is defined in Table 4.9.

Table 4.9: Enhanced Fujita Damage Scale

Scale	Intensity Phrase	Wind Speed (mph)	Typical Damage
EF0	Light tornado	65-85	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	Moderate tornado	86-110	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	Significant tornado	111-135	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	Severe tornado	136-165	Severe damage. Entire stories of well-constructed houses are destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	Devastating tornado	166-200	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	Incredible tornado	>200	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 109 yards , high-rise buildings have significant structural deformation; incredible phenomena occur.

Source: NOAA (2007)

Previous occurrences and losses associated with historical tornado events (described in Appendix A) that occurred before the EF Scale went into effect in February 2007 are based on the Fujita Damage Scale.

- Hurricanes** – The Saffir-Simpson Hurricane Scale is used to categorize the extent of a hurricane from 1 (Minimal) to 5 (Catastrophic) based on intensity. The categorization is used to provide an estimate of the property damage and flooding that will occur along the coast after a hurricane makes landfall. Wind speed is the determining factor because storm surge depends highly on the slope of the continental shelf and the shape of the coastline in the landfall region. The Saffir-Simpson Scale is defined in Table 4.10.

Table 4.10: Saffir-Simpson Scale

Category	Wind Speed (mph)	Storm Surge (Above Normal Sea Level)	Expected Damage
Tropical Depression	< 38	0	NA
Tropical Storm	39 – 73	0 – 3 feet	NA
1	74 – 95	4 – 5 feet	Minimal – Damage is primarily to shrubbery and trees, unanchored mobile homes, and some signs. Structures are not damaged.
2	96 – 110	6 – 8 feet	Moderate – Some trees are toppled, some roof coverings are damaged, and major damage is done to mobile homes.
3	111 – 130	9 – 12 feet	Extensive – Large trees are toppled, some structural damage is done to roofs, mobile homes are destroyed, and structural damage is done to small homes and utility buildings.
4	131 – 155	13 – 18 feet	Extreme – Extensive damage is done to roofs, windows, and doors; roof systems on small buildings completely fail; and some curtain walls fail.
5	> 155	> 18 feet	Catastrophic – Roof damage is considerable and widespread, window and door damage is severe, there are extensive glass failures, and entire buildings fail.

Source: FEMA (2007)
 mph = miles per hour
 NA = not applicable

4.2.2.3 Previous Occurrences

Between 1962 and 2015, New York experienced 34 severe storm-related disasters classified as one or a combination of the following disaster types: severe storms, hurricane, coastal storms, flooding, high tides, and heavy rain. Greene County was declared a disaster area in 10 of the severe storm-related disasters. Table 4.11 provides the Presidentially Declared Disasters, indicated by Disaster Relief (DR), or Emergency Declarations, indicated by Emergency (EM), for severe storm events in Greene County from 1955 to 2012.

Since the last plan update, there have been 27 severe storm events in the County (see Table 4.12).

Table 4.11: Presidentially Declared Disasters for Severe Storm Events in Greene County, 1955 to 2012

Type of Event ⁽¹⁾	Date of Declaration	Declaration No.	Approximate Loss	Description
Hurricane/Floods	August 1955	DR-45	Unknown	—
Severe Storms and Flooding	January 1996	DR-1095	\$10 million ⁽²⁾	Greene County received approximately \$916,000 in Individual Assistance (IA) funds and \$4.4 million in Public Assistance (PA) funds (1997 U.S. dollars).
Hurricane Floyd (Hurricane Floyd/Tropical Storm Floyd)	September 1999	DR-1296	\$3 million ⁽²⁾	Greene County was approved for over \$121,000 in PA funds on December 6, 1999.
Severe Storms	July 2000	DR-1335	\$115,000 ⁽²⁾	From storms including a Nor'easter on June 6, 2000.
Severe Storms, Tornadoes, and Flooding	August 2003	DR-1486	\$1.1 million ⁽²⁾	Tornado damage.
Severe Storms and Flooding	April 2005	DR-1589	\$1.3 million ⁽²⁾	Flood damage. As of June 1, 2005, FEMA had approved over \$2.2 million in PA reimbursements for restoration and mitigation project costs as a result of flood damage during DR-1589, particularly in the Towns of Hunter, Jewett, and Tannersville. However, a September 14, 2005, press release indicated that FEMA had only approved \$1.1 million in PA reimbursements to the County for the Towns of Cairo, Coxsackie, Durham, Greenville, Halcott, Hunter, Jewett, Lexington, New Baltimore, Prattsville, and Windham; the Villages of Catskill, Hunter, and Tannersville; and the East Durham, Lexington, and Palenville fire departments.
Severe Storms and Flooding	July 2006	DR-1650	—	As of August 25, 2006, FEMA had approved over \$609,000 in PA reimbursements for restoration and mitigation project costs that were necessary because of flood damage, particularly in the Towns of Catskill and Greenville .
Severe Storms and Inland and Coastal Flooding (also identified as a Nor'easter)	April 2007	DR-1692	\$1.3 million	Preliminary storm damage totals eligible for federal PA funds for the County totaled approximately \$472,000, with the Town of Cairo and Village of Catskill experiencing the most losses. Preliminary storm damage totals for IA funds in the County totaled \$111 million, with the Town and Village of Catskill experiencing the most losses, totaling approximately \$110 million. Other sources indicate that final losses that were eligible for PA funds were estimated at \$1.3 million as a result of damage, response, and debris removal costs throughout the County. Final losses to homeowners were tallied at \$547,000 (Alarcon – The Daily Mail). The different sources cite monetary loss estimates, making the total losses experienced by the County unclear. As of July 11, 2007, PA funds sent to Greene County had totaled \$58,000.

Type of Event ⁽¹⁾	Date of Declaration	Declaration No.	Approximate Loss	Description
Hurricane Irene	August 2011	EM-3328 DR-4020	Unknown	—
Tropical Storm Lee	September 2011	EM-3341	Unknown	—
Hurricane Sandy	October 2012	EM-3351 DR-4085	Unknown	—

Source: FEMA (2015); NCDC (2015)

(1) Type of event = disaster classification assigned by FEMA

(2) NCDC; SHELUS

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Table 4.12: Severe Storm Events in Greene County, 2009 to 2015

Date	Location	Type	Deaths	Injuries	Reported Property Damage	Reported Crop Damage
6/25/2009	Catskill	Thunderstorm Wind	0	0	0	0
7/7/2009	South Cairo	Hail	0	0	0	0
7/29/2009	Climax	Thunderstorm Wind	0	0	0	0
8/21/2009	Jewett	Thunderstorm Wind	0	0	0	0
5/4/2010	Hannacroix	Thunderstorm Wind	0	0	0	0
	Coxsackie	Thunderstorm Wind	0	0	0	0
7/17/2010	Ashland	Hail	0	0	0	0
	Jewett	Thunderstorm Wind	0	0	0	0
	Lexington	Thunderstorm Wind	0	0	0	0
8/16/2010	Medway	Thunderstorm Wind	0	0	\$4,000	0
	West Coxsackie	Thunderstorm Wind	0	0	0	0
	New Baltimore	Thunderstorm Wind	0	0	0	0
4/28/2011	Ashland	Thunderstorm Wind	0	0	0	0
6/8/2011	Hannacroix	Hail	0	0	0	0
	West Coxsackie	Hail	0	0	0	0
	New Baltimore	Hail	0	0	0	0
	Acra	Hail	0	0	0	0
	Catskill	Hail	0	0	0	0
	East Durham	Hail	0	0	0	0
	Palenville	Thunderstorm Wind	0	0	0	0
	Catskill	Hail	0	0	0	0
6/9/2011	Freehold	Thunderstorm Wind	0	0	0	0
8/1/2011	Coxsackie	Hail	0	0	0	0
8/28/2011	Eastern Greene	Tropical Storm	0	0	0	0
	Western Greene	Tropical Storm	0	0	0	0
10/14/2011	Place Corners	Thunderstorm Wind	0	0	0	0
7/23/2012	New Baltimore	Thunderstorm Wind	0	0	0	0
	Greenville	Thunderstorm Wind	0	0	0	0
	Athens	Thunderstorm Wind	0	0	0	0
9/8/2012	Windham	Thunderstorm Wind	0	0	0	0
	Greenville	Thunderstorm Wind	0	0	0	0
9/18/2012	Jewett	Thunderstorm Wind	0	0	0	0
	Lexington	Thunderstorm Wind	0	0	0	0

Date	Location	Type	Deaths	Injuries	Reported Property Damage	Reported Crop Damage
	Catskill	Thunderstorm Wind	0	0	0	0
6/24/2013	Hannacroix	Hail	0	0	0	0
6/30/2013	Athens	Hail	0	0	0	0
9/11/2013	Prattsville	Thunderstorm Wind	0	0	0	0
10/7/2013	Catskill	Thunderstorm Wind	0	0	0	0
	West Coxsackie	Thunderstorm Wind	0	0	0	0
5/30/2014	Catskill	Thunderstorm Wind	0	0	0	0
6/17/2014	Lexington	Thunderstorm Wind	0	0	0	0
	Ashland	Thunderstorm Wind	0	0	0	0
	Jewett	Thunderstorm Wind	0	0	0	0
7/2/2014	Hannacroix	Thunderstorm Wind	0	0	0	0
7/8/2014	Ashland	Thunderstorm Wind	0	0	0	0
	Windham	Thunderstorm Wind	0	0	0	0
6/12/2015	Windham	Thunderstorm Wind	0	0	0	0
	Greenville	Thunderstorm Wind	0	0	0	0
	Athens	Thunderstorm Wind	0	0	0	0
	Catskill	Thunderstorm Wind	0	0	0	0
8/4/2015	New Baltimore	Hail	0	0	0	0
8/15/2015	Kiskatom	Thunderstorm Wind	0	0	0	0
	Catskill	Thunderstorm Wind	0	0	0	0
	Catskill	Thunderstorm Wind	0	0	0	0

Source: NCDC (2015)

4.2.2.4 Probability of Future Events

With 27 events in a period of 6 years, the probability of future events is 4.5 severe storms per year or 100% chance of a severe storm in any given year.

4.2.2.5 Role of Global Climate Change in Estimating Probability

Intense hurricanes and associated extreme wind events may become more frequent (State of New York, 2011). Hurricane formation may increase as sea surface temperatures rise in the areas where such storms form and strengthen. However, other critical factors in the formation and intensity of these storms are not well known, including changes in wind shear, the vertical temperature gradient in the atmosphere, and patterns of variability such as El Nino and large-scale ocean circulation. As a result, intense hurricanes and their extreme winds may not become more frequent or intense. It is also unknown whether the tracks or trajectories of hurricanes and intense hurricanes will change in

the future. Therefore, climate change impacts to severe storms in Greene County are difficult to assess given current understanding.

4.2.2.6 Vulnerability and Impact

To understand its vulnerability to natural hazards, a community must determine which assets are exposed or vulnerable in the hazard area. All of Greene County has been identified as a hazard area for severe storms. Therefore, all assets in Greene County (population, structures, critical facilities, and lifelines), as described in Section 3.2, are vulnerable.

Severe storms include high winds that result in power outages, disruptions to transportation corridors and equipment, loss of workplace access, significant property damage, injuries and loss of life, and the need to shelter and care for individuals who have been impacted by the events. Significant damage can also be inflicted by trees, branches, and other objects that fall on power lines, buildings, roads, vehicles, and people.

4.2.2.7 Estimated Potential Loss from Hurricanes

Because hurricanes and tropical storms often impact large areas and cross jurisdictional boundaries, all existing and future buildings, facilities, and populations are considered to be exposed to the potential damage from severe storms. Because hurricanes and tropical storms can lead to damage from additional hazards such as flooding, coastal erosion, high winds, and precipitation, estimating the potential losses from all of these hazards is challenging. Because the current Hazus hurricane model analyzes only hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes, only hurricane winds were analyzed.

Since there have been no hurricanes near Greene County, a probabilistic scenario was created using Hazus to assess the vulnerability of Greene County to hurricane winds. Default Hazus wind speed data and damage functions and methodology were used to determine the potential estimated losses for 100- and 500-year. Table 4.13 shows estimated potential losses for the 100- and 500-year hurricane wind event scenarios by jurisdiction. Though Town of Cairo has the greatest dollar value in exposure, the Town of Coxsackie and Town of Catskill would suffer the greatest wind damages from a 100-year event.

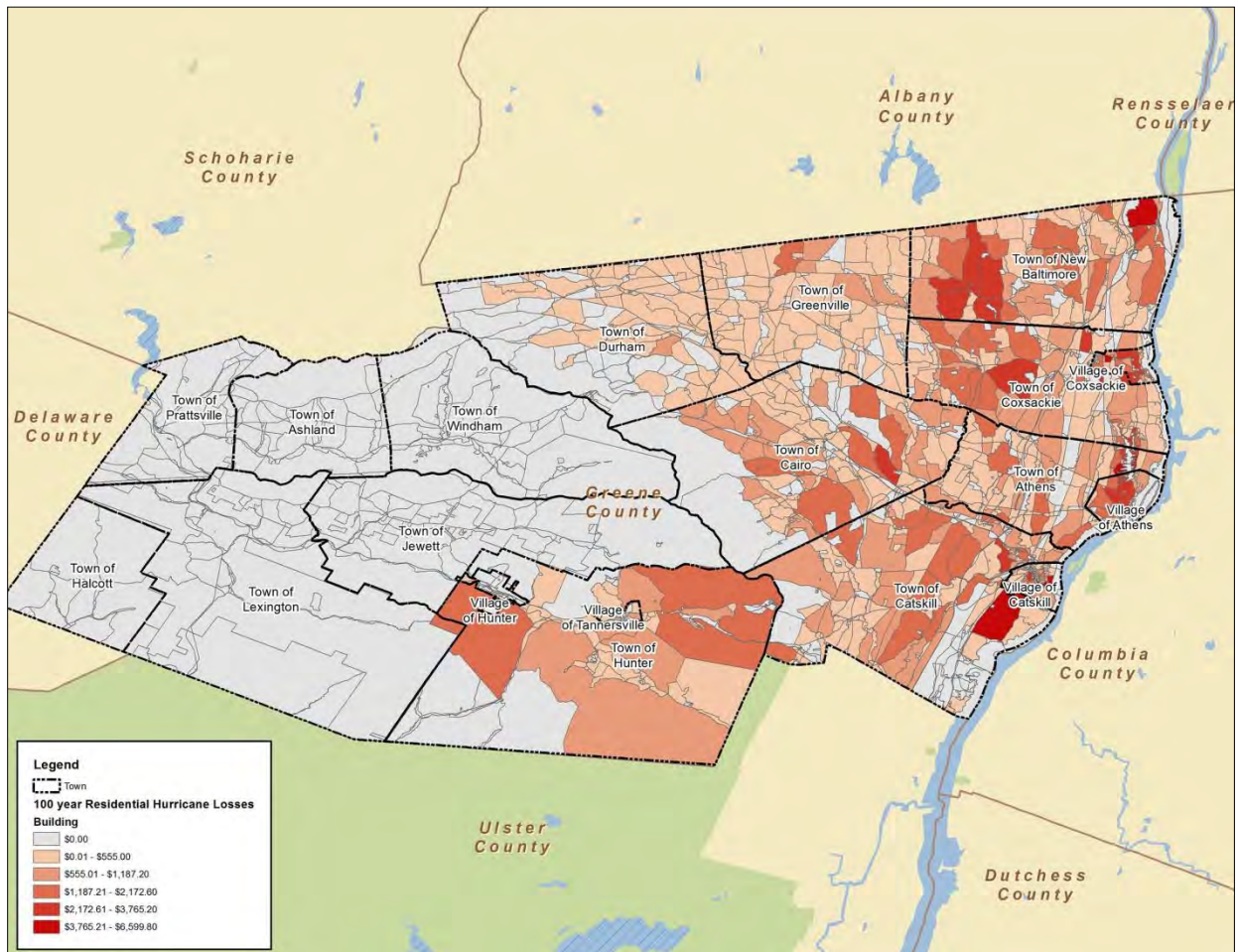
Table 4.13: Estimated Potential Residential Loss from Hurricanes

Jurisdiction		Residential Building Exposure	100-Year Hurricane Residential Building Losses	500-Year Hurricane Residential Building Losses
Town	Ashland	\$225,050,000	\$0	\$461,683
	Athens	\$313,173,000	\$84,871	\$259,827
	Cairo	\$809,560,000	\$57,608	\$869,800
	Catskill	\$774,215,000	\$95,274	\$583,601
	Coxsackie	\$438,950,000	\$97,618	\$298,376
	Durham	\$372,483,000	\$14,241	\$583,772
	Greenville	\$343,703,000	\$30,258	\$498,628

Jurisdiction		Residential Building Exposure	100-Year Hurricane Residential Building Losses	500-Year Hurricane Residential Building Losses
	Halcott	\$50,585,000	\$0	\$82,122
	Hunter	\$464,424,000	\$22,040	\$592,701
	Jewett	\$481,936,000	\$0	\$892,509
	Lexington	\$205,858,000	\$0	\$440,757
	New Baltimore	\$309,597,000	\$85,384	\$280,850
	Prattsville	\$92,910,000	\$0	\$236,189
	Windham	\$597,976,000	\$0	\$1,251,168
Village	Athens	\$243,005,000	\$57,626	\$171,262
	Catskill	\$408,295,000	\$57,360	\$184,835
	Coxsackie	\$282,804,000	\$49,886	\$143,916
	Hunter	\$171,581,000	\$2,810	\$171,061
	Tannersville	\$207,076,000	\$12,382	\$307,622
Total		\$6,793,181,000	\$667,359	\$8,310,680

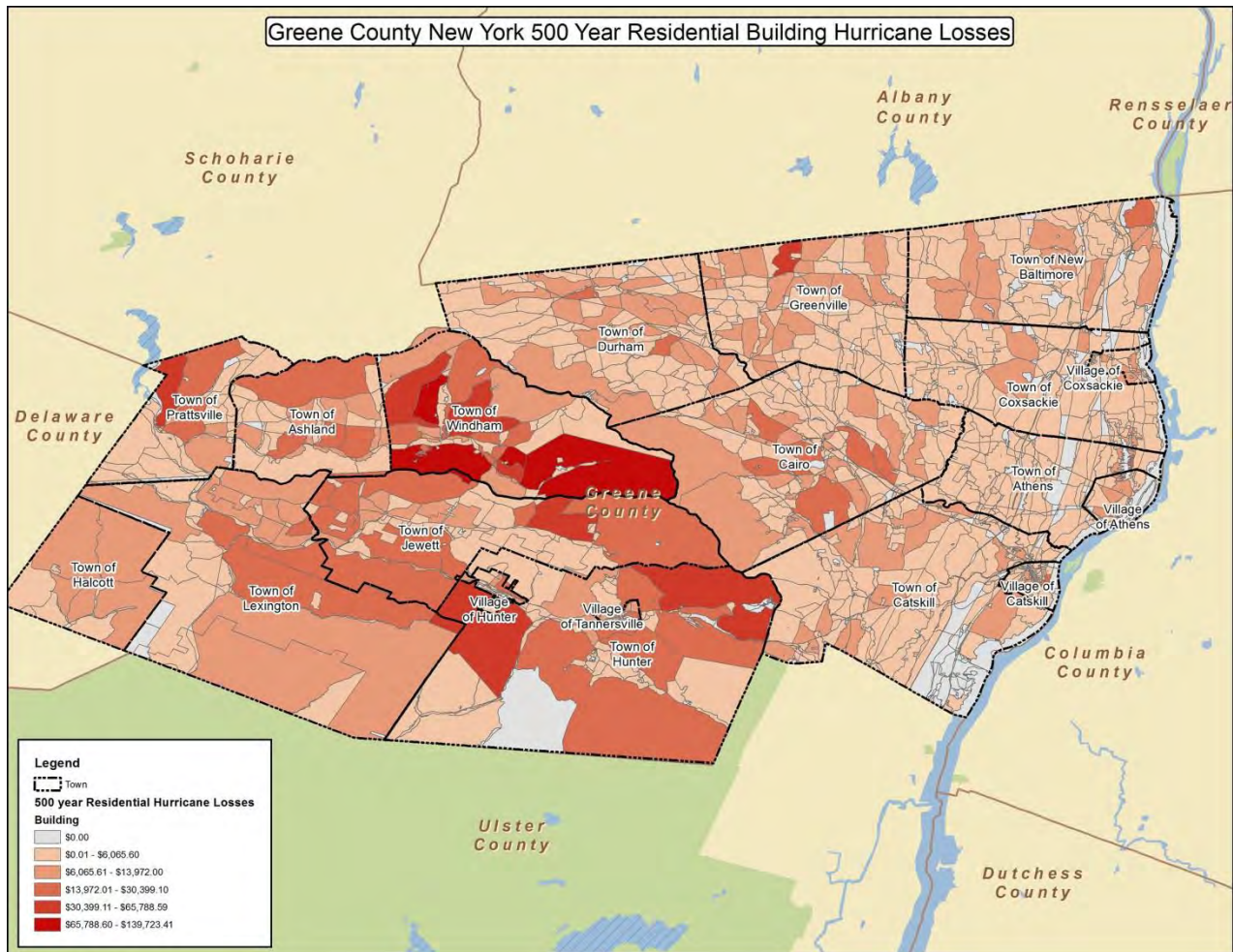
DRAFT

Figures 4-8 and 4-9 illustrate locations that may experience losses due to hurricane wind. Darker colored areas would experience greater wind damages (Towns of Coxsackie and Catskill for 100-year and Towns of Windham and Jewett for 500-year).



Source: Hazus v.2.2

Figure 4-8: Potential residential building losses in Greene County from a 100-year hurricane



Source: Hazus v.2.2

Figure 4-9: Potential residential building losses in Greene County from a 500-year hurricane

Greene County and all of its jurisdictions will continue to experience severe storms annually that may induce secondary hazards such as flooding. Impacts of severe storms include infrastructure deterioration or failure, utility failures, power outages, transportation delays, roof damage, accidents, and inconveniences.

4.2.2.8 Summary of Vulnerability Assessment

Severe storms are common, often causing losses to homes, businesses, government facilities, utilities, and the residents of Greene County. Tropical storms have caused damage to infrastructure such as bridges and have cut off communications, making immediate emergency response efforts more difficult.

4.2.3 Severe Winter Storm

A severe winter storm is defined as heavy snow, blizzard, sleet, freezing rain, ice storm, Nor'easter, or extreme cold.

4.2.3.1 Location

All of Greene County is susceptible to severe winter storms. Extreme cold temperatures occur throughout most of the winter season and generally accompany most winter storms throughout the state.

4.2.3.2 Extent (Magnitude and Severity)

The extent (magnitude and severity) of a severe winter storm depends on factors such as climatological susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, and time (during the day and season).

Tornadoes and hurricanes are rated using the Fujita and Saffir-Simpson Scales, respectively, but there is no widely used scale to classify snowstorms. Paul Kocin of The Weather Channel and Louis Uccellini of NWS developed the Northeast Snowfall Impact Scale (NESIS) to characterize high-impact snowstorms, including Nor'easters, in the Northeast (see Table 4.15. NESIS differs from other meteorological indices in that it uses population information in addition to meteorological measurements and thus provides an indication of a storm's societal impacts.

Table 4.14: Northeast Snowfall Impact Scale Categories

Category	Description	Range (ft.)	Definition
1	Notable	1.0 – 2.49	Large areas of 4-inch (10-centimeter) accumulations and small areas of 10-inch (25-centimeter) snowfall.
2	Significant	2.5 – 3.99	Significant areas of greater than 10-inch (25-centimeter) snows while some include small areas of 20-inch (50-centimeter) snowfalls. May include relatively small areas of very heavy snowfall accumulations (greater than 30 inches [75 centimeters]).
3	Major	4.0 – 5.99	Typical major Northeast snowstorm with large areas of 10-inch (25-centimeter) snows and generally between 50 and 150 × 10 ³ mi ² — approximately 1 to 3 times the size of the state of New York—with significant areas of 20-inch (50-centimeter) accumulations.
4	Crippling	6.0 – 9.99	Widespread, heavy snows that cripple the Northeast, and the impact to transportation and the economy is felt throughout the United States. Huge areas of 10-inch (25-centimeter) snowfalls marked by large areas of 20-inch (50-centimeter) and greater snowfall accumulations.
5	Extreme	10+	Large areas and populations blanketed with snowfalls of greater than 10 inches (25 centimeters). Accumulations cover more than 200 × 10 ³ mi ² and affect more than 60 million people.

Source: Kocin and Uccellini (2004)

NESIS scores are a function of the size of the area that is affected by the snowstorm, amount of snow, and number of people who live in the path of the storm. The data are calculated into a raw

data number from 1 (insignificant snowfall) to 10+ (massive snowstorm). Based on these raw numbers, the storm is categorized. The highest NESIS score is for a snowstorm with heavy snowfall that covers large areas that include major metropolitan centers.

The extent of a Nor'easter can be categorized by the Dolan-Davis Nor'easter Intensity Scale, developed in 1993 by Robert Davis and Robert Dolan, which is based primarily on beach and coastal deterioration and is used to estimate the potential beach erosion, dune erosion, overwash, and property damage expected from a Nor'easter.

Table 4.15: The Dolan-Davis Nor'easter Intensity Scale

Storm Class	Beach Erosion	Dune Erosion	Overwash	Property Damage
1 (Weak)	Minor	None	No	No
2 (Moderate)	Modest; mostly to lower beach	Minor	No	Modest
3 (Significant)	Extends across the beach	Significant	No	Loss of many structures at local level
4 (Severe)	Severe erosion and recession	Severe erosion or destruction	On low beaches	Loss of structures at community level
5 (Extreme)	Extreme erosion	Dunes destroyed over extensive areas	Massive in sheets and channels	Extensive at regional-scale; millions of dollars

Source: MESO (2002)

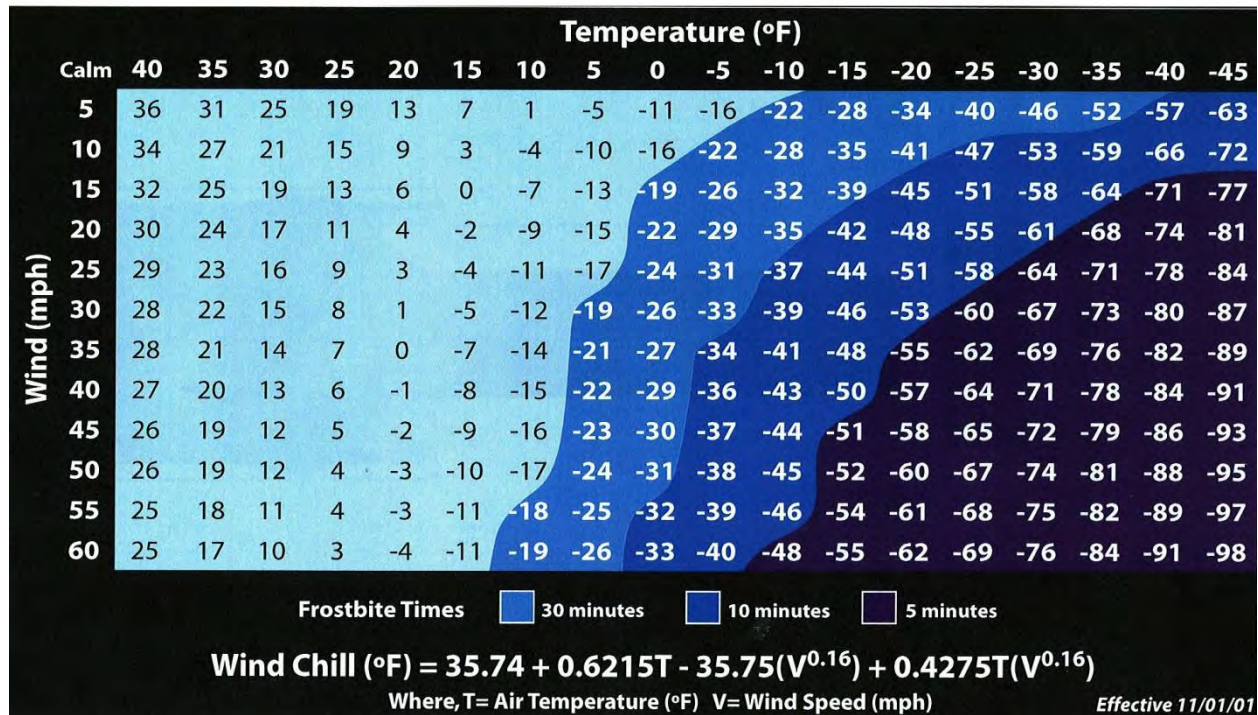
Winter weather can affect New York State as early as October and is usually in full force by late November. Average winter temperatures are between 20 and 40°F and are usually below 0°F more than once each winter.

The extent (magnitude and severity) of extreme cold temperatures is generally measured using the Wind Chill Temperature (WCT) Index. When the temperature is below normal and wind speed increases, heat leaves a person's body more rapidly than usual. The WCT Index is the temperature a person feels when the air temperature is combined with wind speed and is based on the rate of heat loss from exposed skin from the effect of wind and cold. As the speed of the wind increases, the rate of heat loss increases, causing skin temperature to drop. High winds can make serious weather-related health problems more likely, even when the temperatures are not extreme. The WCT Index is important as an indicator of how to dress properly for winter weather to avoid extreme cold affects to human health.

The Wind Chill Chart (Figure 4-10) shows the difference between actual air temperature and perceived temperature and amount of time until frostbite occurs.



Wind Chill Chart



Source: NWS (2015)

Figure 4-10: Wind Chill Chart

4.2.3.3 Previous Occurrences

Table 4.16 is a list of the eight Presidentially Declared Disasters for severe winter storm events in Greene County from 1976 to 2015. The events were classified as one or a combination of the following types of hazards: severe winter storm, blizzard, severe blizzard, snowstorm, and Nor’easter. No extreme cold temperature events resulted in federal disaster declarations.

Since the last plan update, there have been 62 severe winter storm events in the County (see Table 4.17).

Table 4.16: Presidentially Declared Disasters for Severe Winter Storm Events in Greene County, 1976 to 2015

Type of Event	Date of Declaration	Declaration Number	Approximate Loss in Greene County
Severe Winter Storm	November 1987	DR-801	Unknown
Severe Blizzard	March 1993	EM-3107	Unknown
Blizzard	January 1996	DR-1083	\$160,000
Snowstorm	February 2003	EM-3173	\$462,000
Snowstorm	March 2003	EM-3184	Unknown
Nor’easter	April 2007	DR-1692	Unknown

Type of Event	Date of Declaration	Declaration Number	Approximate Loss in Greene County
Severe Winter Storm	December 2008	EM-3299	Unknown
Severe Winter Storm	March 2009	DR-1827	\$1,200,000

Source: FEMA (2015); NCDRC (2015)

Table 4.17: Severe Winter Storm Events, 2009 to 2015

Date	Locations Affected	Type	Deaths	Injuries	Reported Property Damage	Reported Crop Damage
1/6/2009	Eastern Greene	Winter Weather	0	0	0	0
	Western Greene	Winter Weather	0	0	0	0
1/10/2009	Eastern Greene	Heavy Snow	0	0	0	0
	Western Greene	Winter Weather	0	0	0	0
1/18/2009	Western Greene	Winter Weather	0	0	0	0
1/28/2009	Eastern Greene	Winter Storm	0	0	0	0
	Western Greene	Winter Storm	0	0	0	0
2/18/2009	Western Greene	Winter Weather	0	0	0	0
2/22/2009	Western Greene	Winter Weather	0	0	0	0
3/2/2009	Eastern Greene	Winter Weather	0	0	0	0
5/19/2009	Eastern Greene	Frost/Freeze	0	0	0	0
	Western Greene	Frost/Freeze	0	0	0	0
6/1/2009	Eastern Greene	Frost/Freeze	0	0	0	0
	Western Greene	Frost/Freeze	0	0	0	0
12/9/2009	Eastern Greene	Heavy Snow	0	0	0	0
	Western Greene	Heavy Snow	0	0	0	0
12/25/2009	Western Greene	Winter Weather	0	0	0	0
	Eastern Greene	Winter Weather	0	0	0	0
1/3/2010	Western Greene	Heavy Snow	0	0	0	0
1/17/2010	Western Greene	Winter Weather	0	0	0	0
2/16/2010	Western Greene	Heavy Snow	0	0	0	0
	Eastern Greene	Winter Weather	0	0	0	0
2/23/2010	Eastern Greene	Heavy Snow	0	0	0	0
	Western Greene	Heavy Snow	0	0	0	0
2/25/2010	Western Greene	Heavy Snow	0	0	0	0
3/13/2010	Western Greene	Heavy Snow	1	1	0	0
4/12-15/2010	Eastern Greene	Frost/Freeze	0	0	0	0

Date	Locations Affected	Type	Deaths	Injuries	Reported Property Damage	Reported Crop Damage
4/24/2010	Eastern Greene	Frost/Freeze	0	0	0	0
5/9/2010	Western Greene	Frost/Freeze	0	0	0	0
	Western Greene	Frost/Freeze	0	0	0	0
5/10/2010	Eastern Greene	Frost/Freeze	0	0	0	0
	Western Greene	Frost/Freeze	0	0	0	0
5/13/2010	Western Greene	Frost/Freeze	0	0	0	0
12/26/2010	Eastern Greene	Winter Storm	0	0	0	0
	Western Greene	Winter Storm	0	0	0	0
1/7/2011	Western Greene	Winter Storm	0	0	0	0
	Eastern Greene	Winter Weather	0	0	0	0
1/11/2011	Western Greene	Winter Storm	0	0	0	0
	Eastern Greene	Winter Storm	0	0	0	0
1/18/2011	Western Greene	Winter Storm	0	0	0	0
	Eastern Greene	Winter Storm	0	0	0	0
1/23/2011	Western Greene	Extreme Cold/Wind Chill	0	0	0	0
2/1/2011	Eastern Greene	Winter Storm	0	0	0	0
	Western Greene	Winter Storm	0	0	0	0
2/5/2011	Western Greene	Winter Weather	0	0	0	0
	Eastern Greene	Winter Weather	0	0	0	0
2/25/2011	Western Greene	Winter Storm	0	0	0	0
	Eastern Greene	Winter Weather	0	0	0	0
3/6/2011	Western Greene	Winter Storm	0	0	0	0
10/29/2011	Western Greene	Winter Storm	0	0	0	0
	Eastern Greene	Winter Storm	0	0	0	0
11/22/2011	Western Greene	Winter Weather	0	0	0	0
12/7/2011	Western Greene	Winter Weather	0	0	0	0
1/11/2012	Western Greene	Winter Weather	0	0	0	0
2/29/2012	Western Greene	Winter Storm	0	0	0	0
	Eastern Greene	Winter Weather	0	0	0	0
3/1/2012	Eastern Greene	Winter Weather	0	0	0	0
	Western Greene	Winter Storm	0	0	0	0
4/27/2012	Western Greene	Frost/Freeze	0	0	0	0
	Eastern Greene	Frost/Freeze	0	0	0	0

Date	Locations Affected	Type	Deaths	Injuries	Reported Property Damage	Reported Crop Damage
4/28/2012	Western Greene	Frost/Freeze	0	0	0	0
	Eastern Greene	Frost/Freeze	0	0	0	0
4/29/2012	Eastern Greene	Frost/Freeze	0	0	0	0
	Western Greene	Frost/Freeze	0	0	0	0
12/26/2012	Eastern Greene	Winter Storm	0	0	0	0
	Western Greene	Heavy Snow	0	0	0	0
12/29/2012	Western Greene	Winter Weather	0	0	0	0
	Eastern Greene	Winter Weather	0	0	0	0
1/16/2013	Western Greene	Winter Weather	0	0	0	0
	Eastern Greene	Winter Weather	0	0	0	0
2/8/2013	Eastern Greene	Winter Storm	0	0	0	0
	Western Greene	Winter Storm	0	0	0	0
2/26/2013	Western Greene	Winter Weather	0	0	0	0
3/7/2013	Western Greene	Heavy Snow	0	0	0	0
	Eastern Greene	Winter Weather	0	0	0	0
3/18/2013	Eastern Greene	Winter Weather	0	0	0	0
	Western Greene	Winter Weather	0	0	0	0
12/14/2013	Western Greene	Heavy Snow	0	0	0	0
	Eastern Greene	Winter Storm	0	0	0	0
12/17/2013	Eastern Greene	Winter Weather	0	0	0	0
	Western Greene	Winter Weather	0	0	0	0
1/1/2014	Western Greene	Heavy Snow	0	0	0	0
	Eastern Greene	Heavy Snow	0	0	0	0
2/5/2014	Western Greene	Heavy Snow	0	0	0	0
	Eastern Greene	Winter Storm	0	0	0	0
2/13/2014	Western Greene	Heavy Snow	0	0	0	0
	Eastern Greene	Winter Storm	0	0	0	0
3/12/2014	Western Greene	Winter Weather	0	0	0	0
	Eastern Greene	Winter Weather	0	0	0	0
11/26/2014	Western Greene	Winter Storm	0	0	0	0
	Eastern Greene	Winter Storm	0	0	0	0
12/9/2014	Western Greene	Winter Storm	0	0	0	0
	Eastern Greene	Winter Weather	0	0	0	0

Date	Locations Affected	Type	Deaths	Injuries	Reported Property Damage	Reported Crop Damage
1/3/2015	Eastern Greene	Winter Weather	0	0	0	0
	Western Greene	Winter Weather	0	0	0	0
1/7/2015	Western Greene	Extreme Cold/Wind Chill	0	0	0	0
1/26/2015	Eastern Greene	Winter Weather	0	0	0	0
2/1/2015	Eastern Greene	Heavy Snow	0	0	0	0
	Western Greene	Heavy Snow	0	0	0	0
2/7/2015	Eastern Greene	Winter Weather	0	0	0	0
	Western Greene	Winter Weather	0	0	0	0
2/15/2015	Western Greene	Extreme Cold/Wind Chill	0	0	0	0
2/19/2015	Western Greene	Extreme Cold/Wind Chill	0	0	0	0

Source: NCDC (2015)

Selected recent events since the plan was updated in 2009 are described below. Significant severe winter events that impacted Greene County before 2009 are described in Appendix A.

February 15, 2015 – Behind a rapidly developing coastal storm, an extremely frigid Arctic air mass poured into the region from the north, beginning during the late morning hours on Sunday, February 15, 2015. With the developing storm just east of the region, a strong pressure gradient allowed for very strong winds. Northwest winds frequently gusted over 30 mph, with some gusts as high as 46 mph through the evening hours.

Temperatures fell quickly throughout the day and dropped below 0°F on Sunday night into the morning of Monday, February 16. The temperature dropped to as low as were as cold as –30°F. Wind gusts continued during the night and morning hours, and wind chill values dropped to as low as –15 to –45°F.

Because most of February had extreme cold temperatures, many towns and cities kept warming shelters open. There were many reports of bursts water mains and pipes due to the frigid temperatures penetrating deep into the ground, especially in areas with older infrastructure.

By the afternoon of Monday, February 16, wind chill values had risen to above dangerous levels, although it remained rather cold through the remainder of the day.

January 1, 2014 – A long-lasting snowstorm affected eastern upstate New York between the evening of New Year’s Day and the morning of January 3, 2014.

A slow-moving frontal boundary situated over the mid-Atlantic Region was in place on Wednesday, January 1. An area of high pressure over southern Quebec allowed Arctic air to move down into the region. As a weak wave of low pressure developed along the front, moisture moved up and over the

frontal boundary into the region. As a result, light snow broke out and gradually spread from south to north between the evening of Wednesday, January 1, and the early morning hours of Thursday, January 2. The snow evolved into a moderate snow over portions of the Mohawk Valley, Schoharie Valley, and Capital Region during the morning hours of January 2 and continued through much of the day. Farther south, there was a brief break in the steady snowfall during the daytime on January 2, but it remained quite cold, with temperatures in the single digits over much of the region.

On the evening of Thursday, January 2, a new area of low pressure began to form on the mid-Atlantic coast and brought moisture from the Atlantic Ocean into the region. A moderate snowfall developed over the entire area. The snow gradually tapered off to light snow and snow showers from west to east overnight as the low pressure area tracked east-northeast away from the region. By the morning hours of Friday, January 3, 6 to 12 inches of snow had fallen over much of the region, with lighter amounts across the far western Adirondacks and the mid-Hudson Valley. A few spots in the high terrain of the northern Catskills and Helderbergs had approximately 15 inches. Temperatures remained very cold, and with a cold northwest wind, wind chill values were 0 to -20°F.

March 18, 2013 – During the afternoon of Monday, March 18, an area of low pressure moved towards the eastern Ohio Valley. Precipitation well ahead of the storm's warm front moved from southwest to northeast across the region. With enough cold air in place, the precipitation fell in the form of snow during the evening hours. By just after midnight on Tuesday, March 19, the steady precipitation ended or changed to patchy areas of freezing drizzle or sleet from the Mohawk River southward. Meanwhile, steady snowfall continued across the Adirondacks and the Lake George-Saratoga region for the rest of the overnight hours.

At the end of the storm, snowfall amounts ranged from 2 to 5 inches across parts of the mid-Hudson Valley and Taconics to 10 to 15 inches across the Sacandaga and Saratoga Regions. Most areas in the eastern Catskills and Capital Region received 5 to 9 inches of snow.

March 12, 2010 – A low pressure system developed over the mid-Atlantic region on Friday night, March 12, and then moved gradually northward to the Delmarva region over the weekend. A very strong low-level jet developed to the north of the low and trapped abundant moisture. Easterly winds of 20 to 30 mph occurred, with gusts of up to approximately 50 mph. The easterly winds enhanced the precipitation across the eastern Catskills and Taconics due to upslope effects. Complicating the event, colder air drained southward into the region, resulting in a heavy snowfall across the higher terrain of the central and southeastern Catskills Saturday night into Sunday morning.

The National Weather Service reports say that precipitation ranged from approximately 0.25 to 0.5 inch in the mid-Hudson Valley, with 6 to 12 inches of heavy wet snow accumulations above 1,000 feet. Greene County has records that go well beyond these estimates, approximately 4'-7' of snowfall across the County.

The strong and gusty winds led to numerous power outages, especially across the central and southeastern Catskills where the heavy wet snow fell. One man was found dead and another man was rescued from Blackhead Mountain in the eastern Catskills on Sunday night, March 14.

4.2.3.4 Probability of Future Events

Winter storms occur annually in New York since the State is located at relatively high latitude. Winter temperatures fall below freezing during much of the fall through early spring. The probability of extreme cold temperatures is 100 percent in any given year.

With 62 events in 6 years, the probability of future events is approximately 10 severe winter events per year or more than 100 percent chance of severe winter in any given year. Based on historical records, the probability of at least one winter snow storm of emergency declaration proportions, occurring during any given calendar year, is likely for the entire state. Based on historical snow-related disaster declarations, the probability of occurrence for the County is high.

4.2.3.5 Climate Change Effects on Winter Storms/Cold Temperatures

Climate change is expected to affect winter storms and snowfall levels in Greene County. According to the 2011 *Responding to Climate Change in New York State: The CLIMAID Integrated Assessment for Effective Climate Change Adaptation in New York State*, intense mid-latitude, cold-season storms, including Nor'easters, are projected to become more frequent and take a more northerly track. The National Climate Change Viewer shows that snowfall levels in Greene County are expected to drop. By mid-century, county average annual snowfall may drop by up to 33 percent and by 2100 by 55 percent over current day levels. Snowfall is expected to decrease in all winter months, with most of the decrease occurring in early spring.

4.2.3.6 Vulnerability and Impact

To understand its vulnerability to natural hazards, a community must determine the assets that are exposed or vulnerable in the hazard area. For severe storms, the entire County has been identified as the hazard area. Therefore, all assets in Greene County (population, structures, critical facilities, and lifelines), as described in Section 3.1, are vulnerable.

Severe winter storms and extreme cold temperature events are of significant concern to Greene County because of their direct and indirect impacts, which include delays, accidents, health problems, cascading effects such as utility failure, and stress on community resources.

Heavy snow can immobilize a region and paralyze a city by stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse buildings and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of removing snow and repairing damage and loss of business can have large economic impacts on cities and towns.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communications towers. Communications and power can be disrupted for days while utility companies work to repair the extensive damage. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces.

4.2.3.7 Summary of Vulnerability Assessment

Winter storms and cold temperatures are common and affect the entire county. They cause disruptions, delays, accidents, and power outages and may lead to damage and fatalities.

4.2.4 Earthquakes

4.2.4.1 Location

The potential for an earthquake exists throughout Greene County, New York State, and the entire Northeast.

4.2.4.2 Extent (Magnitude and Severity)

Seismic waves are the vibrations from earthquakes that travel through the Earth and are recorded on seismographs. The magnitude of an earthquake is a measure of the earthquake size, or amplitude of the seismic waves, using a seismograph. The Richter magnitude scale (Richter Scale) was developed in 1932 to compare the sizes of earthquakes (USGS, 1989). The Richter Scale is the most widely used scale for measuring the magnitude of an earthquake (Shedlock and Pakiser, 1997; USGS, 2004). It has no upper limit and is not used to express damage. An earthquake in a densely populated area that results in many deaths and considerable damage may have the same magnitude as one occurring in a remote area that does not cause any damage (USGS, 1989).

The intensity of an earthquake is based on the observed effects of groundshaking on people, buildings, and natural features. Intensity is expressed by the Modified Mercalli Scale, a subjective measure that describes how strong a shock was felt at a particular location (Shedlock and Pakiser, 1997; USGS, 2004). The Modified Mercalli Scale expresses the intensity of an earthquake's effects in a given locality in values ranging from I to XII.

Table 4.18 presents the Richter Scale and the Modified Mercalli Scale with the corresponding earthquake effects and the estimated average frequency of occurrence.

Table 4.18: Richter Scale and Modified Mercalli Scale

Richter Scale Magnitude	Description	Modified Mercalli Scale Intensity	Average Earthquake Effects	Estimate Average Frequency Worldwide
Less than 2.0	Micro	I	Micro earthquakes, not felt, or felt rarely. Recorded by seismographs.	Continual/several million per year
2.0–2.9	Minor	I to II	Felt slightly by some people. No damage to buildings.	Over 1 million per year
3.0–3.9		II to IV	Often felt by people but very rarely causes damage. Shaking of indoor objects can be noticeable.	Over 100,000 per year
4.0–4.9	Light	IV to VI	Noticeable shaking of indoor objects and rattling noises. Felt by most people in the affected area. Felt outside slightly. Generally causes no damage to minimal damage. Moderate to significant damage unlikely. Some objects may fall off shelves or be knocked over.	10,000 to 15,000 per year
5.0–5.9	Moderate	VI to VIII	Can cause damage of varying severity to poorly constructed buildings. No damage to slight damage to all other buildings. Felt by everyone.	1,000 to 1,500 per year
6.0–6.9	Strong	VII to X	Damage to a moderate number of well-built structures in populated areas. Earthquake-resistant structures survive with slight to moderate damage. Poorly designed structures receive moderate to severe damage. Felt in up to hundreds of miles/kilometers from the epicenter. Strong to violent shaking at the epicenter.	100 to 150 per year
7.0–7.9	Major	VIII or greater	Causes damage to most buildings, some to partially or completely collapse or receive severe damage. Well-designed structures are likely to receive damage. Felt across great distances with major damage mostly limited to 250 kilometers from the epicenter.	10 to 20 per year
8.0–8.9	Great		Major damage to buildings; structures are likely to be destroyed. Moderate to heavy damage to sturdy or earthquake-resistant buildings. Damage in large areas. Felt in extremely large areas.	One per year
9.0 and greater			At or near total destruction. Severe damage or collapse of all buildings. Heavy damage and shaking extends to distant locations. Permanent changes in ground topography.	One per 10 to 50 years

4.2.4.3 Previous Occurrences

Since the update of the County plan in 2009, there have been no earthquake events in Greene County (State of New York, 2014). Significant earthquake events that may have impacted Greene County before 2009 are described in Appendix A.

4.2.4.4 Probability of Future Occurrences

Given the history of earthquakes in Greene County, the probability of future occurrences is low. Although no reported earthquakes have been centered in the County, it is anticipated that Greene County and all of its jurisdictions may experience indirect impacts from earthquakes that may affect some buildings and may induce secondary hazards such as fires and utility failure.

4.2.4.5 Vulnerability and Impact

All assets in Greene County (population, structures, critical facilities, and lifelines) are vulnerable to the effects of mild shaking caused by an earthquake.

Earthquakes usually occur without warning and can impact areas a great distance from their point of origin. The extent of damage depends on the density of population and building and infrastructure construction in the area shaken by the quake. Some areas may be more vulnerable than others based on soil type, the age of the buildings, and building codes in place.

The entire population and general building stock inventory of the County is at risk of being damaged or experiencing losses due to impacts of an earthquake

4.2.4.6 Estimated Potential Loss from the Earthquake Hazard

To assess the vulnerability of Greene County to earthquakes, probabilistic scenarios of various potential events were attempted using Hazus. However, there are no past earthquake scenarios in Hazus that impacted Greene County directly, which means the analysis yielded no damage.

4.2.4.7 Summary of Vulnerability Assessment

Earthquakes are not likely to affect Greene County. If an earthquake were to affect Greene County, the likelihood of damage is low.

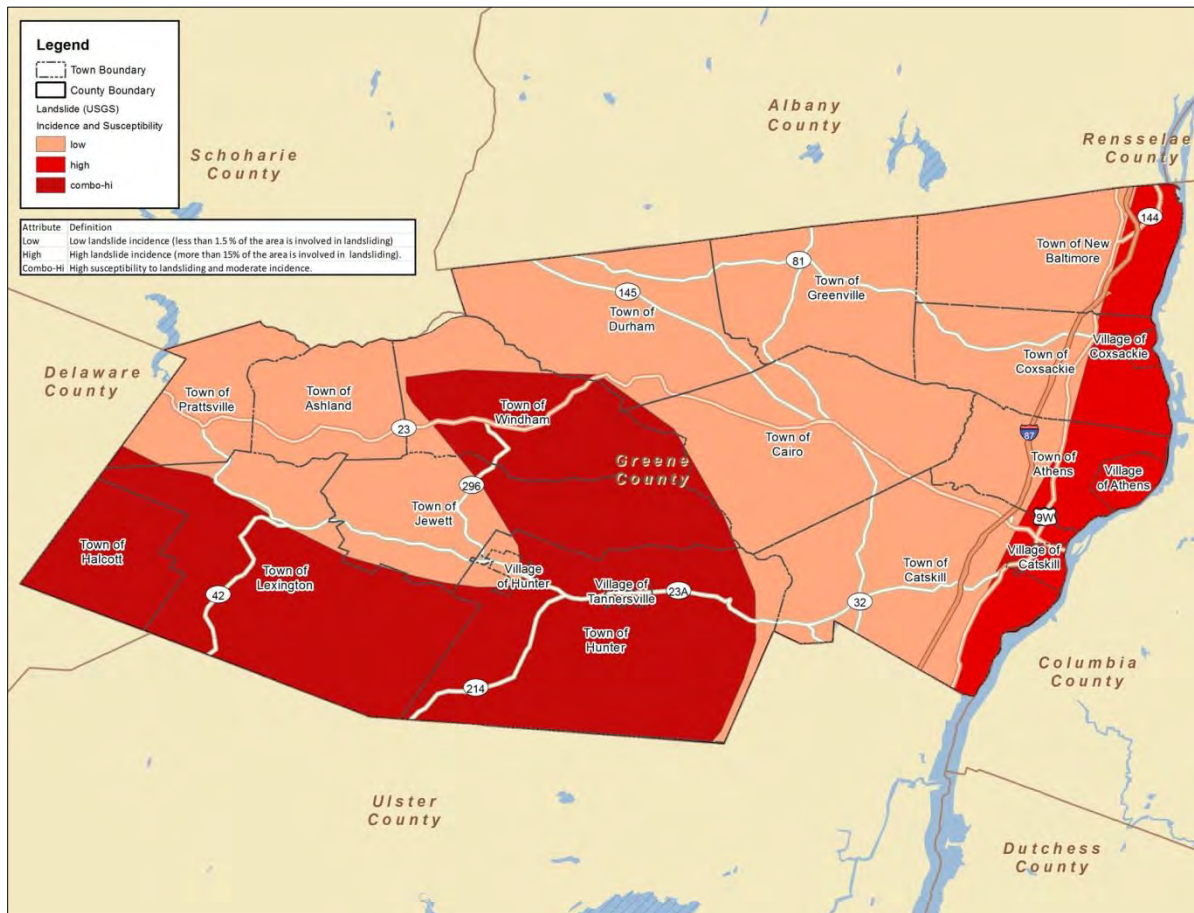
4.2.5 Landslides

4.2.5.1 Location

The potential for landslides exists throughout the entire Northeast. Scientific and historical landslide data indicate that some areas of northern and eastern New York State have a substantial landslide risk. In general, the highest potential for landslides can be found along major rivers and lake valleys that were formerly occupied by glacial lakes resulting in glacial lake deposits (glacial lake clays) and are usually associated with steeper slopes. One example is the Hudson and Mohawk River Valley (NYS DPC, 2008).

Figure 4-11 identifies locations in Greene County at risk of landslides and shows that the risk is particularly along the Hudson River and in the western part of the County.

According to Greene County Highway Department, ground failure or landslide conditions in the County generally occur during wet conditions when the ground becomes saturated. Most of these events occur near creek beds and cause stream bank failure and road failure.



Source: USGS (2015)

Figure 4-11: Landslide incidence and susceptibility for Greene County

4.2.5.2 Extent (Magnitude and Severity)

Natural variables that contribute to the extent of potential landslide activity in any particular area include soil properties, topographic position and slope, and historical incidence. Predicting a landslide is difficult even under ideal conditions. As a result, the landslide hazard is often represented by landslide incidence and/or susceptibility. Landslide incidence is the number of landslides that have occurred in a given geographic area. High, medium, and low incidence is defined as follows:

- High incidence – Greater than 15 percent of a given area has been involved in landslide
- Medium incidence – 1.5 to 15 percent of an area has been involved
- Low incidence – Less than 1.5 percent of an area has been involved (Geological Hazards Program, n.d.).

Landslide susceptibility is defined as the probable degree of response of geologic formations to natural or artificial cutting, to loading of slopes, or to unusually high precipitation. It can be assumed that unusually high precipitation or changes in existing conditions can initiate landslide movement in areas where rocks and soils have experienced numerous landslides. Landslide susceptibility depends on slope angle and the geologic material underlying the slope. Landslide susceptibility only identifies areas that are potentially affected and does not imply a time frame when a landslide might occur. High, medium, and low susceptibility are delimited by the same percentages used for classifying the incidence of landslide (Geological Hazards Program, n.d.; OAS, 1991).

Figure 4-11 shows the landslide incidence and susceptibility and identifies areas that have potential for landslides. The Towns of Halcott, Lexington, Windham, and Hunter and Village of Tannersville have high susceptibility and moderate incidence.

4.2.5.3 Previous Occurrences

Significant events include a landslide affecting County Route 2, which occurred in the early 1990s and the failure along the creek bed and County Route 6 in 1996-1997 in Lexington.

4.2.5.4 Probability of Future Occurrences

With two instances of landslide identified in Greene County since 1990, the probability of occurrence is estimated as an 8 percent chance of occurring in any given year.

4.2.5.5 Vulnerability and Impact

Roadways have been identified as vulnerable to the effects of landslide. Roadways would be closed if affected by landslide and traffic would have to detour around the landslide location until debris is removed and the roadway is determined to be safe for travel.

4.2.5.6 Summary of Vulnerability Assessment

The likelihood of a landslide affecting Greene County is low (relative to floods and severe storms and severe winter storms) and related to flooding and erosion issues. The impact would be localized and limited to delay or disruption in traffic patterns.

5.0 Mitigation Strategy

The Greene County mitigation strategy emerged as a result of the discussions held during regional and Planning Committee meetings, a review of the previously proposed mitigation actions, and a review of existing resources and capabilities.

The County and its jurisdictions have always experienced storms and flooding due to the natural topography, location and climate, but the need for mitigation has been highlighted by the experience after Irene, Lee and Sandy storms. The River towns manage risk through acquisition and other state, regional and local programs (detailed in Capability Assessment section). Mountaintop communities were especially affected in Irene and have been conducting Local Flood Analyses to define and address the flooding problem.

Appendix D has the complete list of actions, as an overview. The County's actions from the 2009 HMP are described in this section. Each jurisdiction's individual Annex also describes their proposed actions and then each action has an Action Worksheet that outlines the implementation strategy for each action.

5.1 Mitigation Goals

The Planning Committee reviewed the 2009 goals and objectives and decided to expand the goals and eliminate objectives from this plan. Therefore the goals of this plan are:

1. Prevent loss of life from natural hazards, especially addressing vulnerable populations
2. Protect and enhance community buildings, critical facilities and infrastructure to make them more resilient
3. Enhance capabilities to mitigate, respond and recover from natural hazard events
4. Foster resilience paradigm across all levels, County, jurisdictions, and public by discussing and incorporating hazard considerations wherever possible

The first two goals focus on saving lives and reducing property damage. The intent of the third and fourth goal is to institute enhanced capabilities and process changes for a resilient Greene County.

5.2 Mitigation Alternatives Considered

A wide range of potential mitigation actions was considered for each of the identified hazards by the County and each Town/Village. The list below is developed by simplifying and adapting what's in the 2015 FEMA Hazard Mitigation Assistance guidance, and 2013 FEMA Mitigation Ideas document. The intent is to provide an overview of mitigation options available to the County and participating jurisdictions, not only for this plan but continuously in future.

5.2.1 All-Hazards (floods, severe winter storms, severe storms, earthquake, landslide)

Various methods are available to protect existing and future buildings from damage due to natural hazards. The techniques could be structural retrofitting (e.g., floodproofing), non-structural retrofitting (e.g. elevating utilities or bracing of contents to prevent earthquake damage) and infrastructure retrofits, i.e. measures to reduce risk to existing utility systems, roads, and bridges).

Retrofitting Against Flooding: Flood retrofitting measures include dry floodproofing where all areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings (doors, windows, and vents) are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under State, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques. The alternative to dry floodproofing is wet floodproofing: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. This is the approach used for the first floor of the elevated homes illustrated in the previous section. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater, and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

Retrofitting Against Wind: The high wind forces of tropical storms, hurricanes and tornadoes can be resisted by securing the roof, walls and foundation with adequate fasteners or tie downs. These help hold the building together when the combination of high wind and pressure differences work to pull the building apart. Another retrofit is to strengthen garage doors, windows and other large openings. If winds break the building's "envelope," the pressures on the structure are greatly increased. Windows can be protected with storm shutters or special glass.

Retrofitting Against Earthquake: Earthquake retrofitting measures include removing masonry overhangs that will fall onto the street during shaking. Bracing the building provides structural stability, but can be very expensive. Less expensive approaches may be more cost effective for an area like that faces a relatively low earthquake threat. These include tying down appliances, water heaters, bookcases and fragile furniture so they won't fall over during a quake and installing flexible utility connections that will not break when shaken.

Infrastructure/Utility

- Burying utility lines is a retrofitting measure that addresses the winds from hurricanes, tornadoes, thunderstorms, and the ice that accompanies winter storms.
- Installing or incorporating backup power supplies minimizes the effects of power losses caused by downed lines.
- Roofs can be replaced with materials less susceptible to damage by hail, such as modified asphalt or formed steel shingles.
- Winter storm retrofitting measures include improving insulation on older buildings, relocating water lines from outside walls to interior spaces, and insulating water lines in crawlspaces and under elevated buildings.
- Windows can be sealed or covered with an extra layer of glass (storm windows) or plastic sheeting.

5.2.1.1 Floods

Property Acquisition and Structure Demolition: Voluntary acquisition of an existing flood-prone structure and conversion of the land to open space through the demolition of the structure.

Property Acquisition and Structure Relocation: Voluntary physical relocation of an existing structure to an area outside of a hazard-prone area, such as the Special Flood Hazard Area (SFHA) or a regulatory erosion zone. Relocation must conform to all applicable State and local regulations.

Structure Elevation: Physically raising and/or retrofitting an existing structure. Elevation may be achieved through a variety of methods, including elevating on continuous foundation walls; elevating on open foundations, such as piles, piers, posts, or columns; and elevating on fill. Foundations must be designed to properly address all loads and be appropriately connected to the floor structure above, and utilities must be properly elevated as well.

Mitigation Reconstruction: The construction of an improved, elevated building on the same site where an existing building and/or foundation has been partially or completely demolished or destroyed. Mitigation reconstruction is only permitted for structures outside of the regulatory floodway or Coastal High Hazard Area (Zone V) as identified by the existing best available flood hazard data.

Dry Floodproofing: Explained above

Localized Flood Risk Reduction Projects: These are projects that reduce the frequency or severity of flooding, and decrease predicted flood damage, within an isolated and confined drainage or catchment area that is not hydraulically linked or connected to a larger basin. These projects include, but are not limited to installation or modification of culverts and other stormwater management facilities; construction or modification of retention and detention basins; and construction or modification of floodwalls, dams, and weirs.

Non-localized Flood Risk Reduction Projects: These are projects that reduce the frequency or severity of flooding, and decrease predicted flood damage, within an area that is hydraulically linked or connected to a drainage basin that is regional in scale. These projects may include the construction, demolition, or rehabilitation of dams; construction or modification of dikes, levees, floodwalls, seawalls, groins, jetties, breakwaters, and stabilized sand dunes; and large-scale channelization of a waterway.

5.2.1.2 Tornado and Severe Storms

Safe Room Construction: Safe room construction projects are designed to provide immediate life-safety protection for people in public and private structures from tornado and severe wind events, including hurricanes.

Wind Retrofit Projects: The purpose of a wind retrofit projects is to reduce the vulnerability of and damage from wind and wind-driven rain intrusion during a high wind event such as a hurricane.

5.2.1.3 Landslide

Soil Stabilization: These are projects that reduce risk to structures or infrastructure from erosion and landslides, including installing geotextiles, stabilizing sod, installing vegetative buffer strips, preserving mature vegetation, decreasing slope angles, and stabilizing with rip rap and other means of slope anchoring.

5.2.1.4 Forest Fires

Creation of defensible space, which are projects that create a perimeters around homes, structures, and critical facilities through the removal or reduction of flammable vegetation;

1. Application of ignition-resistant construction, which are projects that apply ignition resistant techniques and/or non-combustible materials (replacing roofing with fireproof materials) on new and existing homes, structures, and critical facilities;
2. Installing spark arrestors on chimneys; and
3. Hazardous fuels reduction, which are projects that remove vegetative fuels proximate to at risk structures that, if ignited, pose a significant threat to human life and property.

5.2.1.5 Planning/Regulations and public education for all hazards

Planning Review prior to construction of a Subdivision or parcel: Review criteria to avoid building in hazard prone areas, e.g. steep slopes could have been applicable but in Greene County the Planning and Economic Development department does not have the legal authority. Individual towns are encouraging and enforcing building code, development code and floodplain regulations.

Post-Disaster Code Enforcement: Projects designed to support the post-disaster rebuilding effort by ensuring that sufficient expertise is on hand to ensure appropriate codes and standards are used and enforced.

Public Education: About the concept of mitigation and resilience, how simple actions (raising utilities) can protect homes and businesses from flood damage, fire education for visitors and tourists to County parks, what to do in a flood or flash flood, and about earthquake mitigation activities appropriate for homes, schools, and businesses such as securing furnishings, anchoring bookcases, and restraining appliances.

5.3 Selection and Prioritization of Mitigation Actions

This section summarizes the types of mitigation actions proposed for enactment by Greene County and the participating jurisdictions. The plan proposes the actions determined to be the most appropriate for the resources and capabilities of the County and each of the participating jurisdictions based on the experience of local officials and the public.

The relatively large number of flood mitigation actions proposed in the Greene County mitigation strategy reflects the fact that flooding is the hazard of greatest concern. Actions determined to be appropriate for the plan were reviewed during public and Committee meetings and there was consensus that those intended to mitigate the effects of flooding should be the highest priorities.

Potential actions were reviewed relative to potential financial as well as administrative and legal costs and the degree to which they would be endorsed by the public. Potential actions were reviewed during the meetings relative to their potential benefit of effectiveness in saving lives, protecting the natural environment, and reducing disruption and damage.

The mitigation strategy proposes actions reflecting the commitment of the County and local jurisdictions to compliance with requirements of the NFIP. Actions to protect existing structures and infrastructure are:

- Elevating roadways at risk of flooding
- Stabilizing steep slopes to prevent landslides along roadways
- Relocating the existing County Mental Health facility
- Acquiring and demolishing residential and commercial properties at risk of flooding
- Upgrading waste water treatment plants and structural retrofit of waste water pumps

Actions affecting future structures are:

- Jurisdictions are regulating development in the floodplain and enforcing other measures to reduce stormwater runoff.

The mitigation strategy proposes two actions that will enhance community resilience:

- The first resilience-building action is the flood mitigation activity of acquisition, which removes to flood prone properties out of harm's way and restores flood prone land to their natural state so that they can perform the natural, beneficial functions of a floodplain by storing flood water and slowly releasing it to surface and ground water.
- The second resilience-building action is to not only elevate the lower floor of the recycling center in Halcott to reduce the likelihood of flooding but also to expand the facility into a full service solid waste management center. The center would reduce the quantity of waste going into a landfill and would provide at least one additional job for the area.

In general, the high priority actions were determined to be the most effective in saving lives, protecting the natural environment, and reducing damages in the event of a flood. Flood studies and flood mitigation actions that would be carried out primarily by State agencies were rated as medium priority. Public education and outreach actions intended to reduce flood damages were also rated as medium priority. Actions related to the hazards determined to be much less likely that flooding to occur and/or to lead to considerably less damage than flooding were identified as being low priority actions.

5.4 County Mitigation Actions Completed or In Progress

Since the 2009 HMP, Greene County has successfully implemented a significant number projects in addition to the department-specific activities, achievements, and accomplishments (described in Section 3.2). Table 5.1 shows the mitigation projects and natural resource protection mitigation actions performed by the County. The following are the key projects:

- The Emergency Services Department has **enhanced operations at its Emergency Operations Center**. Upgrading the communications infrastructure was identified as a key priority to ensure the continuity of operations as the current system is vulnerable to natural hazards. This project is currently underway and basic infrastructure upgrades are slated to be completed by 2017. A tower is being replaced on Hunter Mountain and the phone lines are being replaced with fiber optic lines with microwave back-up. Another tower is being installed in New Baltimore. The system will also enhance weather monitoring to improve early warning capabilities.
- Greene County Emergency Services continues to implement its **new radio transmission system** to ensure continuity of critical services and to enhance weather monitoring to improve early warning capabilities (\$12 million project cost). In 2014, the Jewett tower on Windham Mountain was completed.
- Since the 2009 HMP, the **Community Emergency Notification System (Reverse 911)** was implemented that provides the capability to notify residents and businesses including those with a traditional landline - cable company-supported landlines may have had to be added manually, those who provided their cell phone number, email and/or downloaded the smartphone app. The system allows for notification whenever an emergency or incident occurs. The system allows for notifications to the entire county or to a particular town, village or single road in a municipality – for instance when there is a water main break or large fire. The communications infrastructure upgrades and Community Emergency Notification System have increased the Emergency Services Department’s capabilities to respond to an event and provide information to residents.
- The **County 911 phones are being upgraded** from 2016 to 2017 to be next-gen compliant so that they can receive text messages and video and pictures from the public. The next phase of the project will be for dispatch to have the ability to send photos, videos to those in the field.
- The Batavia Kill Watershed District Dams **reconstruction and repairs of dams** was completed.
- The Development, Tourism, and Planning Department, along with GCSWCD, is wrapping up the **FEMA Hazard Mitigation Acquisition Program** which acquires properties in the floodplain and removes them permanently. Twenty-three properties in eight towns have gone through the program (with one remaining to be completed).
- The CWC, with GCSWCD, has a **Flood Hazard Mitigation Implementation Program** that will acquire, relocate, and mitigate properties that undergo a detailed in LFA.
- GCSWCD has a number of different programs and projects underway including **stormwater and stream bank restoration projects** (please refer to the *Schoharie Basin Stream Management Program Action Plans* for further detail).

Table 5.1: Summary of Greene County Mitigation Actions Completed or In Progress

Mitigation Action	Project Status
Enhance Operations of Emergency Management Center	Complete and Ongoing
Community Emergency Notification System	Complete
Emergency Communications Infrastructure Mitigation Program	In Progress
Hazardous Cargo Plan	In Progress
Culvert Replacements	Complete/Ongoing
Slater Road Bridge over the Batavia Kill in the Town of Windham	Complete
Stream Bank Restoration and Stormwater Projects	Complete/Ongoing
State Route 23 Bridge over Shingle Kill – Town of Cairo	Complete
Batavia Kill Watershed District Dams Reconstruction and Repairs	Complete
FEMA Hazard Mitigation Acquisition Program	In Progress/Complete
Flood Hazard Mitigation Implementation Program	In Progress

The actions still in-progress and new proposed ones are listed in Appendix D Mitigation Actions and have Action Worksheets as well.

In addition to those, the County and take the following actions in the next 2 years to maintain compliance with the National Flood Insurance Program and enhance capabilities for hazard mitigation:

- Offering floodplain management courses for local officials on enforcement of regulations and updating flood damage prevention ordinances;
- Offering courses for surveyors on completing elevation certificates accurately;
- Providing opportunities for staff to become Certified Floodplain Managers; and
- Supporting and placing high priority on mitigation actions for repetitive loss properties and critical facilities located in the floodplain.

6.0 Implementation and Maintenance

This section provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and proposed schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

Section 2.0 Planning Process includes information on the implementation and maintenance process since the 2009 plan was adopted. This section includes information on the implementation and maintenance process for this plan update.

6.1 Implementation

In view of the capabilities of the County, the actions that are already in-progress have a better chance of implementation. External funding sources are needed to materialize the new proposed actions. Appendix E lists some funding sources for current and any future actions that the County and jurisdictions decide to take. The County will monitor funding opportunities to facilitate the implementation of more costly recommended actions. The County will assist in the identification of specialized pre- and post- disaster funds, state and federal earmarked funds, and other grant programs for opportunities to easily accomplish progress towards plan implementation

Appendix D and Action Worksheets spell out the main constituents of the implementation strategy – lead agency responsible, priority, cost estimate, funding source and timeframe for implementation.

6.2 Integration with Other Planning Mechanisms

A highly effective and low cost implementation mechanism is the incorporation of hazard mitigation plan recommendations into existing planning efforts, such as the County Comprehensive Emergency Management Plan and Economic Development Plan. While the County and participating jurisdictions already implement policies and programs to reduce losses to life and property from hazards it is important to identify additional opportunities to encourage mitigation strategies. It is the County's and participating jurisdictions goal to assimilate mitigation strategies into the day-to-day functions and priorities.

Overall Greene County Emergency Services, Greene County Planning and Economic Development, Greene County Highway Department and Greene County Soil and Water Conservation District are jointly responsible for integration of this plan with current initiatives.

Section 3.3 Capability Assessment explains the role of each department relevant to hazard mitigation and their activities. Integration is envisioned through the following, expanding on the brief discussion held during the Dec 4th Planning Committee meeting:



Figure 6-1: Plan Integration

- Annual meeting between departments to identify programs and policies for coordination and opportunities to implement mitigation strategies.
- Share recommendations provided in the updated mitigation plan with State and Regional transportation authorities to show support for protecting roadways from the effects of erosion/landslide and flooding
- Add actions to restore natural function of floodplains into Greene County Open Space and Recreation Plan (last updated in 2002) when it is next updated
- Incorporate language in the next update of the Greene County Economic Development Plan to present hazard mitigation as an important strategy for supporting local businesses by reducing the threat of disruption due to flooding
- Incorporate the action to relocate the Mental Health facility to a location that is not prone to flooding into the annual plan for the facility
- Incorporate emergency preparedness and response actions (e.g., purchase of generators or a new radio system) into Greene County Comprehensive Emergency Management Plan.

6.3 Plan Maintenance

It is important to monitor, evaluate, and further update the plan so that it continues to be accurate and appropriate for participating jurisdictions. This section describes a process for regular monitoring of mitigation actions, evaluating the planning process, reviewing the information used for the risk assessment, reviewing community priorities, and updating the plan again within five years.

6.3.1 Monitoring

Greene County Planning Committee led by Greene County Emergency Services would be responsible for maintaining the plan and will review it annually (starting one year from the first jurisdiction adoption date) and following each emergency declaration. Each review process will

focus on the implementation of the actions, whether progress is being made, any roadblocks experienced and how implementation strategy can be tweaked.

6.3.2 Evaluation

The Greene County Planning Committee will complete a Hazard Mitigation Progress Report to evaluate the status and accuracy of the Multi-Jurisdictional HMP, and record the Committee's review process. The Greene County Emergency Management Agency will maintain a copy of these records.

Greene County will continue to work with all municipalities regarding Hazard Mitigation projects, especially those municipalities that did not submit projects for inclusion in this Plan.

One month after conducting the annual monitoring of mitigation actions, the Greene County Mitigation Officer will schedule an annual meeting of the Planning Committee to evaluate the mitigation planning process, implementation of the plan, and conditions in Greene County that suggest the need to modify either planning data or planning actions. Participating jurisdictions will be invited to attend the evaluation meetings. The evaluation meeting will include a presentation of the results of the monitoring of mitigation actions and will answer the following questions:

- Do mitigation goals and objectives reflect current community concerns as well as the finding of the risk assessment?
- Have conditions in the County changed so that findings of the risk assessment should be updated?
- What hazards have caused damage in the County since the plan was written?
- Were these anticipated and evaluated in the plan or should these hazards be added to the plan?
- Have conditions in the County changed so that the magnitude of risk as expressed in this plan has changed?
- Are new sources of data available that will improve the risk assessment?
- Are current resources sufficient for implementing mitigation actions?
- For each mitigation action that has not been completed, what are the obstacles to implementation?
- What are potential solutions for overcoming these obstacles?
- Is each completed mitigation action effective in reducing risk? What action is required to further reduce the risk addressed by the completed action?
- What mitigation actions should be added to the plan and proposed for implementation?
- Should any proposed mitigation actions be deleted from the plan? What is the rationale for deleting previously proposed actions from the plan?
- Based upon the evaluation, should the plan be updated as soon as possible or should the plan be updated as scheduled 5 years after it was adopted?

County Emergency Services will document the results of the annual evaluation meeting and submit the findings to each jurisdiction in the County for review within 2 weeks. Documentation of the annual evaluation meeting will be attached to the Greene County paper and electronic copies of this plan within 1

month. If the Planning Committee determines that the Plan should be updated as soon as possible, Emergency Services will take action to initiate the plan update.

6.3.3 Update

This Plan must be updated within 5 years and again adopted by the County and participating jurisdictions in order to maintain compliance with the regulations stated in 44 CFR Part 201.6 and ensure eligibility for applying for and receiving certain Federal mitigation grant funds. Monitoring and evaluation will identify necessary modifications to the plan including changes in mitigation strategies and actions that should be incorporated in the next update.

The update will have more current information about previous occurrences of hazards, ensure that the hazard vulnerability data and risk analysis reflect current conditions of the County, the capabilities assessment accurately reflects local circumstances, and that the hazard mitigation strategies are updated based on the County's damage assessment reports and local mitigation project priorities.

Greene County Emergency Services will initiate the process of updating the plan no more than 3 years after the plan was adopted or immediately upon a determination by the Planning Committee that the plan should be updated sooner. This will allow approximately 1 year for securing funding and/or staff for updating the plan and 1 year for conducting research and writing the updated plan.

6.3.4 Continued Public Involvement

Greene County Emergency Services will provide printed copies of the plan to key Greene County departments well as to the largest public library in the County so that the public has access to printed copies of the plan. A copy of the adopted plan will be posted on the County Web site for 5 years so that the public has electronic access to the plan. The Web site will include an easy-to-access feedback option so that residents, business owners, and others who read the plan will be able to provide a comment about the plan or about the mitigation strategies. Greene County Emergency Services will maintain these comments and will provide them to the Planning Committee for consideration at the annual plan evaluation meetings.

Greene County Emergency Services will post notices of annual mitigation plan evaluation meetings using the usual methods for posting meeting announcements in the County to invite the public to participate. In addition to posting announcements on the County Web site, at least one newspaper press release will be published during the process of updating the plan inviting public participation.

Greene County is committed to the continued involvement of the public. Therefore, copies of the Plan will be made available for review during normal business hours at the Emergency Services Office.

A notice regarding annual updates of the Plan and the location of Plan copies will be publicized annually after the Planning Committee's annual evaluation and posted on the public website <http://greenegovernment.com/departments/emergency-services/>.

Each jurisdiction's Supervisor/Mayor or Clerk shall be responsible for receiving, tracking, and filing public comments regarding their Jurisdiction Annexes.

7.0 References

[This section will be finalized for the final draft]

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 - Schoharie Basin Stream Management Program Action Plan (2011-2013)
 - Schoharie Basin Stream Management Program Action Plan (2013-2015)
 - Schoharie Basin Stream Management Program Action Plan (2015-2017)
 - Batavia Kill Stream Management Plan East Kill Stream Management Plan
 - Manor Kill Management Plan West Kill Management Plan
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Appendix A: Hazard Descriptions and Previous Significant Events

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APPENDIX A

Hazard Descriptions and Previous Significant Events

Floods

Description

Floods are one of the most common natural hazards in the United States. They can develop slowly over a period of days or develop quickly, with disastrous effects that can be local (impacting a neighborhood or community) or regional (affecting entire river basins, coastlines, and multiple counties or states). Floods are the most frequent and costly natural hazards in New York State in terms of human hardship and economic loss, particularly to communities that lie within flood-prone areas or floodplains of a major water source.

The FEMA definition for flooding is “a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from the overflow of inland or tidal waters or the rapid accumulation of runoff of surface waters from any source.”

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 the flood that has a one-percent 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.

Most floods fall into three categories: riverine, coastal, and shallow. Other types of floods could include ice-jam floods, dam failure floods, and floods associated with local drainage or high groundwater. For the purposes of this plan and as deemed appropriate by the County; riverine, flash, ice-jam, and dam failure flooding are the main flood types of concern that could impact the county and are discussed as follows:

Riverine/Flash Floods – Riverine floods, the most common flood type, occur along a channel and include overbank and flash flooding. Channels are defined features on the ground that carry water through and out of a watershed. They may be called rivers, creeks, streams, or ditches. When a channel receives too much water, the excess water flows over its banks and inundates low-lying areas. These floods usually occur after heavy rains, heavy thunderstorms, or snowmelt, and can be slow or fast-rising, and generally develop over a period of hours to days.

Ice-Jam Floods – As indicated by the Northeast States Emergency Consortium (NESEC), an ice jam is an accumulation of ice in a river that acts as a natural dam and can flood low-lying areas upstream. Downstream areas also can flood if the jam releases suddenly, releasing a wave of ice and water.

An ice jam occurs when warm temperatures and heavy rains cause rapid snow melt. The melting snow combined with the heavy rain causes frozen rivers to swell. The rising water breaks the ice layers into large chunks, which float downstream and often pile up near narrow passages and obstructions such as bridges and dams. The ice jam may then build to a thickness great enough to raise the water level and cause flooding. Some of the most devastating winter floods have been associated with a combination of heavy rainfall, rapid snowmelt, and ice jams.

It is difficult to identify particular areas that are generally prone to ice jams because the hazard can be very localized. However, based on causal characteristics, ice jam flood hazard is most prevalent in locations of flat terrain but also where climate includes extended periods of below freezing temperatures.

Most ice jam events create significant economic, environmental, and social impacts to areas located along rivers, streams, reservoirs, and/or tributaries. Impacts can include structural damages, disruption of geomorphology (e.g., bank erosion or channel shifting), and natural habitat loss to fish populations and microbial communities. Ice jams can result in damage to infrastructure through direct impact or through associated flooding of roads, bridges, buildings, and homes. This can cost communities thousands to millions of dollars.

Dam Failure Floods – A "dam" is an artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material for the purpose of storage or control of water (different types of dams). Dams are man-made structures built for the purpose of power production, agriculture, water supply, recreation, and flood protection. A levee is a natural or artificial barrier that diverts or restrains the flow of a stream or other body of water for the purpose of protecting an area from inundation by flood waters. According to FEMA, dam failure is a catastrophic type of failure characterized by the sudden, rapid, and uncontrolled release of impounded water or the likelihood of such an uncontrolled release. It is recognized that there are lesser degrees of failure and that any malfunction or abnormality outside the design assumptions and parameters that adversely affect a dam's primary function of impounding water is properly considered a failure. These lesser degrees of failure can progressively lead to or heighten the risk of a catastrophic failure. They are, however, normally amenable to corrective action. A dam failure can result in severe loss of life, economic disaster, and extensive environmental damage, primarily due to their unexpected nature and high velocity floodwater. According to FEMA, dams can fail for one or a combination of the following reasons:

- Overtopping caused by floods that exceed the capacity of the dam (inadequate spillway capacity);
- Prolonged periods of rainfall and flooding;
- Deliberate acts of sabotage (terrorism);
- Structural failure of materials used in dam construction;
- Movement and/or failure of the foundation supporting the dam;
- Settlement and cracking of concrete or embankment dams;
- Piping and internal erosion of soil in embankment dams;
- Inadequate or negligent operation, maintenance, and upkeep;
- Failure of upstream dams on the same waterway; or
- Earthquake (liquefaction/landslides).

Table A.1 presents details of dams located in Greene County.

Table A.1: Type, Hazard Classification, Owner, and Purpose of Dams in Greene County

Name	Hazard Classification	Nearest City/Town	Type	Owner	Purpose
Herbert Wolff Farm Pond Dam #2	Low	High Falls	RE - Earth	Private	Recreation
High Falls Extension Mill Dam	Low	Catskill	MS - Masonry	Private	Other
Friar Tuck Pond Dam	Low	None	RE - Earth	Private	Recreation
Timber Lake Club Dam	Low	Allaben	RE - Earth, CN - Concrete Gravity	Town of Lexington	Recreation
(176-1176)	No Hazard		OT - Other	Not Found	Other
Cerny Pond Dam	Low	South Jewett	RE - Earth	Not Found	Recreation
Adar Dam	Low	Spruceton	RE - Earth	Private	Recreation
Lake Rip Van Winkle Dam	Low	Tannersville	CN - Concrete Gravity	LOCAL GOVERNMENT	Recreation
Onteora Pond Dam	Intermediate	Tannersville	RE - Earth	Town of Hunter	Irrigation
Tranquility Camp Dam	Low	Leeds	RE - Earth	Private	Recreation
Coxsackie Reservoir #2 Dam	Intermediate	West Coxsackie	CN - Concrete Gravity	Town of Coxsackie	Water Supply - Secondary
Beaver Dam Lake Dam	Low	Earlton	RE - Earth	Private	Recreation
Aiello Pond #1 Dam	Low	Paradise Hill	RE - Earth	Private	Recreation
Aiello Pond #2 Dam	Low	Paradise Hill	RE - Earth	Private	Fire Protection, Stock, Or Small Farm Pond, Recreation
Coxsackie Corr Fclty Retention Pnd Dam	Low	West Coxackie	RE - Earth	State	Flood Control and Storm Water Management
Lloyd Zimmerman Dam	Low	West Coxsackie	RE - Earth	Not Found	Water Supply - Secondary
Mill Pond Dam	Low	Catskill	CN - Concrete Gravity	Not Found	Hydroelectric
Moore Pond Dam	Low	Coxsackie	RE - Earth	Town of New Baltimore	Other
(210-1038)	No Hazard		OT - Other	Not Found	Other
Herbert Wolff Farm Pond Dam #1	Low	High Falls	RE - Earth	Private	Recreation

Name	Hazard Classification	Nearest City/Town	Type	Owner	Purpose
Prattsville Barrier Dam	Low	Prattsville	CN - Concrete Gravity	State	Other
East Jewett Campsite Dam	Low	East Jewett	RE - Earth	Not Found	Recreation
Tannersville Reservoir #3 Dam	Intermediate	Tannersville	RE - Earth	Town of Hunter	Water Supply - Primary
Camp Harriman Dam	High	East Jewett	ER - Rockfill, RE - Earth	Town of Jewett	Recreation
Nyc Police Pond Dam	Low	Platte Clove	RE - Earth	Not Found	Other, Recreation
Tannersville Reservoir #1 Dam	Low	Tannersville	RE - Earth, MS - Masonry	LOCAL GOVERNMENT	Water Supply - Primary
Dibble Dam	No Hazard	Hunter	CN - Concrete Gravity	LOCAL GOVERNMENT	Water Supply - Primary
Tannersville Reservoir #2 Dam	Low	Tannersville	RE - Earth	LOCAL GOVERNMENT	Water Supply - Primary
South Lake Dam	Low	Kaaterskill Falls	RE - Earth	State	Recreation
Dolan Lake Dam	Low	Hunter	OT - Other	Not Found	Other
Levy Dam	Low	Camp Beecher	RE - Earth	Private	Recreation
Twilight Park Dam (upper)	Low	Palenville	CN - Concrete Gravity	Private	Other
Hunter Mountain Lake Dam	High	Hunter	RE - Earth	Town of Hunter	Water Supply - Secondary
R & E Banks Dam	Low	Lexington	RE - Earth	Private	Recreation
William Mead Dam	Low	Lexington	RE - Earth	Private	Recreation
Carl Pond Dams A & B	Low	Lexington	RE - Earth	Private	Recreation
Szabo Pond Dam	No Hazard	Prattsville	RE - Earth	Private	Recreation
Masucchia Pond Dam	Low	Lexington	RE - Earth	Private	Recreation
Ilseher Pond Dam	Low	Jewett Center	RE - Earth	Private	Recreation
Potuck Reservoir Dam	High	Leeds	RE - Earth	Town of Coxsackie	Water Supply - Primary
Athens Dam	Low	Athens	CN - Concrete Gravity	LOCAL GOVERNMENT	Water Supply - Secondary
Albanese Pond Dam	Low	Cornwallville	RE - Earth	Not Found	Recreation
Nicholsen Pond Dam	Low	Woodstock	RE - Earth	Private	Recreation

Name	Hazard Classification	Nearest City/Town	Type	Owner	Purpose
Batavia Kill Watershed Dam #4a	High	Windham	RE - Earth	Town of Windham	Flood Control and Storm Water Management
Hull Farm Pond Dam	Low	Durham	RE - Earth	Not Found	Fire Protection, Stock, Or Small Farm Pond, Recreation
Schmollinger Pond Dam	Low	Cairo	RE - Earth	Town of Greenville	Irrigation
Batavia Kill Watershed Dam #3	High	Windham	RE - Earth	Town of Windham	Flood Control and Storm Water Management
Athens Water Supply Dam	Intermediate	Limestreet	RE - Earth	Town of Athens	Water Supply - Primary
Collins & Meurer Dam	Low	West Coxsackie	RE - Earth, CN - Concrete Gravity	Not Found	Recreation
Coxsackie Reservoir Dam	Intermediate	Climax	RE - Earth	Town of Coxsackie	Water Supply - Primary
Bronck Lake Dam	Low	West Coxsackie	RE - Earth	Private	Recreation, Water Supply - Primary
Deans Mill Dam	Low	None	CN - Concrete Gravity	LOCAL GOVERNMENT	Water Supply - Primary
Sportsmen Wildlife Marsh Dam	Low	Surprise	RE - Earth, CN - Concrete Gravity	Private	Recreation
Albright Brothers Pond Dam	Low	Athens	RE - Earth	Private	Fire Protection, Stock, Or Small Farm Pond, Recreation
Zimmerman Pond #1 Dam	Low	None	RE - Earth	Not Found	Recreation
Wilkinson Pond Dam	Low	None	RE - Earth	Private	Fire Protection, Stock, Or Small Farm Pond, Recreation
Medway Dam	Intermediate	Medway	RE - Earth	Town of New Baltimore	Water Supply - Primary
South Cairo Rod & Gun Club Dam	No Hazard	South Cairo	RE - Earth	Private	Recreation
Ordes Pond Dam	Low	None	RE - Earth	Town of Cairo	Recreation

Name	Hazard Classification	Nearest City/Town	Type	Owner	Purpose
Batavia Kill Watershed Dam #1	High	Maplecrest	RE - Earth	Town of Windham	Flood Control and Storm Water Management, Recreation
Abbuhl & Hosley Pond Dam	Low	Cornwallville	RE - Earth	Not Found	Recreation
Bdk Corporation Dam #1	No Hazard	East Durham	RE - Earth	Not Found	Recreation
Knupfer Dam & Dike	Low	Sunnyside	RE - Earth	Private	Recreation
Sumner Pond Dam	No Hazard	Norton Hill	RE - Earth	Private	Recreation
Bullivant Pond Dam	No Hazard	East Durham	RE - Earth	Private	Recreation
Loughman Pond Dam	No Hazard	East Durham	RE - Earth	Private	Recreation
Helmut Philipp Pond Dam	Low	Greenville Center	RE - Earth	Private	Recreation
John Galt Dam	Low	Camp Beecher	RE - Earth	Private	Recreation
Country Estates Retention Basin Dam	Low	Greenville	RE - Earth	Town of Greenville	Flood Control and Storm Water Management
Cairo Water Company Dam #1	Low	Woodstock	RE - Earth	Private	Recreation
Vitacco Pond Dam	Low		CN - Concrete Gravity, LS - Laid Up Stone	Town of Jewett	Recreation
Bocklet Dam	Low	Catskill	RE - Earth	Town of Durham	Recreation
Durham Concert Site Dam And Dike	Low		RE - Earth	Town of Durham	Recreation
Colgate Lake Dam	Intermediate	Jewett	RE - Earth, CN - Concrete Gravity	Town of Jewett	Recreation
Ferrer Pond Dam	No Hazard	None	RE - Earth	Private	Recreation
Tailleur Wildlife Marsh Dam	Low	None	RE - Earth	Private	Recreation
Clowes Pond Dam	No Hazard	Jefferson Heights	RE - Earth	Private	Recreation
King Pond Dam	No Hazard	Catskill	RE - Earth	Private	Recreation
Sleepy Hollow Dam	High	Athens	RE - Earth	Town of Athens	Recreation, Water Supply - Primary
Girard Pond Dam	Low	Catskill	RE - Earth	Private	Recreation

Name	Hazard Classification	Nearest City/Town	Type	Owner	Purpose
Zimmerman Pond Dam	No Hazard	Athens	RE - Earth	Private	Fire Protection, Stock, Or Small Farm Pond, Recreation
Silver Lake Dam	Intermediate	Brooksbury	ER - Rockfill	Town of Windham	Irrigation, Recreation
St John Pond Dam	Low	Brooksbury	ER - Rockfill	Not Found	Irrigation, Recreation
Klatz Dam	Low	Cairo	CB - Buttress	Town of Cairo	Other
East Durham Pond Dam	No Hazard	East Durham	CN - Concrete Gravity	Not Found	Recreation
Carelas Lake Dam	Low	Freehold	RE - Earth	Private	Recreation
Lake Heloise Dam	Low	Windham	RE - Earth, LS - Laid Up Stone	Private	Recreation
Conservative Baptists Pond Dams A & B	Low	Freehold	RE - Earth	Not Found	Recreation
Beers Pond Dam	Low	East Jewett	RE - Earth	Private	Recreation
Total	89				

Source: National Performance of Dams Program (NPDP), 2015

Previous Occurrences (prior to 2009)

Further descriptions of select flood events that have impacted Greene County are provided below for events where details regarding their impact were available. These descriptions are provided to give the reader a context of the flood events that have affected the county and to assist local officials in locating event-specific data for their municipalities based on the time and proximity of these events. Flood impacts associated with hurricanes, tropical storms, or nor'easters are discussed in this profile and are also mentioned in their designated hazard profiles (Section 5.4.2 Severe Storm and Section 5.4.3 Severe Winter Storm – 2009 plan).

Monetary figures within the event descriptions were U.S. Dollar (USD) figures calculated during or within the approximate time of the event (unless present day recalculations were made by the sources reviewed). If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of inflation.

August 29 - September 14, 1960 (Hurricane Donna): This event holds the record for retaining "major hurricane" status (Category 3 or greater on the Saffir-Simpson Hurricane Scale) in the Atlantic Basin for the longest period of time on record (a total of 17 days). The storm affected every state along the East Coast; producing hurricane-force winds (up to 115 mph) from South Carolina to Maine (Barnes and Lyons, 2007). Greene County experienced between 5 and 7 inches of rain.

In Greene County, the impacts of this event fell primarily within the Batavia Kill watershed. The Soil Conservation Service indicated that the storm devastated the Town of Windham, producing more than \$750,000 in damages (1960 USD) to over 75 residences, 27 businesses, utilities, seven bridges, and multiple State, County, and Town roads. The Windham Country Club, two churches, and the Windham Ashland School all experienced damage. The flooding from this event caused water contamination in the Town of Windham, causing a boil water advisory for a period of time. Information regarding other areas throughout the county impacted from this event is limited or has not been disclosed in the materials reviewed to develop this plan.

April 3-6, 1987 (FEMA DR-792): Heavy rains from this event caused widespread flooding in southeastern New York State. As much as nine inches of rain fell throughout the Catskill Mountains. Flooding along the Schoharie Creek was the third largest since records began in the early 1900s and was exceeded only by the October 1955 and March 1980 floods. In 1987, NYSEMO estimated that flood damage to homes, businesses, farms, crops, roadways, and bridges in New York State exceeded \$65 million.

In Greene County, the Schoharie Creek at Prattsville had a water discharge of 47,600 cfs and crested to 18.37 feet (6.37 feet above 12-foot flood stage) during this event (USGS, 2008). It was a recorded peak event for the East Kill near Jewett Center, cresting 15.68 feet (USGS, Date Unknown). It also caused significant damages in the Batavia Kill watershed and resulted in approximately \$2 million in property damage to public infrastructure in the West Kill watershed.

January 18-20, 1996 (FEMA DR-1095): Precipitation from a strong storm combined with unseasonably warm temperatures that caused rapid snowmelt, resulted in extensive flooding throughout New York State.

Greene County received between 1.5 and 4.5 inches of rain during this event, resulting in widespread flooding along the major rivers and small streams of the county. The Schoharie Creek at Prattsville experienced its highest flood stage ever documented since the beginning of record floods at the gage in 1904. Floodwaters at the station crested at 19.4 feet (7.4 feet above 12-foot flood stage) with peak flows of 52,800 cfs, reaching its 100-year flood stage and representing “disastrous” flooding. Many residential and commercial properties, infrastructure, roadways, bridges, and transportation systems experienced significant damage throughout the county. In Athens, Coxsackie, and New Baltimore flooding of the Hudson River resulted in multiple evacuations and damage to sewer treatment plants. The Prattsville Water System experienced severe damage. Flooding along the Hudson River damaged several marinas and parks including Riverside Park in Coxsackie, Athens Riverfront Park, and the marina section of New Baltimore. Some of the most severe flooding occurred in Palenville, Athens, Windham, and Lexington. Residents in Palenville were evacuated due to the flooding of Kaaterskill Creek. Road washouts were primarily reported in the mountainous terrain of the county. Eighty-percent of the roads in the Town of Durham suffered damage with six roads washed out. Severely damaged State routes within the county included Routes 42, 214, 296, 32 and 81. Melodywood Condominiums, along the Schoharie Creek in the Village of Hunter, suffered extreme streambank failure from this event, with the immediate safety of the structure and additional adjoining properties threatened.

This event resulted in nearly \$2 million in property damage to public infrastructures in the West Kill watershed. NOAA-NCDC and SHELDUS indicated that Greene County experienced approximately \$10 million in total property damages from this event. With the extent of damage created throughout the County during this event, County and State officials began the preparation and initiation of a series of flood hazard mitigation and stream restoration projects throughout Greene County, particularly along Schoharie Creek, West Kill, Batavia Kill, East Kill and Stony Clove Creek.

September 16, 1999 (Hurricane/Tropical Storm Floyd) (FEMA DR-1296):

New York State experienced approximately \$62.2 million in property damages from this event. In Greene County, rainfall totals ranged between 6.9 inches (Prattsville) and 12.21 inches (Cairo). NOAA NCDC and SHELDUS indicated that Greene County experienced approximately \$3 million in flood damages. Over 12 inches of rain was recorded in Cairo, the most recorded amount of rainfall associated with the storm in the state. The Schoharie Creek at Prattsville had a water discharge of 42,800 cfs and crested to 17.64 feet (5.64 feet above 12-foot flood stage). This event created unstable conditions throughout many rivers and streams of the county and exacerbated the degradation and streambank erosion that was initially created during the January 1996 flood.

May through September 2000 (FEMA DR-1335): Between May and September 2000, multiple severe storm events occurred throughout New York State resulting in significant flooding and over \$34.6 million in damage throughout various New York State counties. In Greene County, NOAA NCDC indicated that flooding during this time period particularly occurred on June 6-7, 2000, when heavy rain fell across the Catskills with as much as 5.77 inches falling in East Jewett in Greene County. A portion of State Route 385 was closed in Athens. In New Baltimore, two roads and culvert bridges were closed as a result of flooding. In Leeds, 23 people had to be evacuated from homes along State Highway 23B as the Catskill creek rose out of its banks. Greene County experienced over \$115,000 in flood damages during this time period.

July 21 through August 15, 2003 (FEMA DR-1486): A series of slow-moving thunderstorms, accompanied by torrential rainfall, caused flash flooding throughout much of New York State, including Greene County. Although \$1 million in damages resulted from a tornado outbreak in July, Greene County suffered the most amount of flood damage in early August.

On August 2, the area experienced severe weather when isolated thunderstorms affected the Catskill region. Approximately four to five inches of rain fell in less than two hours throughout eastern Greene County. The heavy rainfall resulted in flooded roads in both Leeds and Catskill. In Catskill, the Catskill Creek overflowed onto State Highway 23B and a mudslide was reported on Sandy Plain Road. The Poltic Creek overflowed its banks and washed away a small bridge. Homes in the cities of Catskill and Athens took on significant water in their basements. According to NOAA NCDC and SHELDUS, Greene County had approximately \$60,000 in flood damage due to the storms.

Another slow-moving series of thunderstorms developed in the area on August 11, producing torrential rainfall and flooding. In Greene County, portions of Route 296 in Hensonville were

washed out and flooding was noted on Route 23 near Cairo. According to NOAA NCDC and SHELDUS, Greene County had approximately \$15,000 in flood damage due to the series of storms.

April 2-4, 2005 (FEMA DR-1589): A slow moving storm moved up through the Appalachians and into the northeast U.S. The heavy rainfall from this event produced flooding throughout New York, New Jersey, and Pennsylvania (NCDC, 2005). Prior to this storm, the rivers and streams in the area had high flow-rates due to a previous rainstorm on March 28 and snowmelt. This substantially increased flooding and caused additional damage, along with the damage produced by this storm.

The NWS reported the heaviest rain and the worst flooding occurred in Greene and Ulster Counties. The NYS HMP indicated that New York State experienced approximately \$66.2 million in damages from this event.

In Greene County, NOAA NCDC indicated that many municipalities were impacted by floodwaters from this event. The Hamlet of East Jewett experienced the most rainfall, resulting in significant flooding. Many of the county's roads were closed, including: Paul Saxe, Embought, and Mountain Roads in the Town of Catskill and County Routes 77, 23C, 14, and State Route 23A in the Town of Jewett. In Haines Falls, State Route 23A was washed out and Route 32 was under water in Greenville Center. In Leeds, Lexington Road and Route 23B were under water. The Schoharie Creek at Prattsville crested to 17.41 feet (5.41 feet above 12-foot flood stage). The West Kill reached flood stage at 3.0 feet in Spruceton. Rainfall totals throughout the county ranged between 1.5 inches in New Baltimore and 5.54 in East Jewett. According to NOAA NCDC and SHELDUS, Greene County experienced approximately \$1.3 million in flood damages from this event.

June 25 through July 10, 2006 (FEMA DR-1650): This severe storm event resulted in significant flooding that affected much of the Mid-Atlantic region. The flooding was widespread, affecting numerous rivers, lakes, and communities from upstate New York to North Carolina. Rain totals throughout the eastern U.S. ranged from 2 to 17 inches, particularly between June 27 and 29, with the largest accumulations falling in Maryland, Pennsylvania, and New York State. Overall, the storm resulted in over 16 deaths and millions of dollars in damages throughout the affected states.

Some sources indicated that this flooding event was the largest and most costly natural disaster that New York State has encountered since Hurricane Agnes in 1972. The NYS HMP indicated that the counties affected throughout the state experienced approximately \$246.3 million in damages during this flood.

In Greene County, precipitation totals averaged between 3 and 12 inches of rain, with the largest accumulations generated in the south central portion of the county. Rain totals between June 26 and June 30 included: Tannersville (12.20 inches), East Jewett (8.3 inches), Catskill (4.43 inches), and Windham (3.14 inches) (NWS, 2006). Law enforcement personnel reported that several roads in Greene County were closed in and near the Towns of Catskill, Cairo, and Haines Falls due to flooding. Part of Route 23-A remained closed between Palenville and Haines Falls, where a retaining wall gave way. Cost estimates of property damage in Greene County were unavailable in the materials reviewed to develop this plan.

In Greene County, NOAA NCDC indicated that the heavy rain from this event led to widespread flooding of small streams and creeks. Precipitation totals for the county ranged between three and six inches, with the greatest accumulations centrally located in the Towns of Lexington, Jewett, and Hunter. Other sources indicate that specific rainfall totals in Greene County ranged from 3.97 inches in Cairo to 7.9 inches in Tannersville. Numerous roads were closed throughout Greene County, including County Route 61 in Coxsackie, and several roads near Catskill. The Schoharie Creek at Prattsville crested to 12.98 feet (0.98 feet above 12-foot flood stage). The Catskill Creek in the Town of Catskill experienced continued stream bank erosion and migration from this event, which would cost an estimated \$1 to \$1.5 million to restore. A reported landslide occurred along Warren Stein Road in the Town of Cairo.

The Greene County Department of Emergency Services indicated that preliminary storm damage totals eligible for Federal Public Assistance (PA) in Greene County totaled nearly \$472,000; with the Town of Cairo and the Village of Catskill experiencing the most losses. Storm damage totals for Individual Assistance (IA) in the county totaled \$111 million, with the Town and Village of Catskill experiencing the most losses, totaling \$110 million. IA losses to the County were denied by FEMA. Other sources indicate that final losses eligible for PA were estimated at \$1.3 million as a result of flood damage, response and debris removal costs throughout the County. Additionally, final loss estimates to homeowners were tallied at \$547,000. These conflicting monetary figures indicate that a discrepancy exists regarding total damages to the county.

Potential Impact

All types of flooding can cause widespread damage throughout rural and urban areas, including but not limited to: water-related damage to the interior and exterior of buildings; destruction of electrical and other expensive and difficult-to-replace equipment; injury and loss of life; proliferation of disease vectors; disruption of utilities, including water, sewer, electricity, communications networks and facilities; loss of agricultural crops and livestock; placement of stress on emergency response and healthcare facilities and personnel; loss of productivity; and displacement of persons from homes and places of employment.

Any type of agricultural, commercial, residential, and recreational development and natural communities (e.g., wetlands, marshes) located in a floodplain (inland or coastal) are vulnerable to flooding. Increased urbanization, and thus increase in paved surfaces, enhances the threat of flooding where drainage systems cannot cope with the increased input of stormwater runoff and decrease in natural water infiltration into the soil (increasing runoff). In rural areas, property damage caused by flooding can be devastating to farmers. When flooding occurs during the growing season, farmers can suffer widespread crop loss. Livestock farmers may lose livestock if they are unable to find safe ground during rising floodwaters. This threat to agricultural areas is primarily associated with flash flooding.

Flooding can also pose several threats to industrial, residential, and commercial properties. Industrial facilities of all types typically handle and store various quantities of hazardous materials for their operations. These materials can potentially come into contact with flood waters and be released into the environment impacting local water sources, natural resources, and threaten

public health. Buildings can experience significant water-related damage, sometimes beyond repair, due to flooding. Household furnishings and business inventories can be lost if there is not adequate time to remove items to safe locations. In addition to being at risk because of floodwater, people face the threat of explosions and fires caused by leaking gas lines along with the possibility of being electrocuted. Even wild animals, forced out of their homes and brought into contact with humans by floodwaters, can be a threat. Post-flood concerns could include mold growth on structures creating an increased health concern.

Severe flooding can cause extensive damage to public utilities and disruptions to the delivery of services. Loss of power and communications can be expected. Drinking water and wastewater treatment facilities may be temporarily out of operation. Impacts of flooding on transportation are particularly noteworthy. Flooded streets and road blocks make it difficult for emergency vehicles to respond to calls for service. Floodwaters can washout sections of roadway and bridges. Most importantly, the majority of fatalities that occur in floods are the result of people trying to drive on roads covered by floodwaters.

Severe Storms

Description

For the purpose of this Plan the severe storm hazard includes hailstorms, windstorms, thunderstorms, tornadoes, hurricanes, and tropical storms, which are defined below.

Hailstorm: According to the National Weather Service (NWS), hail is defined as a showery precipitation in the form of irregular pellets or balls of ice more than 5 millimeters in diameter, falling from a cumulonimbus cloud. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight; they fall as precipitation, in the form of balls or irregularly shaped masses of ice. The size of hailstones is a direct function of the size and severity of the storm. Hailstorms are a potential damaging outgrowth of severe thunderstorms.

Windstorm: According to the Federal Emergency Management Agency (FEMA), wind is air moving from high to low pressure. It is rough horizontal movement of air (as opposed to an air current) caused by uneven heating of the Earth's surface. It occurs at all scales, from local breezes generated by heating of land surfaces and lasting tens of minutes to global winds resulting from solar heating of the Earth. The two major influences on the atmospheric circulation are the differential heating between the equator and the poles, and the rotation of the planet. Windstorm events are associated with cyclonic storms (e.g., hurricanes), thunderstorms, and tornadoes.

Thunderstorm: According to NWS, a thunderstorm is a local storm produced by a cumulonimbus cloud and accompanied by lightning and thunder. A thunderstorm forms from a combination of moisture, rapidly rising warm air, and a force capable of lifting air such as a warm and cold front, a sea breeze, or a mountain. Thunderstorms form from the equator to as far north as Alaska. These storms occur most commonly in the tropics. Although thunderstorms generally affect a small area when they occur, they are very dangerous because of their ability to generate tornadoes, hailstorms, strong winds, flash flooding, and damaging lightning. A thunderstorm produces wind gusts less than 57 miles per hour (mph) and hail, if any, of less than 3/4-inch diameter (20 millimeters) at the surface. A severe thunderstorm has thunderstorm related surface winds (sustained or gusts) of 57 mph or greater and/or surface hail 3/4-inch (20 millimeters) or larger. Wind or hail damage may be used to infer the occurrence/existence of a severe thunderstorm.

Tornado: A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. It is spawned by a thunderstorm (or sometimes as a result of a hurricane) and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. Tornado season is generally March through August, although tornadoes can occur at any time of year. Tornadoes tend to strike in the afternoons and evening, with over 80 percent of all tornadoes striking between noon and midnight. The average forward speed of a tornado is 30 mph, but can vary from nearly stationary to 70 mph. The NOAA Storm Prediction Center (SPC), indicates that the total duration of a tornado can last between a few seconds to over one hour; however, a tornado typically lasts less than 10 minutes. High-wind velocity and wind-blown debris, along with lightning or hail, result in the

damage caused by tornadoes. Destruction caused by tornadoes depends on the size, intensity, and duration of the storm. Tornadoes cause the greatest damage to structures that are light, such as residential homes and mobile homes, and tend to remain localized during impact.

Tropical Storm: A tropical storm is an organized system of strong thunderstorms with a defined surface circulation and maximum sustained winds between 39 and 73 mph. Once a storm has reached tropical storm status, it is assigned a name. During this time, the storm itself becomes more organized and begins to become more circular in shape, resembling a hurricane. Tropical storms can cause a lot of problems, even without becoming a hurricane; however, most of the problems stem from heavy rainfall.

Hurricane: A hurricane is an intense tropical cyclone with wind speeds reaching a constant speed of 74 mph or more. It is a category of tropical cyclone characterized by thunderstorms and defined surface wind circulation. They are caused by the atmospheric instability created by the collision of warm air with cooler air. They form in the warm waters of tropical and sub-tropical oceans, seas, or Gulf of Mexico. Most hurricanes evolve from tropical disturbances. A tropical disturbance is a discrete system of organized convection (showers or thunderstorms), that originate in the tropics or subtropics, does not migrate along a frontal boundary, and maintains its identity for 24 hours or more. Hurricanes begin when areas of low atmospheric pressure move off the western coast of Africa and into the Atlantic, where they grow and intensify in the moisture-laden air above the warm tropical ocean. Air moves toward these atmospheric lows from all directions and circulates clock-wise under the influence of the Coriolis effect, thereby initiating rotation in the converging wind fields. When these hot, moist air masses meet, they rise up into the atmosphere above the low pressure area, potentially establishing a self-reinforcing feedback system that produces weather systems known to meteorologists as tropical disturbances, tropical depressions, tropical storms, and hurricanes.

Almost all tropical storms and hurricanes in the Atlantic basin (which includes the Gulf of Mexico and Caribbean Sea) form between June 1 and November 30, known as hurricane season. August and September are peak months for hurricane development. The threats caused by an approaching hurricane can be divided into three main categories: storm surge, wind damage, and rainfall/flooding:

- Storm surge is simply water that is pushed toward the shore by the force of the winds swirling around the storm. This advancing surge combines with the normal tides to create the hurricane storm tide, which can increase the mean water level 15 feet or more. Storm surge is responsible for nearly 90 percent of all hurricane-related deaths and injuries.
- Wind damage is the force of wind that can quickly decimate the tree population, down power lines and utility poles, knock over signs, and damage/destroy homes and buildings. Flying debris can also cause damage to both structures and the general population. When hurricanes first make landfall, it is common for tornadoes to form which can cause severe localized wind damage.

Rainfall/flooding: the torrential rains that normally accompany a hurricane can cause serious flooding. Whereas the storm surge and high winds are concentrated around the “eye,” the rain may

extend for hundreds of miles and may last for several days, affecting areas well after the hurricane has diminished.

Previous Occurrences (prior to 2009)

August 29-September 14, 1960 (Hurricane Donna): This event holds the record for retaining "major hurricane" status (Category 3 or greater on the Saffir-Simpson Hurricane Scale) in the Atlantic Basin for the longest period of time on record (a total of 17 days). The storm affected every state along the East Coast, producing hurricane-force winds (up to 115 mph) from South Carolina to Maine. Fifty fatalities were reported in the U.S., with damages totaling approximately \$3 billion (2004 USD). Greene County experienced between 5 and 7 inches of rain.

In Greene County, the impacts of this event fell primarily within the Batavia Kill watershed. The Greene County Soil Conservation Service indicated that the storm was devastating to the Town of Windham, producing in excess of \$750,000 in damages (1960 USD) to over 75 residences, 27 businesses, utilities, seven bridges, and multiple state, county, and town roads. Damages also occurred to the Windham Country Club, two churches, and the Windham Ashland School.

July 10, 1989 (Northeastern U.S. Tornado Outbreak): This event was a series of tornadoes which caused more than \$130 million (1989 USD) in damage across the northeastern U.S. The storm system produced severe weather events that included hail up to 2.5 inches in diameter, thunderstorm winds up to 90 mph, and 17 tornadoes. More than 150 people were injured and one fatality occurred as a result of the tornado outbreak and one fatality occurred as a result of winds.

In New York State, the tornado outbreak reportedly devastated areas from Montgomery County to Greene County, injuring 20 people and causing \$20 million in property damages. Although the SPC archives state that this outbreak was a single tornado, other sources indicate that it was actually three or more tornadoes, each ranking F3 or F4 on the F-Scale. The first tornado to hit the area touched ground three miles east of Ames (Montgomery County), moving southeast. It then passed through the Towns of Carlisle, Howe Caverns, Central Bridge, and Schoharie before lifting. The storm continued traveling southeast for 10 miles, and produced another tornado briefly near Rensselaerville. After another 10 miles, a third tornado touched down in Greenville and Surprise (Greene County). Greene County experienced wind and hail damage. According to SHELDUS, Greene County had approximately \$1.25 million in property damages, \$125,000 in crop damages, and five injuries.

July 14-15, 1995 ("The Ontario-Adirondack Derecho"): On the evening of July 14, thunderstorms producing severe weather occurred over upper Michigan and adjacent portions of Ontario near Sault Saint Marie. By late evening, the storms developed into a bowing line just northwest of the Mackinac Bridge. The thunderstorm gust front hit the bridge and a gust of 90 mph was measured. Sustained winds above 80 mph continued on the bridge for several minutes, which was the beginning of the "Ontario-Adirondacks Derecho." This system caused hundreds of millions of dollars in damage, several deaths, and many injuries as it moved from the Great Lakes region to the Atlantic coast.

As the “Ontario-Adirondacks Derecho” entered New York State on July 15, severe wind damage continued in this area. Winds were estimated to be 100 mph or greater at several points along a band from Jefferson and western St. Lawrence counties. In the Adirondack Mountain region, over 30 campers and hikers in the area had to be removed by helicopter since their paths out of the forest were blocked by thousands of fallen trees. The NYS DEC estimated about 900,000 acres of forest were damaged with a value loss of timber over \$200 million. In the more populated areas of central and eastern New York State, almost \$190 million in damage was done to structures and vehicles. Many mobile homes were overturned and numerous homes and businesses were damaged. Several hundred thousands of people were without power due to the powerful derecho winds. Overall, New York State had five deaths, 11 injuries and nearly \$400 million in damages.

According to NCDC and SHELDUS, Greene County suffered approximately \$66,000 in property damages due to winds from the derecho. The most damage was seen in Coxsackie, Greenville, Haines Falls (Hunter), and New Albany.

January 18-20, 1996 (FEMA DR-1095): Unseasonably warm air ahead of a storm overspread the Northeast on January 18th and 19th. Temperatures reached the mid-50s to the mid and upper-60s. Melting snow and ice break-up during the evening of the 18th caused ice jam flooding across scattered areas of western Pennsylvania and western New York State. The storm brought over two inches of rain from northern West Virginia through Central Pennsylvania and over the Catskill Mountains in New York State. The worst of the flooding began on the 19th, due to the heavy rains causing rapid snow melt. Many drainage basins were overwhelmed and widespread flooding broke out. Thousands of people were forced to evacuate their homes in parts of Ohio, Pennsylvania, West Virginia, New Jersey, Maryland, and New York.

The storm produced damaging winds across eastern New York State, resulting in reports of downed trees, limbs, and power lines, producing \$120,000 in property damage. Overall, this event claimed 10 lives, stranded hundreds of people, damaged or destroyed thousands of homes and businesses, and closed hundreds of roads. The most severely affected region was the Catskill Mountains. More than 4.5 inches of rain fell on at least 45 inches of snow in the Catskill Mountain region during this event and caused major flooding throughout the southeastern section of New York State.

In Greene County, the severe storms downed large limbs in Surprise (Greenville).. According to SHELDUS, Greene County had another \$8,000 in property damage due to wind. The majority of damage was due to flooding along the major waterways of the county. Overall, according to NCDC and SHELDUS, Greene County experienced approximately \$10 million in total property damages from this event.

This storm resulted in a FEMA Disaster Declaration (FEMA DR-1095) on January 24, 1996. Through this declaration, 41 counties were declared eligible for Federal and State disaster funds, including Greene County. Greene County received \$916,839 in IA and \$4.4 million in PA funding (1997 USD).

June 4-8, 1996: Severe thunderstorms entered the region on June 4 as a cold front moved east. Up to one-inch diameter hail fell on several parts of New York State. The storm produced strong winds, downing trees and causing minor damage to homes. On the 5th, unstable weather was reported

throughout the New England states. The storms continued on the 8th, bringing three-quarter inch diameter hail and damaging winds to Greene and Dutchess counties due to thunderstorms. Damage in Greene County included lightning in Palenville and wind and lightning in Coxsackie, resulting in \$29,000 in property damage.

September 16-17, 1999 (Hurricane/Tropical Storm Floyd) (FEMA DR-1296): According to the National Hurricane Center, this event was a large and intense storm that pounded the central and northern Bahama islands, seriously threatened Florida, struck near the coast of North Carolina and moved up the east coast of the U.S. into New England as a tropical storm. It neared the threshold of a Category 5 on the Saffir/Simpson Hurricane Scale as it approached the Bahamas, and caused a flood disaster of immense proportions in the eastern U.S., particularly from the eastern coast of North Carolina through New Jersey. Much of Floyd's impact was due to heavy rainfall, creating major losses from floodwaters throughout the eastern U.S. Common rainfall totals ranged between 4 and 12 inches. Ten states were declared major disaster areas, including New York.

As the remnants of Floyd passed by eastern New York State, strong winds pummeled the region with numerous reports of power outages and downed trees. Some of the reported downed trees were the result of the soft ground due to the excessive amount of rain. According to NWS, rainfall totals for Greene County ranged between 6.9 inches (Prattsville) to 12.21 inches (Cairo). Greene County's damage was mainly a result of flooding.

This storm resulted in a FEMA Disaster Declaration (FEMA DR-1296) on September 19, 1999. Through this declaration, 15 New York counties were declared eligible for Federal and State disaster funds, including Greene County.

May through September 2000 (FEMA DR-1335): Between May and September 2000, multiple severe storm events occurred throughout New York State, resulting in significant flooding and over \$34.6 million in damage throughout the state.

The first series of storms began on May 18, 2000. A strong cold front crossed eastern New York State, bringing very strong winds. This system spawned a line of thunderstorms, producing the largest outbreak of severe weather across eastern New York State in nearly two years. The vast majority of damage was from thunderstorm winds, along with hail damage and two confirmed tornadoes. Thunderstorm winds knocked down large trees and powerlines in multiple counties, including Greene County. In Greene County, shingles were blown off a roof in Cairo. According to NCDC and SHELDUS, Greene County had approximately \$110,000 in property damage due to this storm.

The second series of storms hit the area on June 2, 2000. A powerful cold front moved across eastern New York State, bringing an unstable air mass in front of a cold front. This generated straight line thunderstorm winds and hail and caused widespread severe weather damage. In Greene County, one-inch diameter hail was reported in Catskill. According to NCDC and SHELDUS, Greene County had approximately \$23,000 in property damage from this storm.

On June 6, 2000, an area of low pressure developed over the Delmarva Peninsula. The storm tracked up the coast and became a full-blown Nor'Easter. Tropical moisture was trapped and

produced a very heavy rainstorm across eastern New York State, mainly from Albany southward. Albany had a total of 3.5 inches fall on June 6, while heavier rain fell across the Catskills with as much as 5.77 inches falling in East Jewett (Greene County). Many roads and bridges were closed throughout Greene County due to flooding. According to NCDC and SHEL DUS, Greene County had approximately \$115,000 in property damage from this storm, mainly related to flooding.

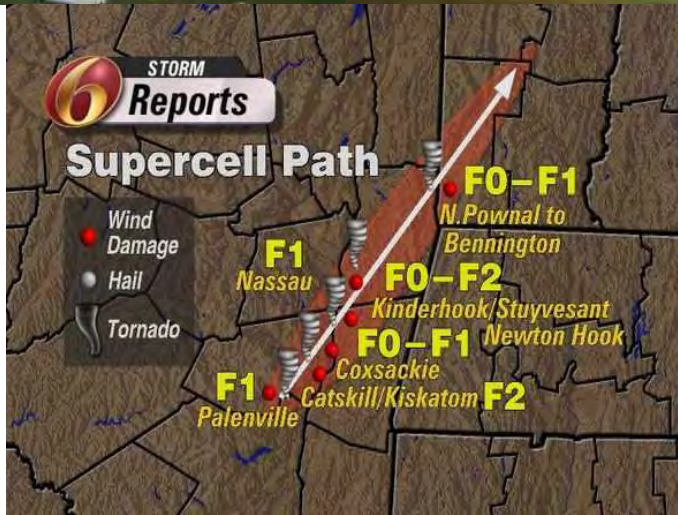
On August 3, 2000, numerous thunderstorms developed, producing dime size hail to a couple of New York State counties, including Greene County. Many other reports were in relation to wind damage. Many trees and power lines were down in several counties. In Greene County, a man was struck by lightning at the Earlton Hill Campground in Coxsackie. Cost estimates of property damage in Greene County were unavailable in the materials reviewed to develop this plan.

These storms resulted in a FEMA Declaration Disaster (FEMA DR-1335) on July 21, 2000. Through this declaration, 27 counties were declared eligible for Federal and State disaster funds, including Greene County. According to the Schoharie Creek SMP, Greene County received approximately \$176,596 in disaster aid from this event.

July 21-August 13, 2003 (FEMA DR-1486): A series of slow-moving thunderstorms accompanied by torrential rainfall caused a tornado outbreak and flash flooding throughout much of New York State, including Greene County. This system produced a significant severe weather outbreak and the largest tornado outbreak since May 1998.

The first line of thunderstorms worked across the region during the afternoon of July 21. This line of storms produced spotty wind damage and downed trees and wires across several New York counties, including Greene County. The heavy rainfall caused torrential rains and flash flooding in some areas. During the evening hours of July 21, a stronger line of storms moved east from central to eastern New York State. One cell broke loose from the line of thunderstorms and became a supercell as it reached the mid-Hudson Valley, spawning a significant tornado. The tornado initially touched down in southeastern Greene County and produced a discontinuous path of 17 miles in the County. The tornado left a swath of destruction, including hundreds of trees uprooted and power and telephone wires down. Many roads in the county were impassable due to debris.

As the storm moved into Greene County, an F1 tornado (about 50 yards wide and a half-mile long) touched down in Palenville, near Pennsylvania Avenue. The tornado then touched down in the hamlet of Kiskatom in the town of Catskill. The storm damage in Kiskatom was rated F2, with a path width of 100 yards and a length of over one mile. Several houses were damaged beyond repair and several mobile homes were destroyed. Seven people were injured as a result of this tornado in Kiskatom.



(Source: Greene County Emergency Services)

Figure A-1: 2003 Tornado in Greene County

The tornado path continued into Athens, where it was rated between an F0 and an F1. It had a path width of 50 yards and a length of one-half mile. In Coxsackie, the tornado was an F1 and caused damage to trees and a manufactured home. The total discontinuous path length of tornadic damage in Greene County was approximately 17 miles. At the height of the storm, 6,000 residents in Greene County were without power. The areas that saw the most damage from this storm was Pennsylvania Avenue in Palenville; Route 23 in Kiskatom; the flats at Lasher's Farm on Cauterskill Road; Paul Saxe Road; and Vedder Road. In Catskill, firefighters responded to reports of downed wires and trees, some on Woodland Avenue. According to NCDC and SHELDUS, Greene County had over \$1.1 million in property damage due to the storms.

On August 2, the area experienced another severe weather event when isolated thunderstorms affected the Catskill region. Approximately 4 to 5 inches of rain fell in less than two hours throughout eastern Greene County. This heavy rainfall resulted in flooded roads in both Leeds and Catskill. In Catskill, the Catskill Creek overflowed onto State Highway 23B and a mudslide was reported on Sandy Plain Road. The Poltic Creek overflowed its banks and washed away a small bridge. Homes in the cities of Catskill and Athens took on significant water in their basements.

According to NCDC and SHELDUS, Greene County had approximately \$60,000 in property damage due to the storms.

Another slow-moving series of thunderstorms developed in the area on August 11, producing flooding rains. A first batch of storms caused flooding in Greene County, washing out portions of Route 296 in Hensonville (Greene County). Flooding was also noted on Route 23 near Cairo, also in Greene County.

April 2-4, 2005 (FEMA DR-1589): A slow moving storm moved up through the Appalachians and into the northeast U.S. The heavy rainfall from this event produced flooding in parts of New York, New Jersey, and Pennsylvania. Prior to this storm, the rivers and streams in the area already had high flow-rates due to a previous rainstorm on March 28 and a snowmelt; therefore, flooding increased substantially and created additional damage as a result of this April storm.

In New York State, the heaviest rain and worst flooding reportedly occurred in Ulster and Greene Counties. The NYS HMP indicated that the State experienced approximately \$66.2 million in damages from this event. Rainfall totals for Greene County ranged between 1.5 inches in New Baltimore to 5.54 inches in East Jewett. According to NCDC and SHELDUS, Greene County experienced approximately \$1.3 million in flood damages from this event. The flood impact and losses of this event are further discussed in more detail in Section 5.4.1 (2009 plan) (Flood).

This storm resulted in a FEMA Disaster Declaration (DR-1589) on April 19, 2005. Through this declaration, 20 counties were declared eligible for Federal and State disaster funds, including Greene County. In a September 14, 2005 Press Release, FEMA indicated that nearly \$35 million in disaster aid was made available to all declared counties as result of this event. In this press release, FEMA approved \$1.1 million in Public Assistance (PA) reimbursements for the Towns of Cairo, Coxsackie, Durham, Greenville, Halcott, Hunter, Jewett, Lexington, New Baltimore, Prattsville and Windham; the Villages of Catskill, Hunter and Tannersville; and the East Durham, Lexington and Palenville fire departments. However, documentation provided by FEMA to Greene County Department of Emergency Services indicated that as of June 1, 2005, the County was approved for over \$2.2 million in PA reimbursements. Aid was provided for various restoration and mitigation project costs generated as a result of flood damages during this event; particularly in the Towns of Hunter, Jewett, and Tannersville.

June 26-July 10, 2006 (FEMA DR-1650): This severe storm event resulted in a significant flood that affected much of the Mid-Atlantic region. The flooding was widespread, affecting numerous rivers, lakes, and communities from upstate New York to North Carolina. Rain totals across the affected states ranged between 2 and 16.67 inches. Overall, the storm resulted in over 16 deaths and millions in damages throughout the affected states.

Some sources indicated that this flooding event was the largest and most costly natural disaster that New York State has encountered since Hurricane Agnes in 1972. The NYS HMP indicated that the counties affected throughout the state experienced approximately \$246.3 million in damages during this flood.

In Greene County, precipitation totals averaged between 3 to 10 inches of rain, with largest accumulations generated in the south central portion of the county. Rain totals from June 26 through June 30, 2006 included: Tannersville (12.20 inches), East Jewett (8.3 inches), Catskill (4.43 inches), and Windham (3.14 inches). The heavy rain led to widespread flooding throughout the county.

April 14-18, 2007 (FEMA DR-1692): An intense and powerful Nor'Easter brought flooding rains and heavy wet snowfall to the northeast U.S. Rainfall totals of six to eight inches were reported across the eastern Catskill Mountains, mid-Hudson Valley and western New England, resulting in widespread flooding. Snowfall accumulations of one to 1 1/2 feet were reported across the southern Adirondacks, eastern Catskills, Berkshires, and southern Green Mountains. The combined effects of high winds and heavy rainfall during this event led to flooding, storm damages, power outages and evacuations, and disrupted traffic and commerce.

Various counties in the eastern Catskills and Mid-Hudson Region of New York State were impacted by several inches of rain during this event. New York State experienced between \$12.8 and \$60 million in damages from this event. In Greene County, the heavy rains led to widespread flooding of small streams and creeks across the county. Rainfall totals ranged from 3.97 inches in Cairo to 7.9 inches in Tannersville.

Severe Winter Storms

Description

For the purpose of this plan severe winter storm hazards include heavy snow, blizzards, sleet, freezing rain, ice, and extreme cold. Since most extra-tropical cyclones, particularly northeasters (or Nor'Easters), generally take place during the winter weather months (with some exceptions), Nor'Easters have also been grouped as a type of severe winter weather storm in this section. In addition, for the purpose of this plan and as consistent with the New York State HMP, extreme cold temperature events were grouped into this hazard profile as well. These types of winter events or conditions are further defined below.

Heavy Snow: According to NWS, heavy snow is generally snowfall accumulating to 4 inches or more in depth in 12 hours or less; or snowfall accumulating to 6 inches or more in depth in 24 hours or less. A snow squall is an intense, but limited duration period of moderate to heavy snowfall (e.g., snowstorm), accompanied by strong, gusty surface winds and possibly lightning (generally moderate to heavy snow showers). Snowstorms are complex phenomena involving heavy snow and winds, whose impact can be affected by a great many factors, including a region's climatological susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, and occurrence during the course of the day, weekday versus weekend, and time of season.

Blizzard: Blizzards are characterized by low temperatures, wind gusts of 35 miles per hour (mph) or more and falling and/or blowing snow that reduces visibility to 0.25 miles or less for an extended period of time (three or more hours).

Sleet or Freezing Rain Storm: Sleet is defined as pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These pellets of ice usually bounce after hitting the ground or other hard surfaces. Freezing rain is rain that falls as a liquid but freezes into glaze upon contact with the ground. Both types of precipitation, even in small accumulations, can cause significant hazards to a community.

Ice Storm: An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous, and can create extreme hazards to motorists and pedestrians.

Nor'Easter: Nor'Easters, named for the strong northeasterly winds blowing in ahead of the storm, are also referred to as a type of extra-tropical cyclone. A Nor'Easter is a macro-scale extra-tropical storm whose winds come from the northeast, especially in the coastal areas of the Northeastern U.S. and Atlantic Canada. More specifically, it describes a low pressure area whose center of rotation is just off the coast and whose leading winds in the left forward quadrant rotate onto land from the northeast. Wind gusts associated with these storms can exceed hurricane force in intensity. Unlike tropical cyclones that form in the tropics and have warm cores (including tropical depressions, tropical storms, and hurricanes), Nor'Easters contain a cold core of low barometric pressure that forms in the mid-latitudes. Their strongest winds are close to the earth's surface and they often measure several hundred miles across. Nor'Easters may occur at any time of the year but are most common during the fall and winter months (September through April).

Nor'Easters can cause heavy snow, rain, gale force winds, and storm surge that can cause beach erosion, coastal flooding, structural damage, power outages, and unsafe human conditions. If a Nor'Easter stays just offshore, the results are much more devastating than if the cyclone meanders up the coast on an inland track. Nor'Easters that stay inland are generally weaker and only cause strong wind and rain. Those that stay offshore can bring heavy snow, blizzards, ice, strong winds, high waves, and severe beach erosion. In these storms, the warmer air is aloft. Precipitation falling from this warm air moves into the colder air at the surface, causing crippling sleet or freezing rain.

If a significant pressure drop occurs within a Nor'Easter, this change can turn a simple extra-tropical storm into what is known as a "bomb." "Bombs" are characterized by a pressure drop of at least 24 millibars within 24 hours (similar to a rapidly-intensifying hurricane). Even though "bombs" occasionally share some characteristics with hurricanes, the two storms have several differences. "Bombs" are extra-tropical, and therefore, are associated with fronts, higher latitudes, and cold cores. They require strong upper-level winds, which would destroy a hurricane.

Extreme Cold: Extreme cold events are when temperatures drop well below normal in an area. Extremely cold temperatures often accompany a winter storm, so individuals may have to cope with power failures and icy roads. Although staying indoors as much as possible can help reduce

the risk of car crashes and falls on the ice, individuals may also face indoor hazards. Many homes will be too cold—either due to a power failure or because the heating system is not adequate for the weather. When people must use space heaters and fireplaces to stay warm, the risk of household fires and carbon monoxide poisoning increases.

What constitutes extreme cold and its effects can vary across different areas of the country. In regions relatively unaccustomed to winter weather, near freezing temperatures are considered “extreme cold.” Exposure to cold temperatures, whether indoors or outside, can lead to serious or life-threatening health problems such as hypothermia, cold stress, frostbite, or freezing of the exposed extremities such as fingers, toes, nose and ear lobes.

According to the NOAA National Severe Storms Laboratory (NSSL), every year winter weather indirectly and deceptively kills hundreds of people in the U.S., primarily from automobile accidents, overexertion, and exposure. Winter storms are often accompanied by strong winds creating blizzard conditions with blinding wind-driven snow, drifting snow, extreme cold temperatures, and dangerous wind chill. They are considered deceptive killers because most deaths and other impacts or losses are indirectly related to the storm. People can die in traffic accidents on icy roads, heart attacks while shoveling snow, or of hypothermia from prolonged exposure to cold. Wind Chill is not the actual temperature but rather how wind and cold feel on exposed skin. As the wind increases, heat is carried away from the body at an accelerated rate, driving down body temperature. Animals are also affected by wind chill; however, cars, plants, and other objects are not. Heavy accumulations of ice can bring down trees and power lines, disabling electric power and communications for days or weeks. Heavy snow can immobilize a region and paralyze a city, shutting down all air and rail transportation and disrupting medical and emergency services. Storms near the coast can cause coastal flooding and beach erosion as well as sink ships at sea. The economic impact of winter weather each year is huge, with costs for snow removal, damage, and loss of business in the millions.

Also, winter storms can generate coastal flooding, ice jams, and snow melt, resulting in significant damage and loss of life:

- Coastal Floods: Winds generated from intense winter storms can cause widespread tidal flooding and severe beach erosion along coastal areas.
- Ice Jams: Long cold spells can cause rivers and lakes to freeze. A rise in the water level or a thaw breaks the ice into large chunks that become jammed at manmade and natural obstructions. Ice jams can act as a dam, resulting in severe flooding.
- Snowmelt: Sudden thaw of a heavy snow pack often leads to flooding.

Previous Occurrences (prior to 2009)

March 11-14, 1888 (“Blizzard of ’88” or “Great White Hurricane”): The “Blizzard of ’88,” remains perhaps the most infamous and unpredictable of all Northeast snowstorms. This event paralyzed the east coast of the United States and Atlantic Canada from the Chesapeake Bay to Maine, and including the Maritime Provinces of Eastern Canada. Telegraph infrastructure was disabled, isolating New York City, Boston, Philadelphia, Baltimore, and Washington, D.C. for days.

Two hundred ships were grounded and at least 100 seamen died. Fire stations were immobilized; property losses from fire alone were estimated at \$25 million. Overall, more than 400 deaths were reported. Sources vary, but NWS estimated that 40 inches of snow covered New York and New Jersey. Winds blew up to 48 mph, creating snowdrifts 40 to 50 feet high. It was identified that over 20 to 50 inches of snow had accumulated within various locations of Greene County. Cost estimates of property damage in Greene County were unavailable in the materials reviewed to develop this plan.

February 2-5, 1961: This 1961 storm produced a maximum of 40 inches of snow in central New York. A large area of 1 to 2 feet of snow accumulated across central New York and northeast Pennsylvania. In Greene County, 10 to 20 inches of snow fell during this event, resulting in over \$80,000 in property damages.

October 4, 1987 (FEMA DR-801): This northeastern coastal storm broke records by dumping heavy, wet snow over eastern New York, Vermont, and western portions of Connecticut and Massachusetts. From the Catskills and Berkshires of upstate New York to the Green and White Mountains of Vermont and New Hampshire, the snow transformed the landscape, isolating entire communities. This event was the earliest snow for the season on record in eastern New York since 1870. Throughout the four state area, the snow brought down power lines, resulting in a loss of electricity to about 333,000 customers, closed roads and airports, and brought down an untold number of trees and tree limbs that were still in full leaf. Many vehicles were damaged by the falling trees and limbs and many weather related traffic accidents resulted in death and injury.

In New York State, leaf-laden trees caught falling snow and the weight snapped branches and toppled trees across power lines and roads. Many highways and a 26-mile stretch of the Thomas E. Dewey Thruway were closed, and power failures hit 230,000 homes in New York State. Many traffic accidents were reported throughout the region and motorists were warned to stay off roads. Emergencies were declared in some communities in the Hudson Valley, and thousands of people were stranded at homes and weekend retreats. Crops of apples, peppers, eggplant, and sweet corn were reported damaged. The heaviest snow, 20 inches, was reported at East Jewett, in Greene County. Elsewhere in New York State, NWS reported accumulations of up to 15 inches in Ulster County, 13 inches in Rensselaer County, 12 inches in the Catskills, and 10 inches in Columbia County. Overall, New York State experienced approximately \$13.5 million in eligible damages. Cost estimates of property damage in Greene County were unavailable in the materials reviewed to develop this plan.

This storm resulted in a FEMA Disaster Declaration (FEMA DR-801) on November 10, 1987. Through this declaration, nine counties were declared eligible for federal and State disaster funds including Greene County. Disaster aid for Greene County has not been disclosed in the materials reviewed to develop this plan.

March 12-15, 1993 (“Superstorm of 1993,” “Storm of the Century,” or “Great Storm of 1993”) (FEMA EM-3107): This storm was identified as both a Nor’Easter and a blizzard by many sources. It was a massive storm complex, affecting at least 26 states and much of eastern Canada. The March 1993 storm is listed among the NOAA Top Billion Dollar Weather Disasters, reportedly causing a

total of \$6.6 billion in damages along the eastern coast of the U.S. and resulting in over 270 fatalities (23 fatalities in New York State). According to the NYS HMP and NYSEMO, this blizzard resulted in total eligible damages of approximately \$8.5 million through New York State.

Achieving a NESIS rating of 12.52, the "Storm Of The Century" ranks as an "Extreme" snow event. With a total area impacting, at its peak, from Maine to Florida, a final total of 5 to 50 inches of snowfall, along with hurricane force winds, this storm ground most of the Eastern seaboard to a halt for days. Total snowfall accumulations for Greene County were between 20 and 40 inches, with Prattsville receiving over 36 inches of snow. Cost estimates of property damage or losses in Greene County were unavailable in the materials reviewed to develop this plan.

This storm resulted in a FEMA Emergency Declaration (FEMA EM-3107) on March 17, 1993. Through this declaration, multiple counties were declared eligible for federal and State disaster public assistance funds. Disaster aid for Greene County has not been disclosed in the materials reviewed to develop this plan.

January 6-9, 1996 (FEMA DR-1083) ("Blizzard of '96"): Much of the eastern U.S. seaboard, from Tennessee to Maine, was affected by this blizzard. Many areas received between 1 and 3 feet of snow during this storm. This blizzard achieved a NESIS rating of 11.54, placing the storm in the "Extreme category." A total of 4 to 40 inches of snow fell along the storm's path, with the highest accumulations in the states of Pennsylvania, New Jersey, New York, Maryland, Virginia, and West Virginia.

The major effects from this storm in New York State were felt across the southeastern sections of the state, resulting in property damages ranging from \$21.3 to \$70 million. The Albany NWS forecast office reported that snowfalls ranged from half an inch at Albany to isolated amounts over 30 inches in Dutchess and Berkshire counties. Snowfalls ranged from 10 to 20 inches with 6- to 10-foot drifts in Berkshire County, Massachusetts; Litchfield County, Connecticut; and Greene, Columbia, Delaware, Ulster, Sullivan, and Dutchess counties in New York. States of Emergency were declared in Litchfield, Pittsfield, Berkshire, Dutchess, Columbia, and Ulster counties. Some sources indicate that Greene County experienced as much as 30 inches of snow during the blizzard. The county also experienced extreme cold temperatures during the blizzard, ranging from -2 to -20 degrees Fahrenheit, mostly in the Towns of Lexington and Prattsville. Greene County experienced approximately \$160,000 in property damages during this event.

This storm resulted in a FEMA Disaster Declaration (FEMA DR-1083) on January 12, 1996. Through this declaration, 19 counties were declared eligible for federal and State disaster funds, including Greene County. Disaster aid for Greene County has not been disclosed in the materials reviewed to develop this plan.

March 31-April 1, 1997 ("April Fool's Nor'Easter"): An intensifying storm off the Mid-Atlantic coast brought record-setting snow to portions of the Northeast. Snowfall amounts of 12 inches and higher covered northeast Pennsylvania, northwestern New Jersey, eastern New York, and central New England. Snowfall amounts of 24 inches and higher covered the northern Catskill Mountain region of New York and central and eastern Massachusetts. The storm also brought high winds,

with peak winds between 30 and 50 mph. The storm achieved a NESIS rating of 2.37, placing the storm in the 'Notable' category. The wet snow and strong winds brought down many trees and caused widespread power outages throughout the New York State counties affected. Overall, the affected counties of the state experienced over \$7.8 million in property damages from this storm. Snow accumulations totaled 20 to 40 inches in Greene County, with East Jewett receiving 37 inches of snow; the highest accumulations recorded in the state. Additionally, Windham received 30 inches and Prattsville received 29 inches of snow. Over 30,000 customers within Greene County lost power during this event. A State of Emergency was declared in Greene, Schoharie, and Dutchess counties. Greene County experienced approximately \$709,090 in property damages during this event.

March 4-7, 2001: A major snowstorm caused snow to fall at a rate of one inch per hour, respectively, throughout the northeastern U.S. over a 2-day period of time. High winds caused snowdrifts and whiteout conditions in many parts of southern and central New York State. Achieving a NESIS rating of 3.53, this event places itself in the 'Significant' category.

The heaviest snowfall from this event fell across Pennsylvania, New York State, and New England. Snowfall totals for Greene County ranged from 10 to 30 inches. Prattsville received 25 inches, Windham received 26 inches, and East Jewett received 21 inches of snow. Cost estimates of property damage or losses throughout the state, including Greene County, were unavailable in the materials reviewed to develop this plan.

December 24-26, 2002 and January 2-4, 2003 (FEMA EM-3173): Two major storm systems extending through the northeastern U.S. on December 25-26, 2002 and January 3-4, 2003. The first storm, December 25-26, 2002, began as light snow and later on, heavy snow began to fall across central NY. Snowfall rates were several inches an hour, resulting in snow amounts ranging from 8 inches to 3 feet. Many New York counties declared state of emergencies, including Greene County. Snowfall totals in Greene County ranged between 10 to 40 inches during the December event. Snowfall totals for certain locations in Greene County included: Prattsville (29 inches), Ashland (16 inches), Catskill (16 inches), Platte Cove (23.2 inches), Windham (20 inches), and Cairo (18.3 inches) (NOAA, 2002). Achieving a NESIS rating of 4.42, this event placed itself in the 'Major' category (Figure 5.4.3-13) (Kocin and Uccellini, 2004).

Earthquakes

Description

An earthquake is the sudden movement of the Earth's surface caused by the release of stress accumulated within or along the edge of the Earth's tectonic plates, a volcanic eruption, or by a manmade explosion (Federal Emergency Management Agency [FEMA], 2001; Shedlock and Pakiser, 1997). Most earthquakes occur at the boundaries where the Earth's tectonic plates meet (faults); however, less than 10 percent of earthquakes occur within plate interiors. New York is in an area where plate interior-related earthquakes occur. As plates continue to move and plate boundaries change over geologic time, weakened boundary regions become part of the interiors of the plates.

These zones of weakness within the continents can cause earthquakes in response to stresses that originate at the edges of the plate or in the deeper crust (Shedlock and Pakiser, 1997).

The location of an earthquake is commonly described by its focal depth and the geographic position of its epicenter. The focal depth of an earthquake is the depth from the Earth's surface to the region where an earthquake's energy originates (the focus or hypocenter). The epicenter of an earthquake is the point on the Earth's surface directly above the hypocenter (Shedlock and Pakiser, 1997). Earthquakes usually occur without warning and their effects can impact areas of great distance from the epicenter (FEMA, 2001).

Previous Occurrences (prior to 2009)

November 18, 1755 ("Cape Ann Earthquake"): This earthquake, also known as the "Cape Ann Earthquake" impacted areas from Halifax, Nova Scotia, south to the Chesapeake Bay in Maryland and from Lake George, New York, east to a ship 320 kilometers east of Cape Ann. The largest impact was felt in Massachusetts, particularly in Cape Ann and Boston. In Boston, much of the damage was confined to areas near the wharfs. Many homes were damaged, with fallen chimneys and roof damage. Homes outside of the Boston area reported their stone fences were thrown down. Many temporary springs were formed that dried up. The ground was cracked in various locations throughout Massachusetts.

Additionally, several aftershocks occurred throughout the area resulting in minimal damage (Stover and Coffman, 1993). Figure 5.4.5-14 illustrates the epicenter of the Cape Ann Earthquake. Details regarding the impact of the earthquake in Greene County were unavailable in the materials reviewed to develop this plan.

August 10, 1884: The August 10, 1884 earthquake was felt over 70,000 square miles, extending along the Atlantic Coast from southern Maine to central Virginia and westward to Cleveland, Ohio. It was a strong earthquake, with the epicenter located at a distance of approximately 17 miles from New York City (NYCEM, 2003).

Property damage was severe at Amityville and Jamaica, New York, where several chimneys were overturned and large cracks formed in walls. Two chimneys were thrown down and bricks were shaken from other chimneys at Stratford (Fairfield County), Connecticut; water in the Housatonic River was agitated violently. Many other chimneys and walls were downed or damaged in Bloomfield, New Jersey; Mount Vernon, New York; and Allentown, Chester Easton, and Philadelphia Pennsylvania.

Three aftershocks occurred on August 10th, the second of which was most violent. Several slight aftershocks were also reported on August 11, 1884 (Stover and Coffman, 1993). According to NYCEM, this earthquake remains the best documented earthquake for the New York City region. Details regarding the impact of the earthquake in Greene County were unavailable in the materials reviewed to develop this plan.

September 5, 1944: An intensity VII earthquake was felt over 172,000 square miles in the U.S., including all of the New England states, Delaware, Maryland, New Jersey, New York, Pennsylvania, and parts of Michigan and Ohio. Parts of Illinois, Indiana, Virginia, West Virginia, and Wisconsin all reported feeling tremors (Stover and Coffman, 1993).

As identified in Figure 5.4.5-16, the epicenter was located between Massena, New York and Cornwall, Ontario, Canada. It caused an estimated \$2 million in damaged between the two cities. With an intensity of VIII (Figure 5.4.5-16), the shock damaged (or destroyed) about 90-percent of the chimneys in Massena. The damage effects were similar in Cornwall as well (Lamantagne and Halchuck, 2001).

Although Greene County was located within the earthquakes range; details regarding the impact of the earthquake in the County were unavailable in the materials reviewed to develop this plan.

April 20, 2002 (FEMA DR-1415): A moderate earthquake occurred about 15 miles southwest of Plattsburgh, New York. The earthquake was felt widely across the northeastern U.S., Mid-Atlantic States and southern Canada, including Montreal, Quebec (USGS, 2002). Boston, Massachusetts; Bangor, Maine; Washington, D.C.; Cleveland, Ohio; and Baltimore, Maryland were among the cities that experienced indirect impacts from this event (Cappiello and Tilghman, 2002).

In New York State, this was the largest earthquake in nearly 20 years with an intensity of 5.1 on the Richter scale and resulted in widespread impacts. Governor George Pataki declared a state of emergency in Clinton and Essex Counties, after feeling the earthquake in Albany (Cappiello and Tilghman, 2002).

Overall damage within the State included tipped chimneys and cracked roads; however, no injuries were reported. Road damage and closures were reported at Keeseville and Au Sable Forks (Essex County). Chimney damage was reported in Lake Placid (Essex County). The Township of Jay (Essex County), there was bridge damage and a reported landslide. Slight damage was reported at Blue Mountain Lake, Indian Lake, Minerva, and North River. The earthquake was also felt in Adirondack, Childwold, Moriah Center, Newcomb, North Creek, Old Forge, Olmstedville, Piercefield, Severance, Wanakena, and many other localities of upstate New York, most reporting at an intensity of V (USGS, 2002).

In Greene County, reports of having felt the earthquake were noted in Athens, Coxsackie, and Catskill (USGS, 2002). Details regarding the impact of the earthquake in Greene County were unavailable in the materials reviewed to develop this plan. Additionally, two aftershocks were felt the morning of the earthquake, which registered 2.2 on the Richter scale. Seven seismographs were set up around the epicenter of the earthquake to gauge activity and pick up data that could help seismologists gain a better understanding of earthquakes (Hughes, 2002).

This earthquake resulted in a FEMA Disaster Declaration (FEMA DR-1415) on May 16, 2002. Through this declaration, the following Counties were declared eligible for federal and State disaster public assistance funds: Clinton, Essex, Franklin, Hamilton, Warren and Washington. Greene County was not declared eligible for assistance from this FEMA disaster.

Landslides

Description

Landslides are a type of slope failure, resulting in a downward and outward movement of rock, debris or soil down a slope under the force of gravity (New York State Disaster Preparedness Commission [NYSDFPC], 2008). They are one of the forms of erosion called mass wasting, which is

broadly defined as erosion involving gravity as the agent causing movement. Because gravity constantly acts on a slope, landslides only occur when the stress produced by the force of the gravity exceeds the resistance of the material (Organization of American States [OAS], 1991).

Landslides consist of free-falling material from cliffs, broken or unbroken masses sliding down mountains or hillsides, or fluid flows. Materials can move up to 120 miles per hour (mph) or more, and slides can last a few seconds or a few minutes, or can be gradual, slower movements over several hours or days. There are several different types of landslides including:

- Rock Falls: a mass detaches from a steep slope or cliff and descends by free-fall, bounding, or rolling.
- Rock Topples: a mass tilts or rotates forward as a unit.
- Slides: a mass displaces on one or more recognizable surfaces, which may be curved or planar.
- Flows: a mass moves downslope with a fluid motion. A significant amount of water may or may not be part of the mass (OAS, 1991).

Landslides can occur naturally or be triggered by human-related activities. Naturally-occurring landslides can occur on any terrain, given the right condition of soil, moisture, and the slope's angle. They are caused from an inherent weakness or instability in the rock or soil combined with one or more triggering events, such as heavy rain, rapid snow melt, flooding, earthquakes, vibrations and other natural causes. Other natural triggers include the removal of lateral support through the erosive power of streams, glaciers, waves, and longshore and tidal currents; through weathering, and wetting, drying and freeze-thaw cycles in surficial materials; or through land subsidence or faulting that creates new slopes (International Union of Geological Sciences [IUGS], Date Unknown). Long-term climate change can influence landslide occurrences through increased precipitation, ground saturation, and a rise in groundwater level, which reduces the strength and increases the weight of the soil (City of Homer, 2004; U.S. Search and Rescue Task Force [USSARTF], 2007; USGS, 2005).

Landslides can also be induced, accelerated or retarded by human actions. Human-related causes of landslides can include grading, terrain/slope cutting and filling, quarrying, removal of retaining walls, lowering of reservoirs, vibrations from explosions, machinery, road and air traffic and excessive development. Normally stable slopes can fail if disturbed by development activities. Often, a slope can also become unstable by earthmoving, landscaping, or vegetation clearing activities (New Jersey Office of Emergency Management [NJOEM], 2005; IUGS, Date Unknown). Changing drainage patterns, groundwater level, slope and surface water through agricultural or landscape irrigation, roof downspouts, septic-tank effluent or broken water or sewer lines can also generate landslides (City of Homer, 2004; USSARTF, 2007).

Due to the geophysical or human factors that can induce a landslide event; they can occur in developed areas, undeveloped areas, or any areas where the terrain was altered for roads, houses, utilities, buildings, and even for lawns in one's backyard. Landslides occur in all fifty states with

varying frequency. More than half the states have rates sufficient to be classified as a significant natural hazard (American Planning Association, 2007). Depending on where the landslides occur, they can pose significant risks to health and safety or interruption to transportation and other services (Northern Virginia Regional Commission [NVRC], 2006; NYSDPC, 2008).

Previous Occurrences (prior to 2009)

Appendix D: Mitigation Actions

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Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
1	Greene County Emergency Services	Emergency Communications Infrastructure Mitigation Program	Greene County's emergency communications system is susceptible to natural hazards (flooding, snow storms, severe storms, landslides, fires). Communications between the 911 center and emergency responders at risk; residents, second home owners and tourists are all affected by any compromise in the system.	New radio transmission system to ensure continuity of critical services through installation of dedicated redundant communication lines between the 911 center and each tower. The system will enhance the reliability and resilience of communications infrastructure by increasing the number of towers to maximize coverage within the county. Dedicated fiber optic lines will provide additional redundancy. The system will also enhance weather monitoring which will help improve early warning capabilities.	In Progress	High	Most of the basic infrastructure that needs to be put in place for this project is estimated to be	\$12 million	DHS Homeland security grant
2	Greene County Emergency Services	Public Awareness Campaign	Improved awareness of the potential damages that can be caused by a natural disaster. Interest and awareness about hazard mitigation may lose momentum after big storms and after the plan update process wraps up, so the County will continue efforts to bring up the topic.	Reach out to towns and villages (and for distribution of information to general public) through their Planning Board meetings, workshops that happen after their meetings and Workshops; radio interviews (similar to the ones done in 2015), public access channel piece. Greene County will look into billboards and inviting FEMA/NYS OEM to meetings.	Proposed Project	Medium	One event/action every summer and every winter	Staff time	PDM
3	Greene County Emergency Services	Hazardous Cargo Plan	Concern about hazardous cargo and potential for spills on CSX line	There's a County Steering Committee working with a State Steering Committee on a plan (with 20 other counties) on a plan which will go into effect in early January. The State will then provide supplies and training to assist with the implementation of the plan.	In Progress	High	Plan in effect from March, 2016	Staff time	NYSDEC
4	Greene County Highway Department	County Road 2 Relocation, Town of Lexington, Greene County	County Route 2 between the Falke Quarry (privately owned soil mining operation) and the Mosquito Point Bridge (connecting CR 2 to State Route 23A is located within the 100 year flood plain of the Schoharie Creek for a distance of 2800 feet. It is the only practical access to the Falke-Cobleskill Quarry which is the primary source for soil materials for the construction industry in the western section of Greene County. The highway has been damaged in a number of storms including Hurricane Irene.	Relocate 2900 feet of two lane County highway section to current County standards. This will include replacement of a 12 foot box culvert carrying a small tributary to the Schoharie creek, storm water detention or retention practices, new subgrade, full depth asphaltic road surface and guiderail as warranted. This project will remove this often damaged highway section outside the 100 year flood plain thus avoiding future effort and cost to repair it. It will also greatly increase the reliability of this access to a major private business.	Proposed Project	High	Ongoing conversation with CWC and DEP with no success so far in securing funding	\$2.5 million	PDM/HMGP
5	Greene County Highway Department	Bridge replacement	Town water supply wells are at risk. A previous mitigation project was implemented with NRCS (please complete/fill in details)	Keep access road clear, improve access, bridge replacement	Proposed Project	High	2017		

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
6	Greene County Highway Department	Relocate Building 3, Ashland Station of Greene County Highway Department, Greene County	Building 3 is a maintenance sub residency quarters for the Greene County Highway Department. It is located in the Town of Ashland within the 100 year flood plain of the Batavia Kill a major tributary of the Schoharie Creek. The building was severely damaged during Hurricane Irene. The building would have to be raised over four (4 feet) to eliminate 100 year flood plain incursion which makes it cost effective to consider relocating to a less vulnerable location. In addition, the opportunity exists to co- create a facility to provide emergency community sheltering for an area comprising over 4000 residents in four townships. This would augment two other shelters and become the prime public shelter. The project cost reflects cost for built equivalent facilities in the eastern part of the County.	Provide new building above 500 year flood plain using an abandoned soil mine area currently privately owned, proximate to County Route 17. Building will contain garaging, vehicle mechanical repair space, parts storage and a small office area. Make existing County property available to the New York City Watershed. Make unused quarry property available to the Watershed as well. Provide additional storage facilities to support the use of the structure as a community shelter in the event of severe weather or other emergencies. Provide backup power and communications, hardened for severe events. Use FEMA 361 guidelines for building design.	Proposed Project	High			Now trying DEC critical infrastructure relocation funding, FEMA HMA application not funded
7	Greene County Highway Department	Replacement of temporary Bailey Bridge	The current bridge is a single lane structure with limited capacity, difficult ingress/egress, and a risk of failure which would result in an extended loss of a significant transportation corridor.	Replace current "temporary" Bailey Bridge which is bearing on a deteriorating stone arch bridge with risk of failure.	Proposed Project	Medium	2019	\$500k	NYSDOT
8	Greene County Highway Department	Replace Timber Lake Bridge over the Broad Street Hollow Creek, Greene County	This one span bridge structure, BIN 3201240, carries Timber Lake Road over the Broad Street Hollow Brook Kill in the Town of Lexington. Broad Street Hollow Brook is a tributary of the Esopus Creek. Timber Lake Road is the sole access to several dozen properties, including residents and a major private sports recreation camp. There is no other feasible alternative access to these properties in the event of emergency bridge closure. The bridge was built in 1987 to minimal local standards and is experiencing increasing element deterioration. It is rated structurally deficient by NYSDOT and FHWA. Further, it is founded on spread, gravity footings, not consistent with current standards for bridges crossing waterways. Scour pockets and wing wall failure have been addressed as temporary repairs. The bridge often traps debris during storms. Given the importance of maintaining access to properties with no alternatives, replacement of the bridge and its immediate approaches to current hydraulic and structural requirements is highly desirable.	Replace bridge and approaches to current standards in accordance with NYSDOT Bridge Design Standards. This would include establishing a temporary crossing for the construction period, providing a pile or rock -keyed foundation and new approaches. This project will ensure that emergency access can be maintained to this area under the most difficult conditions.	Proposed Project			High	DOT

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
9	Greene County Soil & Water Conservation District/Highway Department	Culvert Replacements	Undersized culverts contributes to flooding on roadways during high flows.	Work with Greene County communities to replace undersized culverts.	Proposed Project	High	Various	Various	PDM/HMGP
10	Greene County Soil & Water Conservation District	Catskill Streams Buffer Initiative	An effective riparian buffer program can assist landowners with their efforts to protect and maintain healthy riparian buffers, address invasive species, and improve the condition of unstable or degraded riparian areas. In 2009, the Catskill Streams Buffer Initiative was developed to educate and assist streamside landowners in order to provide for improved stewardship of riparian areas.	The GCSWCD and NYCDEP will work with landowners to protect, enhance, manage and restore riparian buffers within the WOH watershed. GCSWCD staff will conduct site visits to determine eligibility for funding through the CSBI. In addition to site visits, recruitment may also include outreach mechanisms such as press releases, targeted mailings, presentations to organizations, and Riparian Corridor Management Plan development.	Proposed	High	Various	Various	CSBI
11	Greene County Soil & Water Conservation District	Creative Stormwater Practices and Critical Area Seeding	In order to reduce runoff and protect groundwater resources in the basin, the GCSWCD and NYCDEP support promoting the infiltration of stormwater through erosion and sediment control techniques such as hydroseeding of open ditches, stormwater techniques to infiltrate water into the ground, wetland enhancement, filter strips, and creation of rain gardens and bioswales to manage stormwater.	The GCSWCD will work with multiple partners to implement stormwater projects within the Schoharie Watershed.	Proposed	Medium	Various	Various	NYCDEC
12	Greene County Soil & Water Conservation District	Riparian buffer acquisition program	Properties need to be relocated out of the riparian buffer areas within the Schoharie Creek Watershed.	Piloted in the Schoharie Creek Watershed, this program will be used for properties identified in an LFA for acquisition and relocation. The program will be administered by the Catskill Center in Arkville.	Proposed	High	2016		NYCDEC
13	Greene County Soil & Water Conservation District	Stream Restoration Projects and Modifications	Stream bank restoration is needed to prevent erosion and stabilize stream banks.	Stream restoration projects and modifications includes assessment, design, permitting, contracting, and construction oversight. The GCSWCD and NYCDEP will also work cooperatively with the Schoharie Watershed Advisory Committee (SWAC) and others to identify sites.	Proposed	Medium		Various	FEMA, NYCDEC/GCSWCD Schoharie SMP Contract

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
14	Greene County Soil & Water Conservation District	Kaaterskill Creek Landslide Stabilization	<p>A reach of the Kaaterskill Creek in the Town of Hunter is extremely unstable causing significant sediment loading which threatens the hamlet of Palenville, the long-term stability of County Route 32A, the Kaaterskill and Catskill Creeks, the Hudson River estuary fisheries, and causes significant sediment buildup in the Hudson River ultimately contributing to downstream deposits in the NY-NJ Harbor. The nature of the landslide is soft alluvial and glacial till soils that are eroding at the toe of the bank. The instability began approximately 20 years ago, has steadily worsened and with Hurricane Irene in August 2011 deteriorated significantly entraining sediment even at low flows and contributing large deposits of sediment along Kaaterskill Creek throughout Palenville and downstream through Catskill into the Hudson River.</p>	<p>The toe of the eroding bank needs to be stabilized and protected from erosive forces. Sheet piling toe protection is the best option if the geology allows for that. Soil borings would be conducted to determine the depth of the bedrock (generally 1 – 2x's the height of above ground armoring is required). The second best option if bedrock is a limiting factor is pinning stacked rock along the length of the unstable streambank. The area would need to be excavated for a keyway with pins drilled into the bedrock. Site mobilization is an important factor because the problem area is difficult to access. Whereas, the stream restoration treatments are traditional, accessing the site will be difficult and add to the cost. ☐</p> <p>☐ Stabilizing the toe of the eroding bank will protect it from further instability, sediment loading, and downstream impacts to infrastructure. The estimated volume of sediment loading will be calculated using a formula developed by federal NRCS, which has been used for post-Irene Emergency Watershed Protection projects. Improving the aesthetics of the eroding streambank will also be factored into the mitigation strategy given the significance of the state highway as a Scenic Byway and the economic importance to the region. ☐</p>	Proposed Project	High	2017 - 2019	2.5 million	HMGP application submitted, Applied for federal funding

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
14	Greene County Soil & Water Conservation District	Kaaterskill Creek Landslide Stabilization	<p>The USGS has been monitoring suspended sediment deposits at various stations throughout the Hudson River Watershed, and found after Hurricane Irene the Catskill Creek sub-basin, in which the Kaaterskill Creek is a tributary, was a large sediment source for the Hudson River watershed.</p> <p>The Towns of Hunter and Catskill are concerned the actively eroding landslide could jeopardize the only major transportation artery to the Town of Hunter, State Route 23A, as well as the public safety of the residents of Palenville and County Route 32A. The aggradation caused by the sediment build up from Kaaterskill Creek in Palenville is a threat to the hamlet and roadway stability of State Rte. 23A and County Route 32A. Moreover, Route 23A is vulnerable along this reach, causing significant risk to public safety and property should damage occur in future flood events shutting down this vital roadway. A secondary economic consideration is this section of 23A was recently designated under the NYS Scenic Byway Program by Governor Cuomo (click here for article).</p>						
14	Greene County Soil & Water Conservation District	Kaaterskill Creek Landslide Stabilization	<p>The first inter-connecting state byway in the Catskill State Park is along this stretch of road which includes the massive landslide blight on the landscape. The types of damages that have occurred include significant buildup of sediment in the channel (aggradation) exacerbating flood damage in Palenville to homes, public infrastructure and threatening the long term stability of roads along the stream. Sediment studies performed on the Catskill Creek show that the Kaaterskill Creek tributary contributes a large source of sediment to the Catskill Creek extending into the Hudson River potentially affecting the estuarial ecosystem. State Route 23A is the only main transportation network to the Mountaintop (Town of Hunter and beyond), therefore public safety is of utmost concern. It is the primary route on and off the Mountain for emergency and response crews to access hospitals, supplies and personnel. Moreover, Route 23A is the gateway for the northern Catskills and Greene County's predominantly tourism economy.</p>						

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
14	Greene County Soil & Water Conservation District	Kaaterskill Creek Landslide Stabilization	Flood damages over the years to this section of 23A are numerous with the four-mile stretch between Palenville and Haines Falls (Town of Hunter) being one of the most costly state highways in the state to maintain. Past damages have occurred to 23A from flooding causing landslides, slope instability and road closures (in 2006, 23A was closed for several months after landslides triggered by heavy rains damaged the route). The Towns are seeking HMGP assistance to proactively deal with this actively eroding landslide before it threatens public health and safety.						
15	Greene County Administration, Buildings and Grounds, Planning	Mental Health Facility Acquisition and relocation	Mental Health Facility located in the floodplain of Shingle Kill, very close to Emergency Services building. Old building in poor condition, has experienced flooding, and has open fields adjacent to it, and is therefore a good candidate for mitigation. Groundwater intrusion in basement, SCWD in same building. Used to flood every time it rained but no problem since Irene. Pumps set up to get water out.	Discussing relocation for mental health facility	Proposed Project	High	2018		
16	Emergency Services and Health Dept	Natural Disaster Preparedness Training	Residents need additional training on sheltering in place.		Proposed Project			Staff time	
17	GCSWCD	Local Flood Analyses (LFAs) for Valley Towns/Villages	Use the latest flood information and modeling techniques to evaluate flooding issues in population centers, and provide a scientifically-driven process to develop and implement solutions.	Secure funding for LFAs in valley towns/villages (outside of NYC Watershed area)	Proposed Project	Medium	2017-2020 (Long term)	\$50k/community	FEMA/DHSES
18	Planning, GCSWCD	FEMA Hazard Mitigation Acquisition program	Acquisition of properties in the floodplain to remove them permanently from flood hazard.	Twenty-three properties in eight towns across the County have gone through the program (one in Prattsville, is still in progress). Demolition takes place within three months of the closing and the property is restored to its natural floodplain state permanently removing any flood hazard.	In Progress/Complete	High	2016	\$1.5 million	FEMA (75%), CDBG (25%) for eligible landowners, and NYCDEC for city watershed properties
19	CWC/GCSWCD	Flood Hazard Mitigation Implementation Program	Flood hazard mitigation measures.	Acquisition/relocation/ and mitigation of properties in accordance with LFA.	In progress	High	2016-2017 (Medium term)	\$17 million	DEP, CWC

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
20	Town of Ashland	Local Flood Analysis	Need Local Flood Analysis	Town will be conducting a local flood analysis in 2016 to identify flood vulnerabilities and potential mitigation measures (GCSWCD facilitating).	Proposed Project	High	2016	\$50k/community	PDM Planning, SMIP (NYCDEP)
21	Town of Ashland	Backup Power	Support the implementation of a Back up Power Source for EMS/Fire local NIMS structure	Install backup power	Proposed Project				PDM/HMGP
22	Town of Ashland	Emergency Center in Town Hall	Enhance function of Town Hall to serve as a community center in emergencies		Proposed Project				CDBG/EMPG
23	Town of Ashland	Culvert Replacement & Repair, Replace Catch Basin (Combined projects into one project)	Undersized Culverts, Repairs Needed for Culverts and Catch Basin	Implement projects identified in the Town's Stormwater Planning & Assessment Report from December 2013 including: Replacing or repairing culverts that have been determined to present potential sediment sources, culverts in poor structural condition, or culverts with erosion at the inlet or outlet should be repaired; Replace existing culvert with larger capacity to pass the 100 year storm at these locations on County Rte 10 – #'s 90, 78, 79, 77, 73; Upsize culvert to pass 100 yr. base flood at these locations on West Settlement Rd - # 16, 10; Upsize culvert to pass 100 yr. base flood at these locations on North Settlement Rd (CR 19) - # 1, 23, 31; Upsize culvert to pass 100 yr. base flood at Campbell Road - # 13; Upsize culvert to pass 100 yr. base flood at Mail Route Rd. # 26; Upsize culvert to pass 100 yr. base flood on Rte. 23 # 57; Replace catch basin on NYS Route 23-Structure 19	Proposed Project	Medium	2016-2020 (Mid-Long term)	\$1.5 million	PDM/HMGP
24	Town of Athens	Emergency Communications Upgrade	The Town of Athens lacks full communications interoperability during emergency situation as existing radio units cannot always communicate with one another and outside agencies.	The Town of Athens seeks to update to the P25 compliance and expanded our radio communications system. We would conduct a radio study throughout the town on how to enhance our radio communications. We would apply for a FCC license to acquire our own frequency to be used by the town highway and any other public safety agency within the town. A large part of these funds will go to upgrading the highway departments radios to the P25 standard and also equip our local fire departments with a starting point on enhancing their radio communications. With enhancing the towns public safety communications would help during a town wide emergency such as any natural disaster; for example (tornado, server storms, flooding, snow storms, etc.).	Proposed Project				DHS Homeland security grant/EMPG

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
25	Town of Athens	Box culvert replacement	The existing culvert on Schoharie Turnpike is undersized -- leading to localized flooding and sometimes, some road damage during heavy rain/spring runoff events.	Replacement of covert with 6' X 5' X 35' box culvert structure will eliminate localized flooding.	Proposed Project				PDM/HMGP
26	Town of Athens	Automatic standby generator	The Town of Athens highway garage -- a facility that must remain operable during emergency situations -- has insufficient back up power supply capabilities. Presently, the shop only has a pto driven portable generator that currently runs when the powers out after we hook it up. The Town Garage experiences 1-2 outages per year with duration last from several minutes to, in the case of a 12/2009 ice storm, several days. Generators have been rented in the past at a unknown cost.	The Town seeks automatic standby generator that would power shop when needed all for 24/7/365 functionality. estimated cost to be around \$35,000	Proposed Project			\$35,000 - please verify	PDM/HMGP
27	Town of Cairo	Moorehouse Road Elevation Program	Low lying basin area that floods during heavy rain events. Road becomes impassable to 17 residential properties restricting ingress and egress for but not limite to residents, emergency vehicles, etc.	To install a larger culvert pipe as per hydrology study and raise elevation of the road.	Proposed Project	High			PDM/HMGP
28	Town of Catskill	Pennsylvania Avenue Bridge	During a routine inspection, it was determined that serious undermining of the two existing abutments had occurred during Hurricane Irene. This was undetected during the original inspections due to the depth of water at each abutment.	It is proposed to dewater each abutment base, drive sheet piles as protection to prevent further undermining, and fill the existing voids with concrete. The bridge deck will also need to be removed and replaced in order to drive the piles. The bridge spans approximately 20 feet and is approximately 24 feet wide. The existing abutments and wingwalls will be repaired and reused.	Proposed Project	High		\$290k	DHSES, Grant #4085, Project #1919
29	Town of Catskill	Game Farm Road	Game Farm Road – undersized bridge, flooding damage to road.	Replace with precast box culvert.	Proposed Project			\$200k	PDM/HMGP
30	Town of Catskill	Snake Road	Snake Road- Undersized culverts, erosion endangering a house.	Upsize culverts, and install 2 plunge pools to stop erosion.	Proposed Project			\$350k	PDM/HMGP
31	Town of Catskill	Bogart Road	Bogart Road- Undersized 4' diameter culvert, flood damage to road.	Replace with box culvert.	Proposed Project			\$150k	PDM/HMGP

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
32	Town of Coxsackie	Potic Creek Road box culverts	There are two undersized stone box culverts near the State Route 81 side of Potic Creek Road. Unsure of age of construction for the two culverts, made up of laid up flat stone with concrete and concrete slab as a road surface. The first (closest to Route 81) measures 40 feet long by 18 feet wide by 5 feet in depth and the second culvert measures 33 feet in length by 18 feet wide and 3 feet in depth. The culverts are undersized, narrow, and showing signs of age. During large rain storms and quick snowmelt during a warm spring day, the Grapeville Creek will rise and water will overcome the culvert and carry over the road. Potentially washing out the small bridges and leaving many people restricted by not being able to get to their homes on Potic Creek Road. As well as emergency services will take longer to reach its destination on Potic Creek Road. The two culverts were constructed during the time when the town of Coxsackie was more rural.	Install new larger culverts, widen and raise Potic Creek Road. By installing two larger culverts and raising the roadbed 2 feet higher than present elevation will provide more than adequate coverage during high flooding time during the year. Widening the box culvert will eliminate a pinch point at each crossing of Potic Creek. Thus, eliminating the possibility of two cars hitting each other head on.	Proposed Project	High			PDM/HMGP/ DOT/Local
32	Town of Coxsackie	Potic Creek Road box culverts	Over time, vehicular traffic on this road has increased, potential head on collisions happen more frequently. This road is also a thoroughfare for the residents of Earlton, Athens, Greenville and Coxsackie. The two culverts were constructed during the time when the town of Coxsackie was more rural. Over time, vehicular traffic on this road has increased, potential head on collisions happen more frequently. This road is also a thoroughfare for the residents of Earlton, Athens, Greenville and Coxsackie.						

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
33	Town of Coxsackie	Honey Hollow Road culverts	On Honey Hollow Road approximately 1/2 of a mile from The Lane, there are two metal corrugated pipes that are collapsing and will cut off Honey Hollow residents from Coxsackie and New Baltimore. A best guess measurement for the two pipes would be, The north pipe is a squashed 4 foot pipe with 16 feet in length, the southern pipe is approximately 4 foot squashed pipe about 18 feet in length. Over time, the pipes have become rustier and have been failing in size. Even in the driest summers there is a constant flow water from the Grapeville Creek, The water has weakened the galvanized metal and could collapse at any time. During heavy rains and quick thaw in springtime the pipes are not able to handle all the water and therefore the water comes over the road. The two pipes are about 75% of full capacity at all times. Most of the time during heavy rains; the water pushes out along the roadside and waits until it can pass under the road.	Removal of old undersized metal squashed pipes to be replaced with concrete box culvert. Appropriate sizes for both should be at least six feet long by 20 feet wide by 5 feet in depth.	Proposed Project	High			PDM/HMGP/ DOT/Local
34	Town of Coxsackie	Vandenburgh Road culvert replacement	On Vandenburgh Road, approximately 1 mile from State Route 81 the Coxsackie Reservoir runs underneath the road through 5 galvanized pipes. The pipe sizes are 36". The length of the culvert crossing is 40 feet long by 41 feet across, the height is 6 feet. The age of the small bridge is unknown. The bottom of the culvert is only stream bed, rocks, soil, and grass. The constant moisture has rusted out the inside of the pipes which is causing them to fail and eventually collapse. Then the small bridge will be not safe for vehicle travel and will be shut down. Water is always present running through the pipes. During heavy rains or a spring thaw, the water rises and the pipes become overwhelmed with water. Which rises up the front of the wall and washes out the small stones and stone dust within the large laid up stone wall. Making the entire structure weak and dangerous. The size of pipes in place are too small and have become blocked with debris which causes the water to rise faster.	Replace entire culvert with a much larger concrete box culvert or small span bridge.	Proposed Project	High			PDM/HMGP/ DOT/Local
35	Town of Durham	Generator for Town building	Replace generator	Need 220 volts, single phase diesel generator	Proposed Project			\$15k	PDM/HMGP

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
36	Town of Durham	Culvert Replacement	Replace current double culvert with a single arched bottomless culvert. Current Culvert: two (2) 8' X 40'	New Culvert : one (1) 24' X 40' Regrade, re-set and re-establish road.	Proposed Project	High	2016 - 2017	\$40k	DOT/Local
37	Town of Durham	Culvert Replacement	Upgrade culvert to accommodate greater flow from larger storms.	Replace current 8' X 40' culvert with larger 20' X 40' culvert. Regrade, re-set and re-establish road.	Proposed Project	Medium	2017 - 2018	\$45k	PDM/HMGP/ DOT/Local
38	Town of Greenville	WWTP & Sewer District Improvements, Sewer District Extension	The Town of Greenville, located in the north eastern corner of the Catskill Mountains, is proceeding with a plan to 'harden' its waste water infrastructure in the face of recent severe weather events, most notably Hurricane Irene. The Town, located on the Basic Creek which is a tributary to the Catskill Creek Watershed, is peppered with dozens of failed septic systems from the last century. The inflow and infiltration issues in the existing waste water treatment facility have resulted in a DEC negotiated Order on Consent. Retaining walls associated with storm water management are failing and have been partially stabilized with FEMA PA support. New culverts are required for increased storm water management in three sections of the Town's road infrastructure. From FEMA Narrative: The Town of Greenville in Greene County, New York maintains an existing waste water treatment system that was originally built to serve subdivision development in the 1980's.	The Town of Greenville is proposing: <ul style="list-style-type: none"> 1) Extension of the sewer district to remove the commercial hamlet and denser residential areas from septic use, particularly those in the Basic Creek's floodplain and the Catskill Creek Watershed as a whole. 2) Slip lining the existing sewer lines to eliminate inflow and infiltration. Usually, the plant processes 18,000 gallons of effluent per day. During Superstorm Sandy, the groundwater infiltration peaked at 50,000 gallons per day. The plant's permitting only allows for 55,000 gallons per day. 3) Stabilization and replacement of stormwater management infrastructure, including fieldstone retaining walls (with steel girder walls), culverts and improved drainage. The project has been listed with the state's CWSRF and is currently being considered for federal interest-rate subsidy. From FEMA Narrative: 1) Increase of capacity at the waste water treatment plant to handle increased storm water inflows to the system, 2) Fortify existing retaining walls along the Catskill Creek Watershed areas in the Town to support related waste water collections infrastructure,	Proposed Project	High			PDM/HMGP/ EPA - Application submitted, deadline was Sep 2015. Clean Water SRF grant

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
38	Town of Greenville	WWTP & Sewer District Improvements, Sewer District Extension	It does not, currently, serve the traditional hamlet core of the municipality which dates to the early 19th century, nor the school district which depends upon more than a dozen septic units of more than 40 years of age upon average. The hamlet core and the school district are situated within the 100-year floodplain of the Catskill Creek Watershed. During serious storm events, most notably Hurricane Irene in 2011, outflows from ageing septic systems in the hamlet's dense core into the watershed became evident. In addition, the impact of inflow and infiltration issues upon the plant's existing collections system caused a near shutdown of the facility. Discharges into the watershed approached legal limits. The older homes and businesses do not have adequate on-site wastewater treatment capacity.	Routing of the collection system along the stream also will require repair and stabilization of a 200-ft long retaining wall. This wall has been damaged successively through storms over the last two years and is in danger of collapsing and blocking the stream in the event of another heavy rain event. The wall would be stabilized and or replaced in the course of running sewer lines under and through the existing retaining wall. 3) Resolve the existing inflow and infiltration issues within the existing collections system through the employment of new technologies and materials to stabilize the lines themselves, 4) Extend the existing sewer district to include residential and commercial properties that currently depend upon failed or failing septic systems that are within the Catskill Creek Watershed's floodplain. The project provides for elimination of several dozen failed on-site septic systems at homes businesses and the schools in the Town of Greenville's central business district. The properties are located on relatively small lots along NYS Routes 32 and 81 and all feed to the same stream, Tributary-H-192-26-6 of Basic Creek, which in turn flows to the Catskill Creek and Hudson River.					
38	Town of Greenville	WWTP & Sewer District Improvements, Sewer District Extension	As a result heavy rains and storms overload the systems resulting in discharge of untreated or partially treated sewage to the local stream. The stream pools at a small pond in a Town Park where contaminated runoff flows to and collects. All water from the proposed service area then flows into a 110-acre NY State designated Class-2 Freshwater Wetland.						
39	Town of Halcott	Construct satellite fire truck facility	The major challenge we face on an ongoing basis is the isolation of our town during the frequent flooding events. More than five times in the last fifteen years we have been cut off from access to our fire and emergency services by flooding in Fleischmanns (Delaware County). The only remedy would be to locate a satellite fire truck facility in our town.	We have secured the property for this structure but do not have the funds to construct the building. Not a firm estimate, but this will probably require 150K.	Proposed Project			\$150k	CDBG or local?

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
40	Town of Halcott	Retrofit Halcott Town Recycle Station	Tropical Storm Irene was only the latest in a series of serious rainstorms that have flooded our recycling center in ever-increasing intensity, washing tin cans, plastic milk jugs, broken glass downstream in the torrent. Paper goods, if left behind, are waterlogged beyond saving. The cost of restoring the recycle center from this storm alone was \$9472.00. Former storm damage costs have been absorbed by the Town. The Town of Halcott is small, with only 258 residents. It is located on the edge of Greene County and is at least 45 minutes away from our County transfer station, making it virtually inaccessible to the homeowner with no truck or time to make the journey. Townspeople who do not use a hauler or who find our small recycle center full, "stockpile" their solid waste and recyclables until they can take the time to drive them to a dump.	We propose to retrofit our current recyclable center and expand it to include a solid waste collection option. As per the recommendations of our Code Enforcement Officer and Flood Plain Manager, we would lift the floor of the recycle center 10" off its concrete platform, allowing flood waters to pass underneath, harmless and unimpeded. Collection bins will be designed specifically to hold objects securely, employing steel netting as opposed to the current metal barrels that tip over easily. The platform would be surrounded with heavy lattice in frames to further protect the containers. The recycle center site would be enlarged to include a garbage disposal option with a bear-proof dumpster provided by Greene County, and placed beyond the flood plain, and an "E" shed, a disposal site for recyclable electronics. These three options would form a mini transfer-station (MTS) for the Town. Greene County Solid Waste will transport the full dumpster to the transfer station according to a negotiated agreement with the Town. This program would allow our people to easily, quickly and legally rid themselves of their personal waste. The site will be protected from further flooding. The new center will employ one part-time worker to oversee collection and proper disposal.	Proposed Project				PDM/HMGP
40	Town of Halcott	Retrofit Halcott Town Recycle Station	Conventional solutions, such as joining our neighboring County transfer station or relocating our recycle center are not options. As a result, the same flood waters that wash away our recyclables, have washed away much personal garbage as well. This is a slow and quiet disaster with a price tag that impacts an entire generation. Local townspeople who used to bury, burn or do without, today find no legal or simple way of ridding themselves of their garbage. And that garbage now includes hazardous additions such as batteries, outdated computers, fluorescent light bulbs, used motor oil and unused paint cans. The damages are widespread, tainting our streams, and contaminating our reservoirs. The clean-up is costly.						
41	Town of Halcott	Townsend Hollow Road Culvert							HMGP

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
42	Town of Hunter	Town-wide Stormwater Analysis Study	During Tropical Storm Irene 8/28/11 - 9/5/11 we received torrential rainfall and flash flooding in local streams which caused significant infrastructural damage throughout the Town of Hunter. This incident has caused damage on over 28 roads in our town. The town needs a complete storm water analysis to identify areas where current infrastructure (culverts, bridges, conveyance channels etc) are inadequate to handle flood flows. This should include development of an action plan that identifies priority projects appropriate for hazard mitigation funding and other funding availability. All infrastructures should be identified and data updated with their GPS locations. This study was included in our Hazard Mitigation Plan Annex for the Town of Hunter. This project also includes developing local stormwater management districts with the Village of Hunter and Tannersville.	The Town has suffered through two 100 year storms in the past 5 years and the Hurricane Irene in August 2011 was a 500 year storm. These 28 sites and others will continue to cost more and need to be addressed for the safety of the town's people. Due to the severity of storms the study will help us proactively prepare for these climate changes by focusing our efforts on priority sites and making repairs before the next storms.	Proposed Project				CDBG/PDM
43	Town of Hunter	Scribner Hollow Road	This road has a stream crossing under the road three (3) times with three culvert pipes. A hydraulic study and engineering design is a much need and very important hazard mitigation plan. During every heavy rain and especially Hurricane Irene the road needs repair due to these inadequate culverts. The stream inbetween these culverts needs to be dredged reshaped and lined. In the same location 2 private driveway pipes which are the town's responsibility need the same study and engineering design. The first quarter mile of this road on the right hand side going up the road is a stream that is in desperate need of stabilization on both banks. During all severe rain storms severe erosion of road and stream banks occur. The road is in danger of sliding down the embankment. Engineer work and a stream hydraulics study is needed. A study and action plan is need as soon as possible.	The study and engineering plans would help us upgrade all infrastructure to prevent the damage from occuring after every heavy rain. The stream bank stablization will help prevent loss of road and possibly lives if road collapes during storm.	Proposed Project				PDM funding for both study and construction work

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
44	Town of Hunter	Clum Hill Road	Multiple FEMA declarations and yearly repairs from improper drainage has caused road hazards and high repair costs. This road has a grade of 4% - 18% and has had numerous repair methods tried without success. A drainage runoff study and an engineered plan would greatly help prevent life threatening hazards during storms. The area is increasing in development and will benefit from the problems solved with this plan. The drainage runoff study and engineered stormwater drainage system with underground piping and inlets will eliminate many washout problems occurring every storm. Once the system is in place the road will need to resurfaced with blacktop.	New stormwater drainage system would decrease overall cost of road repair and maintenance as well as increase safety for its inhabitants.	Proposed Project				PDM/HMGP/CDBG
45	Town of Hunter	Plateau Mountain Road	Two tributaries of the Scholharie Creek combine together then pass under Plateau Mt. Rd Approximately 500 LF easterly of the road intersection at route 214. NYSDEC has calssified the westerly tributary as Class A and souther tributary as Class B once combined the Class is C. The existing structure is comprised of two 72" diameter steel pipes which are approx. 30' long. Flooding of the stream has caused damage to the drainage structure. The Hydraulic analysis was completed in March 2013 and showed that replacing the existing structure with an in-kind stucture is not recommended, since the existing structure is undersized and comprized of multiple pipes. Undersized crossings and multiple outlets cause restrictions of natural stream flow, increased erosion due to high velocities, and intesify flooding because of clogging with debris. The engineering recommendations are: 1)Three sided culvert Clear(18'-6"x6'-0") area sf 111.0 largest passing storm event 25 yr. or Bridge (bottom 35', top 40') x 6'-0" area sf. 225 largest passing storm event 100 yr.	The design and construction will ensure structural integrity and appropriate hydraulic capacity, shile protecting or restoring stream continuity(ecosystems). Tream sontinuity can be maintained by solecting structures which sufficiently span the stream channel bed and are either embedded or preferably open-bottom. Both above solutions will have the sturctural integrity to mantain access and transportation needs and decrease multiple road erosion and repair needed after every significant rain event. Thus being proactive and prepared for further climate change.	Proposed Project				PDM/HMGP

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
46	Town of Hunter	Platte Clove Mountain Road	The problem is the road is actually on the mountains edge from West Saugerties to Platte Clove. It is an extensively used seasonal road with many drainage and safety issues. It needs engineering and plan to complete installation of new culvert pipes, water channels, retaining walls, guide rails and finally resurfacing. This road is part of our scenic byway and is used by walkers, bicyclists and tourists to view and hike our many trails and enjoy the great vistas. The locals use it frequently as well because of its ease to get down the mountain.	The mitigation would help resolve a continual problem with water runoff and road damage due to the strong storms the area has been receiving and will receive through predictions. This road is more costly due to the higher terrain and severe drops, making it more hazardous and work more difficult. The measure would increase safety and repeated damage.	Proposed Project				Not clear what they want
47	Town of Hunter	Local Stormwater management district	Stormwater management needed within the Town of Hunter, Village of Tannersville, and Village of Hunter.	Developing local stormwater management districts with the Village of Hunter and Tannersville (see Town of Hunter stormwater analysis project).	Proposed Project				
48	Town of Jewett	Mitigate Town Hall	Needs shower, Red Cross Shelter, Generator		Proposed Project	High		\$20k	May be generator can be funded under PDM and HMGP
49	Town of Jewett	Culvert Replacement on 23A - Wright Road	Mitigation needed for Wright Road. The relationship of this road and the Schoharie Creek makes full mitigation difficult and expensive even if possible and this would require enlarging the culvert under 23A controlled by the NYSDOT. See county-wide effort listed above.	Enlarge culvert under 23A	Proposed Project	High	2017-2020 (Long term)	\$20k (H/H study)	
50	Town of Lexington	Comprehensive Flood Mitigation	Flooding every time it rains	Proceed with comprehensive flood mitigation in Lexington Hamlet center through the projects described in the LFA from 2015: <ul style="list-style-type: none"> • acquire and remove homes on south side of Route 13A; • acquire and remove Lexington Hotel; • lower the sewer pipe between Route 13A and Schoharie Creek; • create floodplain bench; and • replace Route 42 bridge with larger span based on H/H modeling 	Proposed Project	Medium	2017-2020 (Long term)	7 million (mostly in bridge replacement)	PDM/HMGP/ DOT/Local CWC for eligible projects, NYCDEP for eligible acquisitions
51	Town of Lexington	Flood mitigation for properties along Route 23A and Banks Road	Flood mitigation for properties along Route 23A and Banks Road where backwater conditions extend from Schoharie Creek through culverts under Route 23, causing tributaries to flood in the vicinity of these culverts.	Mitigation may include property-specific options (elevations) and conveyance/backwater mitigation projects.	Proposed Project				PDM/HMGP

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
52	Town of Lexington	Flood mitigation for properties near West Kill Creek	Flooding in Lexington & West Kill Hamlets near West Kill Creek.	Pursue property-specific flood mitigation options in Lexington & West Kill Hamlets near West Kill Creek. The choice of acquisition vs. elevation will depend on the position of each building relative to the West Kill Creek floodway.	Proposed Project				HMGP/PDM/CDBG
53	Town of Lexington	Stream stabilization along West Kill Creek	Upstream of Route 42 in West Kill Hamlet, the West Kill Creek needs stream stabilization to protect the bridge from structural damage during future floods	Stream stabilization along West Kill Creek upstream of the Route 42 bridge in West Kill Hamlet.	Proposed Project				this is tough to get federal funding
54	Town of Lexington	Building Elevations on Route 42 in FEMA SFHA	Elevate buildings in FEMA SFHA	Per the LFA (2015) Elevate buildings in floodplain: 5 on Route 42 and 1 located east of town hall	Proposed Project				PDM/HMGP
55	Town of Lexington	Building Elevations on Spruceton Road and Route 42 in 500-yr Flood Zone	Elevate buildings in 500-yr Flood Zone	Elevate buildings in 500-yr Flood Zone on Spruceton Road (3 including Community Hall) and 1 on Route 42	Proposed Project				PDM/HMGP
56	Town of Lexington	Beech Ridge Road Embankment Stabilization Project	A reach of the West Kill above Pushman's bridge on Rte. 42 is unstable causing erosion and sediment loading which threatens the short-term stability of Beech Ridge Road as well as the water quality of the West Kill and Schoharie Creek. The nature of the embankment is soft alluvial and glacial till soils that are eroding at the toe of the road embankment along the West Kill. The instability began during Hurricane Irene in August 2011 and has deteriorated significantly leaving the bank geometry below the roadway highly unstable and in a condition where failure is imminent.	The toe of the eroding bank needs to be stabilized and protected from erosive forces. Due to visible bed rock in the channel bed near the toe of the slope, stacked and pinned rock wall is the likely best treatment of the embankment failure. Approximately 170 feet of the embankment's length will need to be stabilized to a height of approximately 25 feet. Soil borings would be conducted to determine the depth of the bedrock and soil characteristics to inform design of the rockery wall. A keyway will need to be excavated into the bed rock to create a stable foundation for the wall. After stacking each course of the wall there will be holes drilled through the rocks and into the bedrock and pins would be installed to connect the rocks to the bed rock. Site mobilization is an important factor because the problem area is difficult to access. Whereas, the stream restoration treatments are traditional, accessing the site will be difficult and add to the cost. Stabilizing the toe of the eroding bank will protect it from further instability, sediment loading, and eliminate impacts to transportation infrastructure on the slope	Proposed Project	High	2017 (Medium term)	\$650k	PDM/HMGP

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
57	Town of New Baltimore	Madison Avenue East Drainage System	Drainage system on Madison Avenue East is faulty	Replace faulty drainage system on Madison Avenue East with larger diameter more effective system	Proposed Project	Medium	2016-2017 (TBD based on funding)	\$20k	PDM/HMGP
58	Town of New Baltimore	Concrete Flood Wall at Waste Water Pump Station	Reduce the chances of pump station being flooded as it has in the past.	Install concrete flood wall at waste water pump station to reduce the chances of pump station being flooded as it has in the past.	Proposed Project	Medium	2016-2017 (TBD based on funding)	\$6,000	PDM/HMGP
59	Town of New Baltimore	Staff Training	Staff training needing in hazard mitigation.	Train all staff including code enforcement and building department regarding hazard mitigation.	Proposed Project	High	2016-2017 (TBD based on funding)		HMGP/PDM/CDBG
60	Town of New Baltimore	Medway Grapeville Fire Station Backup Power	The current standby generator is unrepairable if it should go down again due to its age. This is a very high priority as this generator provides electrical power to the fire station during power outages which is part of our critical infrastructure and is used as an emergency shelter for the western portion of the Town.	Replacement of emergency standby generator	Proposed Project	High	2016-2017	\$30k	
61	Town of New Baltimore	Replacement of Wastewater Treatment Plant	Upgrade of wastewater treatment plant needed.	Replacement of wastewater treatment plant.	Proposed Project	High	2017	\$2.5 million	0% Loan through CWSRF

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
62	Town of Prattsville	Made in Prattsville Business Recovery Park	<p>The Town of Prattsville experienced unprecedented flood damage from Hurricane Irene on August 28, 2011. The Town sustained millions of dollars of worth of damage to its Main Street business and residential district. A flood study was conducted addressing the watershed hydrology, existing riverine morphology, existing channel hydraulics and floodwater elevations along a one mile stretch of the Schoharie Creek that parallels Prattsville's business district.</p> <p>A detailed hydraulic engineering study was done after the flood to identify options for reducing floodwater elevations and subsequent damage to infrastructure. One recommendation is to allow more floodway capacity by reclaiming land in the floodway and floodplain. The largest parcel in the study area is a twelve-acre anchor business that is considering a FEMA buyout (HMGP disaster # 4020). The business was substantially damaged by Irene. The buyout in itself however is not enough for the owner to relocate.</p>	<p>Reclaiming 12 acres of floodplain on the Schoharie Creek in Prattsville's Business District, relocating the Huntersfield Creek outlet (a tributary to Schoharie), removing berms, and select channel dredging are preliminary recommendations in the local flood analysis conducted for Prattsville (April 2012, Malone & MacBroom). In order to successfully relocate Dimensional Hardwoods, the anchor business, out of the floodplain and remain a viable business for the town, a relocation strategy needs to be developed drawing on many different funding sources – NY Rising, Community Reconstruction Zone program (Prattsville is a target community), FEMA HMGP Acquisition (disaster # 4020), Community Development Block Grant, and this round of Hazard Mitigation Grant Funding. This application will add leverage to the other programs, and vice versa, and allow each to contribute to a rebuilding strategy starting with this core anchor business and developing other businesses that have the potential to create local jobs and add value-added economic activity that would complement the emergence of a bio-fuels crop industry and support sustainable agriculture in the Prattsville region.</p>	Proposed Project				PDM/CDBG/HMGP/EDA

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
62	Town of Prattsville	Made in Prattsville Business Recovery Park	<p>A relocation strategy needs to include purchasing a large enough parcel to relocate to, infrastructure investment (water, sewage, utilities), highway access, permitting, and design, and possible site remediation of the existing parcel if hazardous material is found (due to past usage this is a possibility).</p> <p>Prior to the flood, the business, Dimensional Hardwoods, was manufacturing furniture parts and some of the highest grade baseball bat billets in the country. In fact, 20 – 30% of the professional grade billets that left the bat factory made their way to the major leagues. The factory produced rough split and lathed wooden dowels that were then vacuum dry kilned. The state-of-the-art kilns were developed with grants and research from SUNY Environmental Science and Forestry and Watershed Agricultural Council (WAC). The company’s product was packaged and shipped to baseball bat factories in 15 states and six countries.</p>						
62	Town of Prattsville	Made in Prattsville Business Recovery Park	<p>The flooding from Tropical Storm Irene wiped out the factory, equipment, and the kilns. Looking ahead, the bat factory is cultivating a “Made in Prattsville” strategy that will capture the heart of baseball fans while at the same time drive energy independence and help to jump start Prattsville’s community recovery. The company’s focus is to produce wood products and promote the local and regional forestry industry throughout the state of New York. By utilizing all of the waste products to convert into useable cellulosic ethanol and wood pellets, the “Made in Prattsville” concept would provide discounted energy and fuel to the entire community and add lesser dependence on foreign petroleum. Additionally, the project will include a wood crafts open market and retail shop, river walk overlook, river walk trail, and ice cream stand.</p>						
63	Town of Prattsville	Berm and Floodplain Alteration	Flooding of homes near Route 23	Survey lowering berm below State 23 bridge to determine flood reduction to nearby homes. This should be done in combination with floodplain vegetation clearing.	Proposed Project				

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
64	Town of Prattsville	Deepen and widen the Schoharie Creek	Reduce flooding along the Schoharie Creek	Deepen and widen the Schoharie Creek in the vicinity of the business district using HEC RAS modeling performed for the local flood study (2014). Channel configuration spanning 210 to 260 feet in width anticipates drop in water surface elevations from two to almost seven feet during the 100-year event.	Proposed Project				FEMA would not fund this type of project but UISACE or NRCS may
65	Town of Prattsville	Route 23 Bridge Replacement	Replace the Route 23 Bridge with a larger span to pass higher flood flows	Replacement of the Route 23 bridge based on modeling performed for the local flood analysis (2014).	In Progress				PDM/DOT/Local
66	Town of Windham	Culvert Replacement	This culvert four-foot undersized corrugated metal pipe culvert needs to be replaced to provide additional capacity to reduce local flooding impacts.	Upgrade drainage infrastructure along CR 56 in the area of CR 56 to improve stormwater runoff with a six foot by six foot box culvert. This project will expand capacity, improve mobility, ensure access to the dam, and reduce localized flooding impacts. This is a NYCR project, consultant (MMI), expected to complete summer 2016.	In progress	Medium	2016 (summer)	300,000	NY Community Rising PDM/HMGP
67	Town of Windham	Back-up Power	Provide for emergency generators at Town of Windham emergency shelters. These shelters will be used in the event of evacuation of people within the inundation zone, associated with a flash flooding event resulting from a dam failure.	Emergency generators at Town of Windham emergency shelters needed. These shelters will be used in the event of evacuation of people within the inundation zone, associated with a flash flooding event resulting from a dam failure. This is a NYCR project, CT Male consultant	In progress	Medium	2016	100,000	NY Community Rising (CDBG) PDM/HMGP/CDBG, Capital Improvement Budget, HMA grant if project is part of a larger mitigation project
68	Town of Windham	WWTP and Water Systems	Protect WWTP & Water systems	Consolidation with Ski Windham complete	Proposed Project	High			

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
69	Town of Windham	Local Flood Analysis Flood Mitigation Actions	Implement comprehensive flood mitigation actions in high risk areas	Work cooperatively with GCSWCD, NYCDEP and other funders to implement comprehensive flood mitigation actions in high risk areas described in the Local Flood Analysis from 2015: 1) Remove existing structures out of the floodway (HRA #3), specifically homes located at 120 County Rte 65, and at 109 County Route 65 (status unknown) are located in the FEMA floodway and should be removed. 2) Implement Alt. 4.2 in LFA: Replace Main Street (Rt. 23) bridge and create floodplain bench on Mitchell Hollow Creek by acquiring and relocating three commercial structures (5327, 5330 and 5331 State Rte. 23). Passed BCA. Significant flood reduction potential 3. Implement Alt. 4.3 – floodplain enhancement downstream of Church Street which would require buying out and relocating GNH Lumber.	Proposed Project	High	2016-2020	\$6 million (mostly from Rt. 23 bridge replacement)	HMGP, NYCFFBO, CWC FHMIP, GCSWCD SMIP, NYSDOT (bridge replacement)
70	Town of Windham	Drainage Study in Hamlet of Hensonville	Sheet flow flooding	Perform drainage study in Hamlet of Hensonville on SR 296 and CR 65 to identify remediation of sheet flow flooding	Proposed Project	Medium	2016-2017	\$50k/community	PDM/HMGP, Greene Co Highway
71	Town of Windham	Mad (Pratt) Brook stream bank restoration alternatives	Stream bank restoration needed.	Continue to support the study of Mad (Pratt) Brook stream bank restoration alternatives. Part of MMI scope of work, NYCR - 2016 project	In progress	High	2016-2017		NYRCR, Catskill Watershed Corp, Town
72	Town of Windham	Road Drainage and Condition Survey	Survey of road drainage and condition alternatives needed.	Perform a town-wide survey of road drainage and condition alternatives.	Proposed Project				Town of Windham operating budget, CDBG/PDM connect with specific project
73	Village of Athens	Culvert Replacement	Culvert replacement needed.	Replace culvert and widen roadway on Union Street.	Proposed Project	Medium	2016	\$150,000	Private materials donation, HMGP, PDM, NYSCWSRF

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
74	Village of Athens	Wastewater Treatment Plant Flood Mitigation	The Village of Athens Sewage plant is located right on the Hudson River in the flood zone on Water Street and Market Streets. Storm water previously entered the plant and created high inflow and infiltration and created a violation of the SPDES permit for required usage of the plant. Renovation of the Main Waste Water Treatment was initiated after the development of the last plan. The renovation of the Main Waste Water Plant is now complete, eliminating several potentials sources of storm damage. New clarifiers, a new sludge press, waterproof equipment and better drainage upgrades have helped to mitigate storm effects. Electrical service to plant has been relocated to higher area within the plant. Underground fuel tank has been removed.	New influent pumps should be purchased to assure that increased inflow during storms can be properly handled.	Proposed Project	Medium	2016-2017	#####	In house
75	Village of Athens	Brick Row Sewer Plant	In addition to the main sewer plant in the Village, Brick Row has a small sewer plant that serves the residents of Brick Row, the second historic district in the Village. This sewer plant is in a flood zone on the Hudson River at the end of Brick Row. The Village is involved in talks with the Sleepy Hollow Lake management to build a series of pump stations which would remove the Brick Row Waste Water Plant from operation and pump the sewage from SHL and Brick Row directly to the main plant. Problems with the Brick Row site would be mitigated by this action.	Removal of this plant and construction of pump station and forcemain. System would be a public/private partnership with a local development.	Awaiting approval by the involved parties.	High	2016-2019	\$1.7 M	HMGP, PDM, NYSCWSRF
75	Village of Athens	Brick Row Sewer Plant	When the basement flooded in 2014, due to human error, the VFD's were moved out of the flood zone and the heat was converted over to electric resulting in further effective mitigation. A second clarifier was constructed and the old clarifier and manhole were elevated considerably above previous flood levels. Capacity was also increased. A total of 4.6 million dollars was invested in those upgrades. Approximately \$600,000, of that amount went into the treatment of I & I with very positive results.						

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
76	Village of Athens	Village of Athens Drainage System	The consent order from the NYS DEC due to high inflow and infiltration has been lifted. While the rehabbed plant is not flood proof, several steps were taken to make it more resistant to natural hazards.	Perform a full study of the drainage system in the Village of Athens.	Proposed Project	Low	2016-2017	\$50,000	FEMA Hazard Mitigation Grant Program funds FEMA Pre-Disaster Mitigation Program funds. NYSCWSRF
77	Village of Athens	New Sewer and Water Lines /I & I Work	In addition to a new drainage system and in conjunction with the sewage plant and drainage system work, new sewer lines should be placed where necessary. These are old and when the break and leak, add to the high flow to the sewer plant.	Consider replacement of sewer. Ongoing I&I work and the rehab of manholes and sewer mains.	Proposed Project	High	2016-2019	\$5.0 M	PDM and HMGP may be possible to use for manhole elevation and tightening, NYSCWSRF
78	Village of Athens	Relocate Department of Public Works Building	Consider relocation of Public Works Building. The Department of Public works Building is on the Hudson River and houses the Department of Public Works and their equipment. The building is in a flood zone and all equipment needs to be removed during a heavy rain event because of flooding (the machinery shed is a particular concern). However, the problem of cost for this project remains an issue.	The Department of Public Works should have a new building erected outside of the flood zone near the fire department building.	Proposed Project	High	2016-2018	\$1.5 Million	PDM/HMGP, NYSCWSRF
79	Village of Catskill	Wastewater Treatment Plant Flood Mitigation	Flooding of the Wastewater Treatment Plant Control and pump facility due to storm surge or heavy rain. When flooded the building and the motors and pumps that pump raw sewage into the treatment process are at risk. We have experienced flooding at the plant during Hurricane Irene and Storm Surge Sandy. We suffered approximately \$62,000.00 of damage to the plant during Storm Surge Sandy.	Extend the height of the concrete wall surrounding the entrance to the wet well and pump gallery. This will enable the building to sustain higher flood levels.☐ Install aluminum plates on all the glass doors and windows of the building to prevent a breach at any of those locations during a flood event.☐ Install outward opening doors on the wetwell and drywell outside entrances to prevent a breach of those doors during a flood event.	Proposed Project				PDM/HMGP
80	Village of Catskill	Implementation of Resilient Catskill Plan			Proposed Project			Various	Various

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
81	Village of Coxsackie	Rt 385/CSX underpass	Repetitive flooding of the NYS Route 385/CSX underpass. Repetitive flooding frequently results in closure of the main route into and out of the village.	Complete drainage assessment and design/implement improvements to remedy repetitive flooding of the NYS Route 385/CSX underpass. Remedies would include improvements to conveyance system and reconfiguration of SW outfall to eliminate back water effect when Coxsackie creek is at flood stage	Proposed Project	High	2016-2017	2 Million	PDM/HMGP, NYSDOT, CSX Rail, Village of Coxsackie
82	Village of Coxsackie	Wastewater Treatment Plant for Infrastructure	Wastewater Treatment Plant built in 1973	Replace Wastewater Treatment Plant	In progress	High	2017-2019	10 million	PDM/HMGP
83	Village of Coxsackie	West Coxsackie Sewer Trunk Line	Eliminate repetitive flooding problems and overloading to the West Coxsackie sewer pump station	Relocation of West Coxsackie sewer trunk line along the Coxsackie Creek to eliminate repetitive flooding problems and overloading to the West Coxsackie sewer pump station	Proposed Project	High	2017-2020	\$500k - \$750k	PDM/HMGP
84	Village of Coxsackie	Drainage from Apple Blossom Lane and east to Matthew Lane and Luke Ave.	Complete drainage assessment and design/implementation of drainage improvements to remedy a repetitive flooding problem at the development known as Flach Development on Apple Blossom Lane, and the avenues of Matthew, Mark, and Luke and Howard Drive.	Design and install drain piping. Replace approximately 70 water meters with remote read models	Proposed Project	High (4)	2016-2017	\$500k - \$700k	HMGP/other
85	Village of Coxsackie	Flood attenuation basins	Reduce flooding along the Coxsackie creek.	Work cooperatively with the Town of Coxsackie to undertake the design and implementation of a series of shallow flood attenuation basins to reduce flooding along the Coxsackie creek. Initial assessments indicate that 4-6 structures placed on strategic waterways feeding the Coxsackie creek would have an immediate benefit. Such structures would be similar to an existing structure already constructed by the Greene IDA on an unnamed tributary located east of NYS Route 81. Basins would be designed as wetland cells and would provide secondary benefits due to wetland creation as well as habitat value for endangered species known to be in this area. Potential sites include former farm land located on the grounds of Coxsackie and Greene Correctional facilities	Proposed Project	Medium (7)	2017-2020	\$500k	PDM/HMGP
86	Village of Coxsackie	Riverside Avenue retaining wall to address slope failure	17 - 27 Riverside Avenue: The two houses and road are vulnerable to ground failure by river.	Install retaining wall or sheet pilings to stop slope failure.	Proposed Project	Medium (8)	2017-2020		PDM/HMGP
87	Village of Coxsackie	Stabilize Kings Road	Slope failure has occurred and southbound lane is collapsing.	Stabilize west side of Kings Road.	Proposed Project	Medium (9)	2017-2020	\$500k - \$700k	PDM/HMGP

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
88	Village of Coxsackie	Retaining wall and drainage on New Street	Rebuild retaining wall and install drainage to prevent wall failure and avoid danger of collapse of the four houses that are 14' below the wall on New Street between 44 and 52 on northbound lane.	Rebuild retaining wall and provide drainage in wall to prevent wall failure and avoid danger of collapse of the four houses that are 14' below the wall on New Street between 44 and 52 on northbound lane.	Proposed Project	High (1)	2017-2020	\$300k - \$500k	PDM/HMGP - Note: Retaining wall is difficult to be funded under FEMA
89	Village of Coxsackie	Drainage on lower Church St., Franklin St. and South River St.	Complete drainage assessment and design/implementation of drainage improvements to remedy a repetitive flooding problem.	Design and install corrective measures.	Proposed Project	Low (14)	2016-2017	\$300k - \$600k	HMGP/other
90	Village of Coxsackie	Church Street stabilization	North side of road has been collapsing for 30 years and is sliding down embankment.	Stabilize Church Street (from 56-58 Church Street).	Proposed Project	High (5)	2017-2020	\$500k - \$750k	Local or DOT
91	Village of Coxsackie	Mansion Street drainage	Improve drainage between Getty station and rescue squad on Mansion street to avoid mosquito breeding and flooding in local cellars.	Design and install corrective measures.	Proposed Project	Medium (10)	2016-2017	\$300k - \$500k	HMGP/PDM/CDBG
92	Village of Coxsackie	Drainage Assessment and Improvements for Noble Street	Need to remedy drainage and sliding problems to prevent road failure and avoid danger of collapse on north side of Noble Street.	Complete drainage assessment and design/implement improvements to remedy drainage and sliding problems to prevent road failure and avoid danger of collapse on north side of Noble Street.	Proposed Project	Medium (11)	2017-2020	\$300k - \$500k	HMGP/other grants
93	Village of Coxsackie	Gate House Intake at Climax reservoir	Regulates water flow to plant, built in 1935, 1 of 3 gates work	Replace broken gates	Proposed Project	High (2)	2016-2017	\$500k	PDM/HMGP
94	Village of Coxsackie	Spillway at lower reservoir	Spillway at lower reservoir is deteriorated and needs complete overhaul	Design/implement spillway overhaul	Proposed Project	Medium (6)	2017-2020	\$500k	Dam safety program
95	Village of Coxsackie	Pipe connecting the two reservoirs	The Village monitors and maintains the creek between the two reservoirs. Contaminents currently enter the water system as water flows between them, requiring more chemicals to provide safe drinking levels	Install pipe between Climax and Medway Reservoirs	Proposed Project	Low (12)	2017-2020	\$2 million	PDM/HMGP/NYSDEC
96	Village of Coxsackie	Water Tank	Provide additional storage capacity	Purchase and install a new 2 million gallon tank	Proposed Project	High (3)	2019	\$2 million	PDM/HMGP
97	Village of Coxsackie	Water Line Replacement	Aging water distribuion system and sewer lines consisting of mains, valves, hydrants, etc.	Replace nearly 40 miles of distribution system	Proposed Project	Low (13)	2017-2020	\$40 M (\$1Million /mi)	NY Rural Water Assoc.

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
98	Village of Hunter	Stormwater Retrofit program	A stormwater infrastructure assessment was conducted in the Village of Hunter (2006) and identified swales, culvert inlet/outlets and flood prone areas that would benefit from best management practice retrofits to decrease stormwater runoff and associated flood hazards during storm events.	A summary of culvert inlets and culvert outlets that could potentially represent a flood and sediment source problem with the Village are provided below. Upgrade and stabilize areas of erosion above and below these culverts: 1. Berry; 2 - Botti; 3 - Bridge St.; 4 - Brook St.; 5 - Central Ave; 6 - Clearview; 7 - Colonels Dr.; 8 - Ethel Court; 9 - Gaby; 10 - Garfield; 11 - Hunter Lane; 12 - Hunter Rd. 13 - Lake Dr.; 14 - Linda; 15 - Lookout Mt.; VOH 16 - Maple; 17 - Mountain; 18 - Overlook; 19 - Pine; 20 - Point Breeze; 21 - Riverside Dr.; 22 - Route 23A; 23 - Route 296; 24 - Rusk Hollow; 25 - Scribner Hollow	Proposed Project	Some - High; Some - Low	2017-2020	1 million	PDM/HMGP
99	Village of Hunter	LFA	Local Flood Analysis is needed to assess feasibility of flood mitigation projects.	The Village will be conducting a local flood analysis in 2016 to identify flood vulnerabilities and potential mitigation measures (GCSWCD facilitating).	Proposed Project	High	2016	\$50k/community	HMGP/PDM/GCSWCD/NY CDEP
100	Village of Tannersville	LFA	Local Flood Analysis is needed to assess feasibility of flood mitigation projects.	The Village will be conducting a local flood analysis in 2016 to identify flood vulnerabilities and potential mitigation measures (GCSWCD facilitating).	Proposed Project	High	2016	\$50k/community	HMGP/PDM/GCSWCD/NY CDEP
101	Village of Tannersville	Reservoir #3 Mitigation	Tannersville Reservoir #3, DEC Dam ID# 192-2716 is an earth dam that was built in 1957 and retains 10 million gallons of water when at peak capacity. This Class B-Intermediate Hazard Dam is our main water supply. In recent years, there has been a growing expression of concern regarding failure of the dam. In November of 2012, the New York State Department of Environmental Conservation Division of Water Dam Safety Section had assigned an Unsound condition rating due to inadequate spillway capacity. They have also noted further depressions in the dam in the downstream slope and leakage at the joints of the spillway wingwall. In addition, there are several wet areas on the downstream embankment and toe. The Village of Tannersville has had a hydrologic/hydraulic analysis completed on the reservoir and more recently completed an Emergency Action Plan which included a dam break analysis. Just less than 100 residents downstream would be affected in the event of failure which is 1/4 of our population.	The Village of Tannersville needs to complete a full Engineering Assessment in order to fully identify how to mitigate the problem if not identify more issues that may not be seen. It is expected with full remediation of the current issues the Village can prevent failure of the dam and protect our resources. Construction costs cannot be estimated at this moment due to the unknown specific measures needed to prevent the dam failure. The figure given below may not be accurate and it is imperative that an engineering assessment be completed in order to more accurately assess costs and mitigation measures.					PDM/HMGP/USACE

Serial No.	Lead	Project Title	Description of Problem	Proposed Mitigation Measure	Status	Priority	Timeframe	Cost Estimate	Funding Source
101	Village of Tannersville	Reservoir #3 Mitigation	It would also destroy our water plant which would effect all of our water customers inside the Village and approximately 200 outside the Village. While the Reservoir has withstood Hurricane Irene and Tropical Storm Sandy, the Village would want to prevent an unfortunate disaster with the current issues at hand. In the event of failure, the dam may damage isolated homes, highways, public utilities and/or cause economic loss to the community as well as cause serious environmental damage. Recently we have spent approximately \$25,000 for the Inspection & Maintenance plan, Hydrologic/Hydraulic analysis, and Emergency Action Plan including a dam break analysis. The Village needs to retain professional engineers to perform an engineering assessment of the dam and complete remedial measures. The DEC would like the Village to have this rectified by the fall of 2014.						

This mitigation list includes actions from state database, meetings, and notes and annexes, from jurisdictions and county departments as of 1/14/16
When priority ranking was used it was assigned a value of High, Medium, or Low. High was #1-5, Medium was #6-11, and #12 and above. Implentation timeframe is categorized as Short Term was listed as 2016, Medium Term as 2016-2017,
Need additional information/ clarification

Appendix E: Potential Funding Sources

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Federal Technical Assistance and Funding

The Federal government offers a wide range of funding and technical assistance programs that communities can access to assist in their long-term recovery. Some of these programs are geared to disaster preparedness and mitigation planning, while the focus of others is the long-term vitality of the communities. To assist communities in their rebuilding efforts and to better prepare for the future, the information in this table is divided under the headings of conservation and environment, economic development, emergency management, historic preservation, housing, infrastructure, and mitigation.

Agency	Program	Purpose	Eligible Applicants	Application Deadline	For More Information
CONSERVATION & ENVIRONMENT					
DOI; FWS	North American Wetlands Conservation Fund	Grants to acquire real property interest in lands and water, including water rights, and to restore, manage, and/or enhance wetland ecosystems and other habitats for migratory birds, and other fish and wildlife.	Public or private organizations or to individuals who have developed partnerships to carry out wetland conservation projects.	February and July 2016.	Regional or local office. http://www.fws.gov/birds/grants/north-american-wetland-conservation-act.php
EPA, Office of Water	Regional Wetland Program Development Grants	Project Grants to encourage wetland program development by promoting the coordination and acceleration of research, investigations, experiments, training, demonstration, survey and studies related to the causes, effects, extent, prevention, reduction and elimination of water pollution.	Tribes, local governments, interstate agencies and intertribal consortia.	Contact EPA Regional Office. http://www.epa.gov/epahome/locate2.htm	EPA Regional Office, Wetland Coordinator. http://www.epa.gov/epahome/locate2.htm
USDA; Forest Service	Forest Land Enhancement Program	Project Grants for technical assistance to develop management plans, educational programs and assistance to increase awareness, and cost-share assistance to implement sustainable forestry practices on the ground.	State Forestry Agencies and Landowners, managers of non-industrial private forests lands, nonprofit organization, consultant foresters, universities, other state, local and private organization and agencies.	Deadlines are determined by State Forestry Agencies. http://www.fs.fed.us/spf/coop/programs/loa/flep.shtml	Regional or local office of US Forest Service. http://www.fs.fed.us/spf/coop/programs/loa/flep.shtml

Agency	Program	Purpose	Eligible Applicants	Application Deadline	For More Information
ECONOMIC DEVELOPMENT					
DOC; EDA	Economic Adjustment Assistance	Project Grants to help local interests design and implement strategies to adjust or bring about changes in the economy.	Economic Development Districts, cities or other political subdivisions of the state or a consortium of political subdivisions, Indian tribes or a consortium of higher learning or a consortium of such institutions, or public or non-profit organizations or association acting in cooperation with the political subdivisions.	There are no submission deadlines under this opportunity. Proposals and applications will be accepted on an ongoing basis until the publication of a new EDAP FFO.	EDA representative for your state. A complete list of EDA representatives is available on EDA's website at http://www.eda.gov/contact/ http://www.eda.gov/funding-opportunities/ http://www.grants.gov/web/grants/view-opportunity.html?oppld=279842
HUD; Office of Community Planning and Development	Community Development Block Grants Section 108 Loan Guarantees	Guaranteed/Insured Loans for financing of economic development, housing rehabilitation, public facilities, and large scale physical development projects.	Metropolitan Cities and Urban Counties, states	Continuing basis.	Contact your local HUD office in advance for help in preparing an application. http://www.hud.gov/offices/cpd/communitydevelopment/programs/108/index.cfm
USDA; Rural Utilities Service	Assistance to High Energy Cost Rural Communities	Project Grants and Direct loans use to acquire construct, extend, upgrade and improve energy generation, transmission, or distribution facilities in rural communities where the average expenditure on home energy cost is at least 275% of the national average	Political subdivisions of states, for-profit and non-profit businesses, cooperatives, association, organization, and other entities organized under the laws of States, Indian tribes, tribal entities, and individuals.	Contact USDA (202) 720-9545	Program Contact http://www.rd.usda.gov/programs-services/high-energy-cost-grants
USDA; Rural Business-Cooperative Service	Business and Industry Loans	Direct Loans and Guaranteed/Insured Loans. Direct Loans for modernization, development cost, purchasing and developing land, easements, rights-of-way, buildings, facilities, leases or materials, purchasing equipment, leasehold improvements, machinery and supplies, and pollution control and abatement equipment. Guaranteed Loans are for the same actions mentioned above plus for agricultural production, when not	A cooperative, corporation, partnership, trust or other legal entity organized and operated on a profit or nonprofit basis, an Indian tribe, a municipality, county or other subdivision of state or individuals in rural areas.	Not Applicable.	Rural Development State Office. http://www.rd.usda.gov/programs-services/business-industry-loan-guarantees

Agency	Program	Purpose	Eligible Applicants	Application Deadline	For More Information
ECONOMIC DEVELOPMENT					
		eligible for the Farm Service Agency farmer program assistance and when it is part of an integrated business also involved in the processing of agricultural products.			
USDA; Rural Utilities Service	Community Connect Grant Program	Project grants for the deployment of broadband transmission services to critical community facilities, rural residents and rural businesses and for the construction, acquisition, expansion, and/or operation of a community center which would provide such services free to residents for at least 2 years.	Indian Tribe or tribal organization, local units of government or other legal entity, including cooperatives or private corporations of limited liability companies organized on a for profit or nonprofit basis, and have the legal authority to own and operate the broadband facilities as proposed in its application, to enter into contracts and to comply with federal statutes and regulations.	Contact Community Connect Grant Program	DOA Telecommunications Program http://www.rd.usda.gov/programs-services/community-connect-grants community.connect@wdc.usda.gov (202) 720-0800
USDA; Rural Housing Service	Community Facilities Loans and Grants	Guaranteed/Insured Loans, Direct Loans or Project Grants for community facilities such as child care facilities, food recovery and distribution centers, assisted living facilities, group homes, mental health clinics, shelters and education facilities. Projects comprise community, social, cultural, transportation, industrial park sites, fire and rescue services, access ways, and utility extensions. All facilities must be for public use.	Rural areas including cities, villages, townships, and towns including Federally Recognized Tribal Lands with no more than 20,000 residents according to the latest U.S. Census Data are eligible for this program.	Contact the local office for application deadlines.	Contact your local RD office . http://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program
USDA; Rural Business–Cooperative Service	Rural Business Opportunity Grants	Project grants to be used to assist in economic development of rural areas by providing technical assistance, training, and planning for business and economic development.	Public bodies, nonprofit corporations, Indian tribes and cooperatives with members that are primarily rural residents and that conduct activities for the mutual benefit of their members.	Contact the headquarters or regional office, as appropriate, for application deadlines.	http://www.rd.usda.gov/programs-services/rural-business-development-grants This program is administered by the State Office
USDA; Rural Business–Cooperative Service	Rural Economic Development Loans and Grants	Direct Loans and Project Grants for project feasibility studies, start-up costs, incubator projects and other reasonable costs for the purpose of fostering rural development.	Electric and telephone utilities that have current loans with the Rural Utilities Service or rural telephone Bank loans or guarantees outstanding.	Contact the headquarters or regional office, as appropriate, for application deadlines.	http://www.rd.usda.gov/programs-services/rural-economic-development-loan-grant-program http://www.rd.usda.gov/ny

Agency	Program	Purpose	Eligible Applicants	Application Deadline	For More Information
ECONOMIC DEVELOPMENT					
					(315) 477-6400

Agency	Program	Purpose	Eligible Applicants	Application Deadline	For More Information
EMERGENCY MANAGEMENT					
DHS	Community Disaster Loans	To provide loans subject to Congressional loan authority, to any local government that has suffered substantial loss of tax and other revenue in an area in which the President designates a major disaster exists. The funds can only be used to maintain existing functions of a municipal operating character and the local government must demonstrate a need for financial assistance	Applicants must be in a designated major disaster area and must demonstrate that they meet the specific conditions of FEMA Disaster Assistance Regulations 44 CFR Part 206, Subpart K, Community Disaster Loans.	Contact the headquarters or regional office, as appropriate, for application deadlines.	Regional or Local Office. https://www.fema.gov/community-disaster-loan-program
SBA	Economic Injury Disaster Loans	To provide working capital to small business, small agricultural cooperatives or nurseries who have actual economic injury.	Business owners who have suffered economic injury.	Contact the SBA disaster assistance customer service center	SBA Disaster Office. https://www.sba.gov/content/economic-injury-disaster-loans
SBA	Home and Personal Property Loans	Loans made to homeowners and renters to repair or replace damaged or destroyed real property and/or personal property to its pre-disaster condition.	Eligible applicants must have suffered physical property loss as a result of a disaster which occurred in an area declared by the President or SBA. They must also demonstrate an ability and willingness to repay the loan.	Contact the SBA disaster assistance customer service center.	https://www.sba.gov/content/home-and-personal-property-loans

Agency	Program	Purpose	Eligible Applicants	Application Deadline	For More Information
HOUSING					
HUD	Community Development Block Grant (CDBG)	Grant. The CDBG program works to ensure decent affordable housing, to provide services to the most vulnerable in our communities, and to create jobs through the expansion and retention of businesses. CDBG is an important tool for helping local governments tackle serious challenges facing their communities.	Eligible CDBG grant recipients include States, units of general local government (city, county, town, township, parish, village or other general purpose political subdivision determined to be eligible for assistance by the Secretary), the District of Columbia, Puerto Rico, Guam, the Virgin Islands, American Samoa, the Commonwealth of the Northern Marianas, and recognized Native American tribes and Alaskan Native villages.	Contact your State https://www.hudexchange.info/grantees/	http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs
HUD	Mortgage insurance-Homes for Disaster Victims	Guaranteed / Insured Loans. To insure lenders against losses on mortgage loans used to finance purchase or reconstruction of one-family home that will be the principal residence of a borrower that is a victim of a disaster.	Anyone whose home has been destroyed or severely damaged in a Presidentially declared disaster area is eligible to apply for mortgage insurance under this program.	Contact the Federal Housing Administration	http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/ins/203h-dft
USDA; Rural Housing Service	Housing Preservation Grants	It provides grants to sponsoring organizations for the repair or rehabilitation of housing occupied by low and very low income people.	Most State and local governmental entities, Nonprofit organizations, Federally Recognized Tribes Individual homeowners are not eligible	March 15, 2016	Regional or Local Office of Rural housing Service. http://www.rd.usda.gov/programs-services/housing-preservation-grants

Agency	Program	Purpose	Eligible Applicants	Application Deadline	For More Information
INFRASTRUCTURE					
DHS	National Dam Safety Program	To reduce the risks to life and property from dam failure in the United States through the establishment and maintenance of an effective national dam safety program to bring together the expertise and resources of the Federal and non-Federal communities in achieving national dam safety hazard reduction.	For a State to be eligible for primary assistance under the National Dam Safety Program, the State dam safety program must be working toward meeting the following criteria: The authority to review and approve plans and specifications to construct, enlarge, modify, remove, and abandon dams; the authority to perform periodic inspections during dam construction to ensure compliance with approved plans and specifications. All inspections be performed under the supervision of a State-registered professional engineer with experience in dam design and construction.	Contact the headquarters or regional office, as appropriate, for application deadlines.	<i>Headquarters Office:</i> Director, National Dam Safety Program, Mitigation Directorate, FEMA, DHS, 500 C Street SW., Washington, DC 20472; Telephone: (202) 646-3885. Additional information is available on the National Dam Safety Program web site, http://www.fema.gov/national-dam-safety-program
DOC; EDA	Economic Development Assistance	To provide investments that support construction, non-construction, technical assistance, and revolving loan fund projects under EDA's Public Works and EAA programs. Grants and cooperative agreements made under these programs are designed to leverage existing regional assets and support the implementation of economic development strategies that advance new ideas and creative approaches to advance economic prosperity in distressed communities.	Cities, counties, institutions of higher education or a consortium of institutions of higher education, other political subdivision, Indian Tribes, Economic Development Districts and non-profit organizations.	There are no submission deadlines under this opportunity. Proposals and applications will be accepted on an ongoing basis until the publication of a new EDAP FFO.	Regional or Local Office. http://www.grants.gov/web/grants/view-opportunity.html?oppld=279842 http://www.eda.gov/funding-opportunities/
FHWA	Emergency Relief Program	Special funding and technical assistance to States and Federal agencies to provide aid for repair of Federal-aid roads.	State highway/transportation agency or Federal agency.	Contact FHWA.	Director, Office of Engineering, FHWA, DOT, 400 7th Street, S.W., Washington, DC 20590. Telephone: 202.366.4655. http://www.fhwa.dot.gov/programadmin/erelief.html

Agency	Program	Purpose	Eligible Applicants	Application Deadline	For More Information
MITIGATION					
DHS	Emergency Management Performance Grants (EMPG)	To provide Federal grants to states to assist state, local, territorial, and tribal governments in preparing for all hazards, as authorized by the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Stafford Act), as amended (42 U.S.C. §§ 5121 et seq.) and Section 662 of the Post Katrina Emergency Management Reform Act of 2006, as amended (6 U.S.C. § 762). Title VI of the Stafford Act authorizes FEMA to make grants for the purpose of providing a system of emergency preparedness for the protection of life and property in the United States from hazards and to vest responsibility for emergency preparedness jointly in the Federal government and the states and their political subdivisions. The Federal government, through the EMPG Program, provides necessary direction, coordination, and guidance, and provides necessary assistance, as authorized in this title, to support a comprehensive all hazards emergency preparedness system.	Funding provided to States, which can be used to educate people and protect lives and structures from natural and technological hazards.	Contact FEMA for next FY	Office of Financial Management, FEMA, 500 C Street, S.W., Washington, DC 20472 Telephone: 202.646.7057. http://www.fema.gov https://www.fema.gov/fiscal-year-2015-emergency-management-performance-grant-program
DHS	Flood Mitigation Assistance Program	To help States and communities plan and carry out activities designed to reduce the risk of flood damage to structures covered under contracts for flood insurance.	The State or community must first develop (and have approved by FEMA) a flood mitigation plan that describes the activities to be carried out with assistance provided under this program. The plan must be consistent with a comprehensive strategy for mitigation activities, and be adopted by the State or community following a public hearing. Eligible projects include acquisition, elevation, or relocation of National Flood Insurance Program (NFIP)-insured structures, especially those that	Annual.	Risk Reduction Branch, Mitigation Division, FEMA, DHS 500 C Street SW., Washington, DC 20472; Telephone: (202) 646-2856. Additional information is available on FEMA's web site, http://www.fema.gov/flood-mitigation-assistance-grant-program

Agency	Program	Purpose	Eligible Applicants	Application Deadline	For More Information
MITIGATION					
			have been repetitively flooded or substantially damaged.		
DHS	Hazard Mitigation Grant Program	To prevent future losses of lives and property due to disasters; to implement State or local hazard mitigation plans; to enable mitigation measures to be implemented during immediate recovery from a disaster; and to provide funding for previously identified mitigation measures to benefit the disaster area.	State and local governments; certain private and nonprofit organizations or institutions; Indian tribes or authorized tribal organizations; and Alaska Native villages or organizations.	Please contact your State Hazard Mitigation Officer, or federally-recognized tribal/local government official to obtain information on the HMGP application process and deadlines.	Branch Chief, Risk Reduction Branch, Mitigation Division, FEMA, DHS, 500 C Street SW., Washington, DC 20472; Telephone: (202) 646–2856. Additional information is available on FEMA's web site https://www.fema.gov/hazard-mitigation-grant-program
DHS	Pre-Disaster Mitigation Program	To assist States, territories, Federally-recognized tribes, and local communities in implementing a sustained pre-disaster natural hazard mitigation program. The goal is to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. This program awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes. PDM grants are funded annually by Congressional appropriations and are awarded on a nationally competitive basis.	States, territories, federally-recognized tribes, local communities	Please contact your State Hazard Mitigation Officer, or federally-recognized tribal/local government official to obtain detailed information on the application process and deadlines.	Branch Chief, Risk Reduction Branch, Mitigation Division, FEMA, DHS, 500 C Street SW., Washington, DC 20472; Telephone: (202) 646–2856. Additional information is available on FEMA's web site https://www.fema.gov/pre-disaster-mitigation-grant-program

Agency	Program	Purpose	Eligible Applicants	Application Deadline	For More Information
FEDERAL, STATE AND LOCAL POTENTIAL FUNDING SOURCES					
NYS DEC	Grants Program for the Hudson River Estuary	The New York State Department of Environmental Conservation provides funding through the Hudson River Estuary Program to implement priorities outlined in the Hudson River Estuary Action Agenda aimed at conserving or improving clean water; fish, wildlife and their habitats; waterway access; the resiliency of communities; and river scenery. These opportunities are announced as grants or as Requests for Proposals.	Municipalities (counties, cities, towns or villages) and not-for-profit corporations with a 501(c)(3) designation. Projects eligible for state assistance must be located within the Hudson River estuary geographic boundaries.	Contact the NYSDEC Hudson River Estuary Program	http://www.dec.ny.gov/lands/5091.html
NYS DEC	Water Quality Improvement Project	Competitive, reimbursement grant program that directs funds from the New York State Environmental Protection Fund to projects that reduce polluted runoff, improve water quality and restore habitat in New York's waterbodies.	Municipalities, Municipal Corporations, Soil and Water Conservation Districts, and Not for Profit Corporations	All questions should be submitted via e-mail to User.Water@dec.ny.gov	http://www.dec.ny.gov/pubs/4774.html
NYS Department of State	Local Waterfront Revitalization Program competitive grants and technical assistance	Financial assistance (requires local match) to undertake Local Waterfront Revitalization Program plans. Completed LWRPs reflect a vision for management of waterfront issues. They also provide a framework for local governments to attract appropriate waterfront development, while opening additional opportunities for NYS funding and technical assistance.	Any village, town, or city located along the State's coast or designated inland waterway (pdf) can prepare a new, or amend an existing Local Waterfront Revitalization Program. Municipalities are encouraged to address local revitalization issues in a broader context, aligned with regional economic development strategies and regional resource protection and management programs.		http://www.dos.ny.gov/opd/programs/lwrp.html

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Action Worksheet

Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Building 3 is a maintenance sub residency quarters for the Greene County Highway Department. It is located in the Town of Ashland within the 100 year flood plain of the Batavia Kill - a major tributary of the Schoharie Creek. The building was severely damaged during Hurricane Irene.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	The building would have to be raised over four (4 feet) to eliminate 100 year flood plain incursion which makes it cost effective to consider relocating to a less vulnerable location.
Action or Project Intended for Implementation	
Action/Project Number:	CTY-10
Name of Action or Project:	Relocate Building 3, Ashland Station of Greene County Highway Department, Greene County
Action or Project Description:	<p>Provide new building above 500 year flood plain using an abandoned soil mine area currently privately owned, proximate to County Route 17. Building will contain garaging, vehicle mechanical repair space, parts storage and a small office area. Make existing County property available to the New York City Watershed. Make unused quarry property available to the Watershed as well. Provide additional storage facilities to support the use of the structure as a community shelter in the event of severe weather or other emergencies. Provide backup power and communications, hardened for severe events. Use FEMA 361 guidelines for building design.</p> <p>In addition, the opportunity exists to co-create a facility to provide emergency community sheltering for an area comprising over 4000 residents in four townships. This would augment two other shelters and become the prime public shelter.</p>
Summary of Evaluation	
Benefits (losses avoided)	
Estimated Cost	The project cost reflects cost for built equivalent facilities in the eastern part of the County.
Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Greene County Highway Department
Action/Project Priority:	High Priority
Timeline for Completion:	
Potential Fund Sources:	DEP critical infrastructure relocation funding
Local Planning Mechanisms to be Used in Implementation, if any:	Greene County Highway Department
Progress Report	
Date of Status Report:	No report at this time.
Report of Progress:	
Evaluation of Effectiveness:	

Action Worksheet	
Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Town of Ashland water supply wells are at risk. A previous mitigation project was implemented with NRCS <i>(please complete/fill in details)</i>
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-5
Name of Action or Project:	Bridge Replacement
Action or Project Description:	Keep access road clear, improve access, bridge replacement
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Greene County Highway Department
Action/Project Priority:	High Priority
Timeline for Completion:	2017
Potential Fund Sources:	
Local Planning Mechanisms to be Used in Implementation, if any:	Greene County Highway Department
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet	
Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	An effective riparian buffer program can assist landowners with their efforts to protect and maintain healthy riparian buffers, address invasive species, and improve the condition of unstable or degraded riparian areas. In 2009, the Catskill Streams Buffer Initiative was developed to educate and assist streamside landowners in order to provide for improved stewardship of riparian areas.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-7
Name of Action or Project:	Catskill Streams Buffer Initiative
Action or Project Description:	The GCSWCD and NYCDEP will work with landowners to protect, enhance, manage and restore riparian buffers within the WOH watershed. GCSWCD staff will conduct site visits to determine eligibility for funding through the CSBI. In addition to site visits, recruitment may also include outreach mechanisms such as press releases, targeted mailings, presentations to organizations, and Riparian Corridor Management Plan development.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Various
Plan for Implementation	
Responsible Organization:	GCSWCD/NYCDEP
Action/Project Priority:	High Priority
Timeline for Completion:	Various
Potential Fund Sources:	CSBI
Local Planning Mechanisms to be Used in Implementation, if any:	GCSWCD/NYCDEP
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Undersized culverts contributes to flooding on roadways during high flows.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-6
Name of Action or Project:	Culvert Replacements
Action or Project Description:	Work with Greene County communities to replace undersized culverts.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Various
Plan for Implementation	
Responsible Organization:	GCSWCD/Highway
Action/Project Priority:	High Priority
Timeline for Completion:	Various
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	GCSWCD/Highway
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	<p>Greene County's emergency communications system is susceptible to failure from natural hazards. The system relies on two primary and two supplementary radio towers for communications with Law Enforcement, EMS and the Fire Departments. Radio transmissions from the 911 center first run through copper phone lines which are operated by Verizon. There is no redundancy in the system so when a phone line goes down; communications to that tower are severed until Verizon can repair the line. This not only impairs communications to that particular tower, but since there are no back-up or secondary towers, communications between the 911 center and emergency responders in that coverage area is lost until the phone line is operational again. Additionally as resident, second home and tourist populations expand into previously undeveloped areas, the ability to maintain effective emergency communications throughout the county has been compromised; this project will mitigate these communications issues.</p> <p>During Hurricane Irene significant lengths of phone line were damaged and a phone company relay station flooded, which severed communications between the 911 center and the mountaintop communities as they rely on a single tower fed by a single source phone line. Historically communications failures have also occurred simply from limbs falling on the phone lines, a motor vehicle accident or heavy rain damaging lines.</p>
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Currently Greene County spends \$103,000 per year just to maintain the existing lines and it is estimated to increase to \$135,000 per year with the addition of one new tower in the mountaintop area. In 2010, Greene County contracted with the radio consulting group Blue Wing to identify ways to provide maximum emergency communications coverage. Those results provided several possible methods to achieve the desired result. Additionally, Delaware Engineering, Pittsfield Communications and Motorola have been providing coverage maps, tower site analysis and frequency identification processes to help us determine the best system to meet Greene County's needs.
Action or Project Intended for Implementation	
Action/Project Number:	CTY-1
Name of Action or Project:	Emergency Communications Infrastructure Mitigation Program
Action or Project Description:	<p>Greene County's proposed long-term hazard mitigation measure is to build a new radio transmission system to ensure continuity of critical services through installation of dedicated redundant communication lines between the 911 center and each tower. The system will protect and enhance the reliability and resilience of communications infrastructure by increasing the number of towers to maximize coverage within the county. This proposal will utilize microwave links from the 911 center to each tower in a circular fashion so that if one link is broken, the other side of the loop will be able to transmit to the tower. Additional redundancy is planned through the installation of dedicated fiber optic lines. The addition of more towers will also provide tower redundancy. In the event that a tower does experience communications failure, one of the other towers will be able to cover the affected area so that communications between the 911 center and emergency responders is maintained.</p> <p>The new system will require construction of twelve new radio towers including the radio equipment which consists of both the VHF radios and the microwave backhaul system, the buildings to house the equipment, generators, roadways and power lines. These new tower sites will also provide the ideal location to install remote weather monitoring stations so that the county can receive real-time rainfall, wind speed and other data to maintain situational awareness and enhance early warning capabilities.</p>

Action Worksheet

Action or Project Description (continued)	This project will mitigate the communications problems by providing a robust and redundant communications system with county radio coverage near 100%. Police, Fire and EMS will all be operating on VHF frequencies which will resolve issues related to cross band failures. The project will also provide a secondary benefit of access to tower space for broadband initiatives in underserved areas of the county and could also be utilized by cell phone providers to increase cell coverage and provide for cell phone redundancy in Greene County.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$12 million
Plan for Implementation	
Responsible Organization:	Greene County Emergency Services
Action/Project Priority:	High Priority
Timeline for Completion:	End of 2017
Potential Fund Sources:	DHS Homeland security grant
Local Planning Mechanisms to be Used in Implementation, if any:	Greene County Emergency Services
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Acquisition of properties in the floodplain to remove them permanently from flood hazard.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-18
Name of Action or Project:	FEMA Hazard Mitigation Acquisition Program
Action or Project Description:	Twenty-three properties in eight towns across the County have gone through the program (one in Prattsville is still in progress). Demolition takes place within three months of the closing and the property is restored to its natural floodplain state permanently removing any flood hazard.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$1.5 million
Plan for Implementation	
Responsible Organization:	Planning & Economic Development/GCSWCD
Action/Project Priority:	High Priority
Timeline for Completion:	2016
Potential Fund Sources:	FEMA (75%), CDBG (25%) for eligible landowners, and NYCDEP for City watershed properties
Local Planning Mechanisms to be Used in Implementation, if any:	Planning & Economic Development/GCSWCD
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Action Worksheet	
Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Flood hazard mitigation measures.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-19
Name of Action or Project:	Flood Hazard Mitigation Implementation Program
Action or Project Description:	Acquisition/relocation and mitigation of properties in accordance with LFA.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$17 Million
Plan for Implementation	
Responsible Organization:	CWC/GCSWCD
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	NYCDEP, CWC
Local Planning Mechanisms to be Used in Implementation, if any:	CWC/GCSWCD
Progress Report	
Date of Status Report:	No report at this time.
Report of Progress:	
Evaluation of Effectiveness:	

Action Worksheet

Name of Jurisdiction:	Town of Durham
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The current hybrid Bailey/Stone Arch Bridge is a single lane structure with limited capacity, difficult ingress/egress, and a risk of failure which would result in an extended loss of a significant transportation corridor.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-9:
Name of Action or Project:	Replacement of temporary Bailey Bridge
Action or Project Description:	Replace current "temporary" Bailey Bridge which is bearing on a deteriorating stone arch bridge with risk of failure.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Total replacement cost will likely exceed \$500,000. The new bridge could be located adjacent to the current structure which would result in minimal traffic disruption during construction.
Plan for Implementation	
Responsible Organization:	Town of Durham
Action/Project Priority:	Medium Priority
Timeline for Completion:	2019
Potential Fund Sources:	DOT/local
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Concern about hazardous cargo and potential for spills on CSX line.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-4
Name of Action or Project:	Hazardous Cargo Plan
Action or Project Description:	There's a County Steering Committee working with a State Steering Committee (with 20 other counties) on a plan which will go into effect in early January. The State will then provide supplies and training to assist with implementation of the plan.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Staff time
Plan for Implementation	
Responsible Organization:	Greene County Emergency Services
Action/Project Priority:	High Priority
Timeline for Completion:	Plan in effect from March 2016
Potential Fund Sources:	N/A
Local Planning Mechanisms to be Used in Implementation, if any:	Greene County Emergency Services
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	<p>A reach of the Kaaterskill Creek in the Town of Hunter is extremely unstable causing significant sediment loading which threatens the hamlet of Palenville, the long-term stability of County Route 32A, the Kaaterskill and Catskill Creeks, the Hudson River estuary fisheries, and causes significant sediment buildup in the Hudson River ultimately contributing to downstream deposits in the NY-NJ Harbor. The nature of the landslide is soft alluvial and glacial till soils that are eroding at the toe of the bank. The instability began approximately 20 years ago, has steadily worsened and with Hurricane Irene in August 2011 deteriorated significantly entraining sediment even at low flows and contributing large deposits of sediment along Kaaterskill Creek throughout Palenville and downstream through Catskill into the Hudson River. The USGS has been monitoring suspended sediment deposits at various stations throughout the Hudson River Watershed, and found after Hurricane Irene the Catskill Creek sub-basin, in which the Kaaterskill Creek is a tributary, was a large sediment source for the Hudson River watershed.</p> <p>The Towns of Hunter and Catskill are concerned the actively eroding landslide could jeopardize the only major transportation artery to the Town of Hunter, State Route 23A, as well as the public safety of the residents of Palenville and County Route 32A. The aggradation caused by the sediment build up from Kaaterskill Creek in Palenville is a threat to the hamlet and roadway stability of State Rte. 23A and County Route 32A. Moreover, Route 23A is vulnerable along this reach, causing significant risk to public safety and property should damage occur in future flood events shutting down this vital roadway. A secondary economic consideration is this section of 23A was recently designated under the NYS Scenic Byway Program by Governor Cuomo (click here for article). The first inter-connecting state byway in the Catskill State Park is along this stretch of road which includes the massive landslide blight on the landscape.</p> <p>The types of damages that have occurred include significant buildup of sediment in the channel (aggradation) exacerbating flood damage in Palenville to homes, public infrastructure and threatening the long term stability of roads along the stream. Sediment studies performed on the Catskill Creek show that the Kaaterskill Creek tributary contributes a large source of sediment to the Catskill Creek extending into the Hudson River potentially affecting the estuarial ecosystem. State Route 23A is the only main transportation network to the Mountaintop (Town of Hunter and beyond), therefore public safety is of utmost concern. It is the primary route on and off the Mountain for emergency and response crews to access hospitals, supplies and personnel. Moreover, Route 23A is the gateway for the northern Catskills and Greene County's predominantly tourism economy.</p> <p>Flood damages over the years to this section of 23A are numerous with the four-mile stretch between Palenville and Haines Falls (Town of Hunter) being one of the most costly state highways in the state to maintain. Past damages have occurred to 23A from flooding causing landslides, slope instability and road closures (in 2006, 23A was closed for several months after landslides triggered by heavy rains damaged the route). The Towns are seeking HMGP assistance to proactively deal with this actively eroding landslide before it threatens public health and safety.</p>
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	

Action Worksheet

Action or Project Intended for Implementation	
Action/Project Number:	CTY-12
Name of Action or Project:	Kaaterskill Creek Landslide Stabilization
Action or Project Description:	<p>The toe of the eroding bank needs to be stabilized and protected from erosive forces. Sheet piling toe protection is the best option if the geology allows for that. Soil borings would be conducted to determine the depth of the bedrock (generally 1 – 2x's the height of above ground armoring is required). The second best option if bedrock is a limiting factor is pinning stacked rock along the length of the unstable streambank. The area would need to be excavated for a keyway with pins drilled into the bedrock. Site mobilization is an important factor because the problem area is difficult to access. Whereas, the stream restoration treatments are traditional, accessing the site will be difficult and add to the cost.</p> <p>Stabilizing the toe of the eroding bank will protect it from further instability, sediment loading, and downstream impacts to infrastructure. The estimated volume of sediment loading will be calculated using a formula developed by federal NRCS, which has been used for post-Irene Emergency Watershed Protection projects. Improving the aesthetics of the eroding streambank will also be factored into the mitigation strategy given the significance of the state highway as a Scenic Byway and the economic importance to the region.</p>
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$2.5 Million
Plan for Implementation	
Responsible Organization:	Greene County Soil & Water Conservation District
Action/Project Priority:	High Priority
Timeline for Completion:	2017-2019
Potential Fund Sources:	HMGP application submitted, applied for federal funding
Local Planning Mechanisms to be Used in Implementation, if any:	Greene County Soil & Water Conservation District
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Action Worksheet	
Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Mental Health Facility located in the floodplain of Shingle Kill, very close to Emergency Services building. Old building in poor condition, has experienced flooding, has open fields adjacent to it, and is therefore a good candidate for mitigation. Groundwater intrusion in basement, SCWD in same building. Used to flood every time it rained but no problem since Irene. Pumps set up to get water out.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-16
Name of Action or Project:	Mental Health Facility Acquisition and Relocation
Action or Project Description:	Discussing relocation of mental health facility
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	GCSWCD/NYCDEP
Action/Project Priority:	High Priority
Timeline for Completion:	2018
Potential Fund Sources:	
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report:	No report at this time.
Report of Progress:	
Evaluation of Effectiveness:	

Action Worksheet	
Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Residents need additional training on sheltering in place.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-20
Name of Action or Project:	Natural Disaster Preparedness Training
Action or Project Description:	
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Staff time
Plan for Implementation	
Responsible Organization:	Greene County Emergency Services/Health Department
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	N/A
Local Planning Mechanisms to be Used in Implementation, if any:	Greene County Emergency Services/Health Department
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Improved awareness of the potential damages that can be caused by a natural disaster. Interest and awareness about hazard mitigation may lose momentum after big storms and after the plan update process wraps up, so the County will continue efforts to bring up the topic.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-3
Name of Action or Project:	Public Awareness Campaign
Action or Project Description:	Reach out to towns and villages (and for distribution of information to the general public) through their Planning Board meetings, workshops that happen after their meetings; radio interviews (similar to the ones done in 2015), public access channel piece. Greene County will look into billboards and inviting FEMA/NYS OEM to meetings.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Staff time
Plan for Implementation	
Responsible Organization:	Greene County Emergency Services
Action/Project Priority:	Medium Priority
Timeline for Completion:	One event/action every summer and every winter
Potential Fund Sources:	PDM
Local Planning Mechanisms to be Used in Implementation, if any:	Greene County Emergency Services
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Properties need to be relocated out of the riparian buffer areas within the Schoharie Creek Watershed.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-14
Name of Action or Project:	Riparian buffer acquisition program
Action or Project Description:	Piloted in the Schoharie Creek Watershed, this program will be used for properties identified in an LFA for acquisition and relocation. The program will be administered by the Catskill Center in Arkville.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Various
Plan for Implementation	
Responsible Organization:	GCSWCD/Catskill Center
Action/Project Priority:	High Priority
Timeline for Completion:	2016
Potential Fund Sources:	NYCDEP
Local Planning Mechanisms to be Used in Implementation, if any:	GCSWCD/Catskill Center
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	County Route 2 between the Falke Quarry (privately owned soil mining operation) and the Mosquito Point Bridge (connecting CR 2 to State Route 23A) is located within the 100 year flood plain of the Schoharie Creek for a distance of 2800 feet. It is the only practical access to the Falke-Cobleskill Quarry which is the primary source for soil materials for the construction industry in the western section of Greene County. The highway has been damaged in a number of storms rendering it unable to be traversed and has to essentially be rebuilt in its entirety. After the Hurricane Irene event, the County hired a consultant firm to investigate the feasibility and cost to relocate CR 2 out of the 100 year flood plain. The site is located within the New York City watershed boundary.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-8
Name of Action or Project:	County Road 2 Relocation, Town of Lexington, Greene County
Action or Project Description:	Relocate 2900 feet of two lane County highway and construct to current County standards. This will include replacement of a 12 foot box culvert carrying a small tributary to the Schoharie creek, storm water detention or retention practices, new subgrade, full depth asphaltic road surface and guiderail, as warranted.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	This project will remove this often damaged highway section outside the 100 year flood plain thus avoiding future effort and cost to repair it. It will also greatly increase the reliability of this access to a major private business. Estimated total cost of \$2.5 Million. Estimated cost includes all phases of work – engineering, right-of way and construction and inspection.
Plan for Implementation	
Responsible Organization:	Greene County Highway Department
Action/Project Priority:	High Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	Greene County Highway Department
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet	
Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	In order to reduce runoff and protect groundwater resources in the basin, the GCSWCD and NYCDEP support promoting the infiltration of stormwater through erosion and sediment control techniques such as hydroseeding of open ditches, stormwater techniques to infiltrate water into the ground, wetland enhancement, filter strips, and creation of rain gardens and bioswales to manage stormwater.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-13:
Name of Action or Project:	Creative Stormwater Practices and Critical Area Seeding
Action or Project Description:	The GCSWCD will work with multiple partners to implement stormwater projects within the Schoharie Watershed.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Various
Plan for Implementation	
Responsible Organization:	GCSWCD
Action/Project Priority:	High-Low Priority
Timeline for Completion:	Various
Potential Fund Sources:	
Local Planning Mechanisms to be Used in Implementation, if any:	GCSWCD/NYCDEP
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Stream bank restoration is needed to prevent erosion and stabilize stream banks.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-15
Name of Action or Project:	Stream Restoration Projects and Modifications
Action or Project Description:	Stream restoration projects and modifications include assessment, design, permitting, contracting, and construction oversight. The GCSWCD and NYCDEP will also work cooperatively with the Schoharie Watershed Advisory Committee (SWAC) and others to identify sites.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Various
Plan for Implementation	
Responsible Organization:	GCSWCD/NYCDEP
Action/Project Priority:	High-Low Priority
Timeline for Completion:	2016
Potential Fund Sources:	FEMA, NYCDEP/GCSWCD Schoharie SMP Contract
Local Planning Mechanisms to be Used in Implementation, if any:	GCSWCD/NYCDEP with Schoharie Watershed Advisory Committee (SWAC)
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	This one span bridge structure, BIN 3201240, carries Timber Lake Road over the Broadstreet Hollow Brook Kill in the Town of Lexington. Broad Street Hollow Brook is a tributary of the Esopus Creek. The bridge was built in 1987 to minimal local standards and is experiencing increasing element deterioration. It is rated structurally deficient by NYSDOT and FHWA. Further, it is founded on spread, gravity footings, not consistent with current standards for bridges crossing waterways. Scour pockets and wing wall failure have been addressed as temporary repairs. The bridge often traps debris during storms. Given the importance of maintaining access to properties with no alternatives, replacement of the bridge and its immediate approaches to current hydraulic and structural requirements is highly desirable.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Timber Lake Road is the sole access to several dozen properties, including residents and a major private sports recreation camp. There is no other feasible alternative access to these properties in the event of emergency bridge closure.
Action or Project Intended for Implementation	
Action/Project Number:	CTY-11
Name of Action or Project:	Replace Timber Lake Bridge over the Broadstreet Hollow Creek, Greene County
Action or Project Description:	Replace bridge and approaches to current standards in accordance with NYSDOT Bridge Design Standards. This would include establishing a temporary crossing for the construction period, providing a pile or rock -keyed foundation and new approaches. This project will ensure that emergency access can be maintained to this area under the most difficult conditions.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Greene County Highway Department
Action/Project Priority:	(High, Medium, or Low) Priority
Timeline for Completion:	
Potential Fund Sources:	DOT
Local Planning Mechanisms to be Used in Implementation, if any:	Greene County Highway Department
Progress Report	
Date of Status Report:	No report at this time.
Report of Progress:	
Evaluation of Effectiveness:	

Action Worksheet

Name of Jurisdiction:	Greene County
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Use the latest flood information and modeling techniques to evaluate flooding issues in population centers, and provide a scientifically-driven process to develop and implement solutions.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	CTY-17
Name of Action or Project:	Local Flood Analyses (LFAs) for Valley Towns/Villages
Action or Project Description:	Secure funding for LFAs in valley towns/villages (outside of NYC Watershed area)
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$50,000 per community
Plan for Implementation	
Responsible Organization:	GCSWCD
Action/Project Priority:	Medium Priority
Timeline for Completion:	2017-2020
Potential Fund Sources:	FEMA/SEMO
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

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Action Worksheet	
Name of Jurisdiction:	Town of Ashland
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Support the implementation of a backup power source for EMS/Fire local NIMS structure. This is a mitigation initiative that was identified in the previous HMP. The Town Hall and Fire Department are co-located on the same property and are relatively new having been opened in 2011 after the existing structure was destroyed in a fire the previous year. During Hurricane Irene, the building served as a shelter for those who had been displaced during the storm.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)ASH-2
Name of Action or Project:	Backup Power for EMS/Fire local NIMS structure
Action or Project Description:	Install backup power. <i>Is this project complete?</i>
Summary of Evaluation¹ Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Ashland
Action/Project Priority:	(High, Medium, or Low) Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

¹ Summarize the evaluation of potential actions and the action selected for implementation. Always consider the benefits and costs. Other criterion might include: Technical Feasibility, Political Support, Legal Authority, Environmental Impacts, positive and negative Social Impacts, and whether the jurisdiction has a person willing to be the Local Champion for implementation and is this person with the full support of the jurisdiction Administratively Capable of implementing the action selected for implementation.

Action Worksheet

Name of Jurisdiction:	Town of Ashland
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Replace or repair culverts and catch basin that have been determined to present potential sediment sources, culverts in poor structural condition, or culverts with erosion at the inlet or outlet that should be repaired. These projects were identified in the Town's Stormwater Planning & Assessment Report from December 2013.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)ASH-4
Name of Action or Project:	Undersized Culverts, Repairs Needed for Culverts and Catch Basin <i>(Combined projects into one project)</i>
Action or Project Description:	<ul style="list-style-type: none"> • Replace existing culvert with larger capacity to pass the 100 year storm at these locations on County Rte 10 – #'s 90, 78, 79, 77, 73 • Upsize culvert to pass 100 yr. base flood at these locations on West Settlement Rd - # 16, 10 • Upsize culvert to pass 100 yr. base flood at these locations on North Settlement Rd (CR 19) - # 1, 23, 31 • Upsize culvert to pass 100 yr. base flood at Campbell Road - # 13 • Upsize culvert to pass 100 yr. base flood at Mail Route Rd. # 26 • Upsize culvert to pass 100 yr. base flood on Rte. 23 # 57 • Replace catch basin on NYS Route 23-Structure 19
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$1.5 Million <i>Please break out estimated costs by culvert/catch basin if available.</i>
Plan for Implementation	
Responsible Organization:	Town of Ashland Town Board
Action/Project Priority:	Medium Priority
Timeline for Completion:	2016-2020
Potential Fund Sources:	Stormwater Capital Improvement Plan, PDM, HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	DPW
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Ashland
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)ASH-3:
Name of Action or Project:	Emergency Center in Town Hall
Action or Project Description:	Enhance function of the Town Hall to serve as a community center in emergencies.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Ashland Town Board with emergency preparedness committee
Action/Project Priority:	(High, Medium, or Low) Priority
Timeline for Completion:	
Potential Fund Sources:	CDBG/EMPG?
Local Planning Mechanisms to be Used in Implementation, if any:	Town Board with emergency preparedness committee.
Progress Report	
Date of Status Report:	No report at this time.
Report of Progress:	
Evaluation of Effectiveness:	

Action Worksheet

Name of Jurisdiction:	Town of Ashland
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	A local flood analysis is needed to identify flood vulnerabilities and potential mitigation measures.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)ASH-1
Name of Action or Project:	Local Flood Analysis
Action or Project Description:	The Town will be conducting a local flood analysis in 2016 to identify flood vulnerabilities and potential mitigation measures.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$50,000
Plan for Implementation	
Responsible Organization:	Town of Ashland
Action/Project Priority:	High Priority
Timeline for Completion:	2016
Potential Fund Sources:	PDM Planning, SMIP (NYCDEP)
Local Planning Mechanisms to be Used in Implementation, if any:	GCSWCD will be facilitating.
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Durham
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Upgrade culvert to accommodate greater flow from larger storms.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Replace culvert with single arched bottomless culvert.
Action or Project Intended for Implementation	
Action/Project Number:	(T)DUR-1
Name of Action or Project:	Culvert Replacement 1
Action or Project Description:	Replace current double culvert with a single arched bottomless culvert. Current Culvert: two (2) 8' X 40' New Culvert : one (1) 24' X 40' Regrade, re-set and re-establish road.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Estimated project cost approximately \$40,000. On an average of once every two (2) years the culvert is over capacity and/or blocked by flowing ice and/or debris associated with rain/thaw/cycle. The major risks relate to road and culvert damage and flooding of an adjacent residence with a potential loss exceeding \$100,000.
Plan for Implementation	
Responsible Organization:	Town of Durham
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	DOT/local
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Action Worksheet	
Name of Jurisdiction:	Town of Durham
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Upgrade culvert to accommodate greater flow from larger storms.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Replace current 8' X 40' culvert with larger 20' X 40' culvert.
Action or Project Intended for Implementation	
Action/Project Number:	(T)DUR-2
Name of Action or Project:	Culvert Replacement 2
Action or Project Description:	Replace current 8' X 40' culvert with larger 20' X 40' culvert. Regrade, re-set and re-establish road.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	On average the current is over-capacity on an annual basis which results in road flooding and serious erosion around the culvert. Risk primarily relates to loss of the road which is a significant transportation avenue for the area. Total culvert loss could cost more than \$50,000 to remediate and result in an extended road closure. The estimated project cost is \$45,000
Plan for Implementation	
Responsible Organization:	Town of Durham
Action/Project Priority:	Medium Priority
Timeline for Completion:	2017-2018
Potential Fund Sources:	PDM/HMGP/DOT/local
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Durham
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Replace existing generator.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)DUR-3
Name of Action or Project:	Generator for Town Building
Action or Project Description:	Need 220 volts, single phase diesel generator.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	The estimated project cost is \$14,000-\$16,000.
Plan for Implementation	
Responsible Organization:	Town of Durham
Action/Project Priority:	(High, Medium, or Low) Priority
Timeline for Completion:	2017-2018
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Greenville
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	<p>The Town of Greenville maintains an existing waste water treatment system that was originally built to serve subdivision development in the 1980's. It does not, currently, serve the traditional hamlet core of the municipality which dates to the early 19th century, nor the school district which depends upon more than a dozen septic units of more than 40 years of age upon average. The hamlet core and the school district are situated within the 100-year floodplain of the Catskill Creek Watershed. During serious storm events, most notably Hurricane Irene in 2011, outflows from aging septic systems in the hamlet's dense core into the watershed became evident. In addition, the impact of inflow and infiltration issues upon the plant's existing collections system caused a near shutdown of the facility. Discharges into the watershed approached legal limits.</p> <p>The older homes and businesses do not have adequate on-site wastewater treatment capacity. As a result heavy rains and storms overload the systems resulting in discharge of untreated or partially treated sewage to the local stream. The stream pools at a small pond in a Town Park where contaminated runoff flows to and collects. All water from the proposed service area then flows into a 110-acre NY State designated Class-2 Freshwater Wetland.</p>
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)GRE-1
Name of Action or Project:	WWTP& Sewer District Improvements, Sewer District Extension
Action or Project Description:	<p>1) Increase of capacity at the waste water treatment plant to handle increased storm water inflows to the system.</p> <p>2) Fortify existing retaining walls along the Catskill Creek Watershed areas in the Town to support related waste water collections infrastructure. Routing of the collection system along the stream also will require repair and stabilization of a 200-ft long retaining wall. This wall has been damaged successively through storms over the last two years and is in danger of collapsing and blocking the stream in the event of another heavy rain event. The wall would be stabilized and or replaced in the course of running sewer lines under and through the existing retaining wall.</p> <p>3) Resolve the existing inflow and infiltration issues within the existing collections system through the employment of new technologies and materials to stabilize the lines themselves.</p> <p>4) Extend the existing sewer district to include residential and commercial properties that currently depend upon failed or failing septic systems that are within the Catskill Creek Watershed's floodplain. The project provides for elimination of several dozen failed on-site septic systems at homes businesses and the schools in the Town of Greenville's central business district. The properties are located on relatively small lots along NYS Routes 32 and 81 and all feed to the same stream, Tributary-H-192-26-6 of Basic Creek, which in turn flows to the Catskill Creek and Hudson River.</p>
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	

Action Worksheet

Plan for Implementation

Responsible Organization:	Town of Greenville
Action/Project Priority:	High Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP/EPA – Application submitted, deadline was September 2015. Clean water SRF grant
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Athens
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The existing culvert on Schoharie Turnpike is undersized leading to localized flooding and sometimes, some road damage during heavy rain/spring runoff events.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)ATH-2
Name of Action or Project:	Box Culvert Replacement
Action or Project Description:	Replacement of culvert with a 6' X 5' X 35' box culvert structure should eliminate localized flooding.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Athens
Action/Project Priority:	(High, Medium, or Low) Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Athens
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The Town of Athens lacks full communications interoperability during emergency situation as existing radio units cannot always communicate with one another and outside agencies.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)ATH-1
Name of Action or Project:	Emergency Communications Upgrade
Action or Project Description:	The Town of Athens seeks to update to the P25 compliance and expand our radio communications system. We would conduct a radio study throughout the town on how to enhance our radio communications. We would apply for a FCC license to acquire our own frequency to be used by the town highway department and any other public safety agency within the town. A large part of these funds will go to upgrading the highway department's radios to the P25 standard and also equip our local fire departments with a starting point on enhancing their radio communications. With enhancing the town's public safety communications it would help during a town wide emergency such as any natural disaster; for example (tornado, server storms, flooding, snow storms, etc.).
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Athens
Action/Project Priority:	(High, Medium, or Low) Priority
Timeline for Completion:	
Potential Fund Sources:	DHS Homeland Security Grant/EMPG
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Athens
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The Town of Athens highway garage -- a facility that must remain operable during emergency situations -- has insufficient back up power supply capabilities. Presently, the shop only has a pto driven portable generator that currently runs when the power goes out after we hook it up. The Town Garage experiences 1-2 outages per year with duration lasting from several minutes to, in the case of a 12/2009 ice storm, several days.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Generators have been rented in the past at an unknown cost.
Action or Project Intended for Implementation	
Action/Project Number:	(T)ATH-3
Name of Action or Project:	Automatic Standby Generator
Action or Project Description:	The Town seeks automatic standby generator that would power the shop when needed for 24/7/365 functionality.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Estimated cost to be around \$35,000.
Plan for Implementation	
Responsible Organization:	Town of Athens
Action/Project Priority:	(High, Medium, or Low) Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Cairo, Greene County NY
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Low lying basin area that floods during heavy rain events. Road becomes impassable to 17 residential properties restricting ingress and egress for, but not limited to, residents, emergency vehicles, etc.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Hydrology Study to determine size of replacement of existing 42" culvert <u>Road Grade Elevation</u>
Action or Project Intended for Implementation	
Action/Project Number:	(T)CAI-1
Name of Action or Project:	Moorehouse Road Elevation Program
Action or Project Description:	To install a larger culvert pipe as per hydrology study and raise the elevation of the road.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Estimated cost not available at this time.
Plan for Implementation	
Responsible Organization:	Town of Cairo Highway Department
Action/Project Priority:	High Priority
Timeline for Completion:	An application for FEMA grant will be made in year 1 and the program should be completed within 2 years.
Potential Fund Sources:	FEMA Hazard Mitigation Grant Program (HMGP) funds FEMA Pre-Disaster Mitigation Program (PDM) funds
Local Planning Mechanisms to be Used in Implementation, if any:	The administration of this activity will be added to the Town of Cairo Highway Department's annual work plan.
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Catskill
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	During a routine inspection, it was determined that serious undermining of the two existing abutments had occurred during Hurricane Irene. This was undetected during the original inspections due to the depth of water at each abutment.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)CAT-1
Name of Action or Project:	Pennsylvania Avenue Bridge
Action or Project Description:	It is proposed to dewater each abutment base, drive sheet piles as protection to prevent further undermining, and fill the existing voids with concrete. The bridge deck will also need to be removed and replaced in order to drive the piles. The bridge spans approximately 20 feet and is approximately 24 feet wide. The existing abutments and wingwalls will be repaired and reused.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$290,000 (2013 Estimate)
Plan for Implementation	
Responsible Organization:	
Action/Project Priority:	High Priority
Timeline for Completion:	
Potential Fund Sources:	DHSES, Grant #4085, Project #1919
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Catskill
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Game Farm Road Bridge is undersized leading to flooding and flood-related damage to the road.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)CAT-2
Name of Action or Project:	Game Farm Road Bridge Replacement
Action or Project Description:	Replace the existing undersized bridge with a precast box culvert.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$200,000 construction cost
Plan for Implementation	
Responsible Organization:	
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report:	No report at this time.
Report of Progress:	
Evaluation of Effectiveness:	

Action Worksheet	
Name of Jurisdiction:	Town of Catskill
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Erosion endangering a nearby house.
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)CAT-3
Name of Action or Project:	Snake Road
Action or Project Description:	The current undersized culverts are causing erosion which is endangering a nearby house. This project will upsize the culverts and include construction of two plunge pools to stop the erosion.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$350,000
Plan for Implementation	
Responsible Organization:	
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	<p>There are two undersized stone box culverts near the State Route 81 side of Potic Creek Road. Unsure of age of construction for the two culverts, made of laid up flat stone with concrete and concrete slab as a road surface. The first (closest to Route 81) measures 40 feet long by 18 feet wide by 5 feet in depth and the second culvert measures 33 feet in length by 18 feet wide and 3 feet in depth. The culverts are undersized, narrow, and showing signs of age. During large rain storms and quick snowmelt during a warm spring day, the Grapeville Creek will rise and water will overcome the culvert and carry over the road. Potentially washing out the small bridges and leaving many people restricted by not being able to get to their homes on Potic Creek Road as well as emergency services which will take longer to reach destinations on Potic Creek Road. The two culverts were constructed during the time when the Town of Coxsackie was more rural. Over time, vehicular traffic on this road has increased, potential head on collisions happen more frequently. This road is also a thoroughfare for the residents of Earlton, Athens, Greenville and Coxsackie.</p>
Potential Actions/Projects (not being implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)CXK-1
Name of Action or Project:	Potic Creek Road
Action or Project Description:	Install new larger culverts, widen and raise Potic Creek Road. By installing two larger culverts and raising the roadbed 2 feet higher than present elevation will provide more than adequate coverage during high flooding time during the year. Widening the box culvert will eliminate a pinch point at each crossing of Potic Creek thus reducing the possibility of two cars hitting each other head on.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Coxsackie
Action/Project Priority:	High Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP/DOT/local
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Halcott
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The major challenge we face on an ongoing basis is the isolation of our town during the frequent flooding events. More than five times in the last fifteen years we have been cut off from access to our fire and emergency services by flooding in Fleischmanns (Delaware County). The only remedy would be to locate a satellite fire truck facility in our town.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)HAL-1
Name of Action or Project:	Satellite Fire Truck Building
Action or Project Description:	We have secured the property for this structure but do not have the funds to construct the building.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	 \$150,000 (Not a firm estimate)
Plan for Implementation	
Responsible Organization:	Town of Halcott
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	CDGG or local?
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Halcott
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Tropical Storm Irene was only the latest in a series of serious rainstorms that have flooded our recycling center in ever-increasing intensity, washing tin cans, plastic milk jugs, and broken glass downstream in the torrent. Paper goods, if left behind, are waterlogged beyond saving. The cost of restoring the recycle center from this storm alone was \$9,472.00. Former storm damage costs have been absorbed by the Town. The Town of Halcott is small, with only 258 residents. It is located on the edge of Greene County and is at least 45 minutes away from our County transfer station, making it virtually inaccessible to the homeowner with no truck or time to make the journey. Townspeople who do not use a hauler or who find our small recycle center full, "stockpile" their solid waste and recyclables until they can take the time to drive them to a dump. As a result, the same flood waters that wash away our recyclables, have washed away much personal garbage as well. This is a slow and quiet disaster with a price tag that impacts an entire generation. Local townspeople who used to bury, burn or do without, today find no legal or simple way of ridding themselves of their garbage. And that garbage now includes hazardous additions such as batteries, outdated computers, fluorescent light bulbs, used motor oil and unused paint cans. The damages are widespread, tainting our streams, and contaminating our reservoirs. The clean-up is costly.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Conventional solutions, such as joining our neighboring County transfer station or relocating our recycle center are not options.
Action or Project Intended for Implementation	
Action/Project Number:	(T)HAL-2
Name of Action or Project:	Retrofit Halcott Town Recycle Station
Action or Project Description:	<p>We propose to retrofit our current recyclable center and expand it to include a solid waste collection option. As per the recommendations of our Code Enforcement Officer and Flood Plain Manager, we would lift the floor of the recycle center 10" off its concrete platform, allowing flood waters to pass underneath, harmless and unimpeded. Collection bins will be designed specifically to hold objects securely, employing steel netting as opposed to the current metal barrels that tip over easily. The platform would be surrounded with heavy lattice in frames to further protect the containers.</p> <p>The recycle center site would be enlarged to include a garbage disposal option with a bear-proof dumpster provided by Greene County, and placed beyond the flood plain, and an "E" shed, a disposal site for recyclable electronics. These three options would form a mini transfer-station (MTS) for the Town. Greene County Solid Waste will transport the full dumpster to the transfer station according to a negotiated agreement with the Town. This program would allow our people to easily, quickly and legally rid themselves of their personal waste. The site will be protected from further flooding. The new center will employ one part-time worker to oversee collection and proper disposal.</p>
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	

Plan for Implementation	
Responsible Organization:	Town of Halcott
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Halcott
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)HAL-3
Name of Action or Project:	Townsend Hollow Road Culvert
Action or Project Description:	
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Halcott
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Hunter
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Multiple FEMA declarations and yearly repairs from improper drainage has caused road hazards and high repair costs. This road has a grade of 4% - 18% and has had numerous repair methods tried without success. A drainage runoff study and an engineered plan would greatly help prevent life threatening hazards during storms. The area is increasing in development and will benefit from the problems solved with this plan.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)HNT-3
Name of Action or Project:	Clum Hill Road
Action or Project Description:	The drainage runoff study and engineered stormwater drainage system with underground piping and inlets will eliminate many washout problems occurring every storm. Once the system is in place the road will need to resurfaced with blacktop.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	New stormwater drainage system would decrease overall cost of road repair and maintenance as well as increase safety for its inhabitants.
Plan for Implementation	
Responsible Organization:	Town of Hunter
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP/CDBG
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report:	No report at this time.
Report of Progress:	
Evaluation of Effectiveness:	

Action Worksheet

Name of Jurisdiction:	Town of Hunter
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Two tributaries of the Schoharie Creek combine together then pass under Plateau Mt. Rd. approximately 500 LF easterly of the road intersection at Route 214. NYSDEC has classified the westerly tributary as Class A and southern tributary as Class B once combined the Class is C. The existing structure is comprised of two 72" diameter steel pipes which are approx. 30' long. Flooding of the stream has caused damage to the drainage structure. The hydraulic analysis was completed in March 2013 and showed that replacing the existing structure with an in-kind structure is not recommended since the existing structure is undersized and comprised of multiple pipes. Undersized crossings and multiple outlets cause restrictions of natural stream flow, increased erosion due to high velocities, and intensify flooding because of clogging with debris. The engineering recommendations are: 1) Three sided culvert Clear (18'-6" x 6'-0") area sf 111.0 largest passing storm event 25 yr. or Bridge (bottom 35', top 40') x 6'-0" area sf. 225 largest passing storm 100 yr event.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)HNT-4
Name of Action or Project:	Plateau Mountain Road
Action or Project Description:	The design and construction will ensure structural integrity and appropriate hydraulic capacity, while protecting or restoring stream continuity (ecosystems). Stream continuity can be maintained by selecting structures which sufficiently span the stream channel bed and are either embedded or preferably open-bottom.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Both above solutions will have the structural integrity to maintain access and transportation needs and decrease multiple road erosion and repair needed after every significant rain event. Thus the project is proactive and prepares for further climate change.
Plan for Implementation	
Responsible Organization:	Town of Hunter
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Hunter
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The problem is the road is actually on the mountain edge from West Saugerties to Platte Clove. It is an extensively used seasonal road with many drainage and safety issues. It needs engineering and plan to complete installation of new culvert pipes, water channels, retaining walls, guide rails and resurfacing. This road is part of our scenic byway and is used by walkers, bicyclists and tourists to view and hike our many trails and enjoy the great vistas. The locals use it frequently as well because of its ease to get down the mountain.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)HNT-5
Name of Action or Project:	Platte Clove Mountain Road
Action or Project Description:	The mitigation would help resolve a continual problem with water runoff and road damage due to the strong storms the area has been receiving and is predicted to receive.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	This road is more costly due to the higher terrain and severe drops, making it more hazardous and work more difficult. The measure would increase safety and repeated damage.
Plan for Implementation	
Responsible Organization:	Town of Hunter
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Hunter
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	<p>This road has a stream crossing under it three (3) times through three culvert pipes. A hydraulic study and engineering design is needed and very important to hazard mitigation planning. During every heavy rain, especially Hurricane Irene, the road needs repair due to these inadequate culverts. The stream in between these culverts needs to be dredged reshaped and lined. In the same location 2 private driveway pipes which are the town's responsibility need the same study and engineering design.</p> <p>The first quarter mile of this road on the right hand side going up the road is a stream that is in desperate need of stabilization on both banks. During all severe rain storms severe erosion of road and stream banks occur. The road is in danger of sliding down the embankment. Engineering work and a stream hydraulics study is needed. A study and action plan is needed as soon as possible.</p>
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)HNT-2
Name of Action or Project:	Scribner Hollow Road
Action or Project Description:	The study and engineering plans would help us upgrade all infrastructure to prevent damage from occurring after every heavy rain. The stream bank stabilization will help prevent loss of the road and possibly loss of lives if the road collapses during a storm.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Hunter
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	PDM funding for both study and construction work
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Hunter
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	During Tropical Storm Irene 8/28/11 - 9/5/11 we received torrential rainfall and flash flooding in local streams which caused significant infrastructure damage throughout the Town of Hunter. This incident caused damage on over 28 roads in our town. The town needs a complete storm water analysis to identify areas where current infrastructure (culverts, bridges, conveyance channels etc.) is inadequate to handle flood flows. This should include development of an action plan that identifies priority projects appropriate for hazard mitigation funding and other funding availability. All infrastructure should be identified and data updated with GPS locations. This study was included in the Hazard Mitigation Plan Annex for the Town of Hunter.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)HNT-1:
Name of Action or Project:	Town-wide Stormwater Analysis Study
Action or Project Description:	The Town has suffered through two 100 year storms in the past 5 years and the Hurricane Irene in August 2011 was a 500 year storm. These 28 sites and others will continue to cost more and need to be addressed for the safety of the town's people. Due to the severity of storms the study will help us proactively prepare for climate change by focusing our efforts on priority sites and making repairs before the next storms.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Hunter
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	CDBG/PDM
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report:	No report at this time.
Report of Progress:	
Evaluation of Effectiveness:	

Action Worksheet

Name of Jurisdiction:	Town of Jewett
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Town Hall needs shower and generator to qualify for Red Cross Shelter.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Will need shower installed in future but no cost projection at this time, important to have backup generator to keep Town Hall operational in case of long term power outages and severe winter storms.
Action or Project Intended for Implementation	
Action/Project Number:	(T)JWT-1
Name of Action or Project:	Mitigate Town Hall
Action or Project Description:	Sustainability Install shower and generator to qualify as a Red Cross Shelter.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Cost for buying/installing 20KW propane, single phase, generator (with emergency outlet in garage). Approximately \$20,000 dollars (this is a rough estimate).
Plan for Implementation	
Responsible Organization:	Town of Jewett
Action/Project Priority:	High Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	None at this time.
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Jewett
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Mitigation needed for Wright Road. The relationship of this road and the Schoharie Creek makes full mitigation difficult and expensive even if possible and this would require enlarging the culvert under 23A controlled by the NYSDOT.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Nothing at this time
Action or Project Intended for Implementation	
Action/Project Number:	(T)JWT-2
Name of Action or Project:	Culvert Replacement on 23A - Wright Road
Action or Project Description:	Enlarge culvert under 23A.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	None at this time. \$20,000 for H & H Study.
Plan for Implementation	
Responsible Organization:	Town of Jewett
Action/Project Priority:	High Priority
Timeline for Completion:	2017-2020
Potential Fund Sources:	None at this time.
Local Planning Mechanisms to be Used in Implementation, if any:	NYSDOT and Town of Jewett
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Lexington
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Flood mitigation is needed for properties along Route 23A and Banks Road where backwater conditions extend from Schoharie Creek through culverts under Route 23, causing tributaries to flood in the vicinity of these culverts.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)LEX-2
Name of Action or Project:	Flood Mitigation along NYS Rt. 23A and Banks Road
Action or Project Description:	Mitigation may include property-specific options (elevations) and conveyance/backwater mitigation projects.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Lexington
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Lexington
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	A reach of the West Kill above Pushman's bridge on Rte. 42 is unstable causing erosion and sediment loading which threatens the short-term stability of Beech Ridge Road as well as the water quality of the West Kill and Schoharie Creek. The nature of the embankment is soft alluvial and glacial till soils that are eroding at the toe of the road embankment along the West Kill. The instability began during Hurricane Irene in August 2011 and has deteriorated significantly leaving the bank geometry below the roadway highly unstable and in a condition where failure is imminent.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Site mobilization is an important factor because the problem area is difficult to access. Whereas, the stream restoration treatments are traditional, accessing the site will be difficult and add to the cost. Stabilizing the toe of the eroding bank will protect it from further instability, sediment loading, and eliminate impacts to transportation infrastructure on the slope.
Action or Project Intended for Implementation	
Action/Project Number:	(T)LEX-7
Name of Action or Project:	Beech Ridge Road Embankment Stabilization Project
Action or Project Description:	The toe of the eroding bank needs to be stabilized and protected from erosive forces. Due to visible bed rock in the channel bed near the toe of the slope, stacked and pinned rock wall is the likely best treatment of the embankment failure. Approximately 170 feet of the embankment's length will need to be stabilized to a height of approximately 25 feet. Soil borings would be conducted to determine the depth of the bedrock and soil characteristics to inform design of the rockery wall. A keyway will need to be excavated into the bed rock to create a stable foundation for the wall. After stacking each course of the wall there will be holes drilled through the rocks and into the bedrock and pins would be installed to connect the rocks to the bed rock.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$650,000
Plan for Implementation	
Responsible Organization:	Town of Lexington
Action/Project Priority:	High Priority
Timeline for Completion:	2017
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Lexington
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Flooding every time it rains
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)LEX-1
Name of Action or Project:	Comprehensive Flood Mitigation
Action or Project Description:	<p>Proceed with comprehensive flood mitigation in Lexington Hamlet center through the projects described in the LFA from 2015:</p> <ul style="list-style-type: none"> • acquire and remove homes on south side of Route 13A; • acquire and remove Lexington Hotel; • lower the sewer pipe between Route 13A and Schoharie Creek; • create floodplain bench; and • replace Route 42 bridge with larger span based on H/H modeling
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$7 million (mostly in bridge replacement)
Plan for Implementation	
Responsible Organization:	Town of Lexington
Action/Project Priority:	Medium Priority
Timeline for Completion:	2017-2020
Potential Fund Sources:	PDM/HMGP/DOT/Local/CWC for eligible projects, NYCDEP for eligible acquisitions
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Lexington
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Buildings need elevations in FEMA SFHA.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)LEX-5
Name of Action or Project:	Elevate buildings in FEMA SFHA
Action or Project Description:	Per the LFA (2015) Elevate buildings in FEMA SFHA: 5 on Route 42 and 1 located east of Town Hall
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Lexington
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Lexington
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Building Elevations needed on Spruceton Road and Route 42 in 500-yr Flood Zone.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)LEX-6
Name of Action or Project:	Elevate buildings in 500-yr Flood Zone
Action or Project Description:	Elevate buildings in 500-yr Flood Zone on Spruceton Road (3 including Community Hall) and 1 on Route 42
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Lexington
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Lexington
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Upstream of Route 42 in West Kill Hamlet, the West Kill Creek needs stream stabilization to protect the bridge from structural damage during future floods.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)LEX-4
Name of Action or Project:	Stream Stabilization along West Kill Creek
Action or Project Description:	Stream stabilization along West Kill Creek upstream of the Route 42 bridge in West Kill Hamlet.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Lexington
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Lexington
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Flooding in Lexington & West Kill Hamlets near West Kill Creek.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)LEX-3
Name of Action or Project:	Flood Mitigation near West Kill Creek
Action or Project Description:	Pursue property-specific flood mitigation options in Lexington & West Kill Hamlets near West Kill Creek. The choice of acquisition vs. elevation will depend on the position of each building relative to the West Kill Creek floodway.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Lexington
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	HMGP/PDM/CDBG
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of New Baltimore, Greene County NY
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Staff including code enforcement and building department needs training regarding hazard mitigation.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)NWB-1
Name of Action or Project:	Staff Training
Action or Project Description:	Train all staff including code enforcement and building department regarding hazard mitigation.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of New Baltimore
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	HMGP/PDM/CDBG
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of New Baltimore, , Greene County NY
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Drainage system on Madison Avenue East is not adequate.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)NWB-2
Name of Action or Project:	Madison Avenue East Drainage System
Action or Project Description:	Replace faulty drainage system on Madison Avenue East in the Hamlet of New Baltimore with a new larger diameter drainage system.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$20,000
Plan for Implementation	
Responsible Organization:	Town of New Baltimore
Action/Project Priority:	Medium Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of New Baltimore, , Greene County NY
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Flooding at the pump station.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)NWB-3
Name of Action or Project:	Concrete Flood Wall at Waste Water Pump Station
Action or Project Description:	Install concrete flood wall at the Waste Water pump station to reduce the chances of pump station being flooded as it has in the past.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of New Baltimore
Action/Project Priority:	(High, Medium, Low) Priority
Timeline for Completion:	
Potential Fund Sources:	
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of New Baltimore, , Greene County NY
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The current standby generator is unrepairable if it should go down again due to its age. This is a very high priority as this generator provides electrical power to the fire station during power outages which is part of our critical infrastructure and is used as an emergency shelter for the western portion of the Town.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)NWB-4
Name of Action or Project:	Medway Grapeville Fire Station Backup Power
Action or Project Description:	Replacement of emergency standby generator.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$25,000-30,000
Plan for Implementation	
Responsible Organization:	Town of New Baltimore
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of New Baltimore, , Greene County NY
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Upgrade of Wastewater Treatment Plant needed.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)NWB-5
Name of Action or Project:	Replacement of Wastewater Treatment Plant
Action or Project Description:	Replacement of Wastewater Treatment Plant.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$2.5 Million
Plan for Implementation	
Responsible Organization:	Town of New Baltimore
Action/Project Priority:	High Priority
Timeline for Completion:	2017
Potential Fund Sources:	0% Loan through CWSRF
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Prattsville
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Flooding of homes near Route 23
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)PRA-2
Name of Action or Project:	Berm and Floodplain Alteration
Action or Project Description:	Survey lowering berm below State 23 bridge to determine flood reduction to nearby homes. This should be done in combination with floodplain vegetation clearing.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Prattsville
Action/Project Priority:	(High, Medium, or Low) Priority
Timeline for Completion:	
Potential Fund Sources:	
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Prattsville
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	<p>The Town of Prattsville experienced unprecedented flood damage from Hurricane Irene on August 28, 2011. The Town sustained millions of dollars of worth of damage to its Main Street business and residential district. A flood study was conducted addressing the watershed hydrology, existing riverine morphology, existing channel hydraulics and floodwater elevations along a one mile stretch of the Schoharie Creek that parallels Prattsville's business district.</p> <p>A detailed hydraulic engineering study was done after the flood to identify options for reducing floodwater elevations and subsequent damage to infrastructure. One recommendation is to allow more floodway capacity by reclaiming land in the floodway and floodplain. The largest parcel in the study area is a twelve-acre anchor business that is considering a FEMA buyout (HMGP disaster # 4020). The business was substantially damaged by Irene.</p> <p>Prior to the flood, the business, Dimensional Hardwoods, was manufacturing furniture parts and some of the highest grade baseball bat billets in the country. In fact, 20–30% of the professional grade billets that left the bat factory made their way to the major leagues. The factory produced rough split and lathed wooden dowels that were then vacuum dry kilned. The state-of-the-art kilns were developed with grants and research from SUNY Environmental Science and Forestry and Watershed Agricultural Council (WAC). The company's product was packaged and shipped to baseball bat factories in 15 states and six countries. The flooding from Tropical Storm Irene wiped out the factory, equipment, and the kilns. Looking ahead, the bat factory is cultivating a "Made in Prattsville" strategy that will capture the heart of baseball fans while at the same time drive energy independence and help to jump start Prattsville's community recovery. The company's focus is to produce wood products and promote the local and regional forestry industry throughout the state of New York.</p>
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	The FEMA buyout in itself however is not enough for the owner to relocate. A relocation strategy needs to include purchasing a large enough parcel to relocate to, infrastructure investment (water, sewage, utilities), highway access, permitting, and design, and possible site remediation of the existing parcel if hazardous material is found (due to past usage this is a possibility).
Action or Project Intended for Implementation	
Action/Project Number:	(T)PRA-1
Name of Action or Project:	Made in Prattsville Business Recovery Park
Action or Project Description:	<p>By utilizing all of the waste products to convert into useable cellulosic ethanol and wood pellets, the "Made in Prattsville" concept would provide discounted energy and fuel to the entire community and add lesser dependence on foreign petroleum. Additionally, the project will include a wood crafts open market and retail shop, river walk overlook, river walk trail, and ice cream stand.</p> <p>Reclaiming 12 acres of floodplain on the Schoharie Creek in Prattsville's Business District, relocating the Huntersfield Creek outlet (a tributary to Schoharie), removing berms, and select channel dredging are preliminary recommendations in the local flood analysis conducted for Prattsville (April 2012). In order to successfully relocate Dimensional Hardwoods, the anchor business, out of the floodplain and remain a viable business for the town, a</p>

	relocation strategy needs to be developed.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	This project will add leverage to the other programs, and vice versa, and allow each to contribute to a rebuilding strategy starting with this core anchor business and developing other businesses that have the potential to create local jobs and add value-added economic activity that would complement the emergence of a bio-fuels crop industry and support sustainable agriculture in the Prattsville region.
Plan for Implementation	
Responsible Organization:	Town of Prattsville
Action/Project Priority:	(High, Medium, or Low) Priority
Timeline for Completion:	
Potential Fund Sources:	NYRCR, Community Development Block Grant, FEMA HMGP Acquisition (disaster # 4020), PDM, EDA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Prattsville
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Replace the Route 23 Bridge with a large span to pass higher flood flows as the current bridge is susceptible to loss of foundation materials and flooding.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)PRA-4
Name of Action or Project:	Route 23 Bridge Replacement
Action or Project Description:	Replacement of Route 23 Bridge based on modeling performed for the Local Flood Analysis in 2014.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Prattsville
Action/Project Priority:	High Priority
Timeline for Completion:	2016
Potential Fund Sources:	HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Prattsville
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Reduce flooding along the Schoharie Creek
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)PRA-3
Name of Action or Project:	Deepen and Widen the Schoharie Creek
Action or Project Description:	Deepen and widen the Schoharie Creek in the vicinity of the business district using HEC RAS modeling performed for the local flood study (2014). Channel configuration spanning 210 to 260 feet in width anticipates drop in water surface elevations from two to almost seven feet during a 100-year event.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Prattsville
Action/Project Priority:	(High, Medium, or Low) Priority
Timeline for Completion:	
Potential Fund Sources:	UISACE, NRCS
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Windham
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	This culvert is a four-foot undersized corrugated metal pipe culvert. The culvert needs to be replaced to provide additional capacity to reduce local flooding impacts.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)WIN-1
Name of Action or Project:	Culvert Replacement
Action or Project Description:	Upgrade drainage infrastructure along CR 56 in the area of 97 CR 56 to improve stormwater runoff with a six foot by six foot box culvert.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	This project will expand capacity, improve mobility, ensure access to the dam, and reduce localized flooding impacts. \$300,000
Plan for Implementation	
Responsible Organization:	Town of Windham
Action/Project Priority:	Medium Priority
Timeline for Completion:	2016
Potential Fund Sources:	NYRCR, PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	Municipality, (likely through flood advisory committee and NFIP administrator)
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Windham
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Sheet flow flooding in the Hamlet of Hensonville.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)WIN-5
Name of Action or Project:	Drainage Study in Hamlet of Hensonville
Action or Project Description:	Perform drainage study in Hamlet of Hensonville on SR 296 and CR 65 to identify remediation actions for sheet flow flooding.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$50,000
Plan for Implementation	
Responsible Organization:	Town of Windham
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	PDM, HMGP, Greene Co. Highway
Local Planning Mechanisms to be Used in Implementation, if any:	Municipality, local DPW
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Windham
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Emergency generators at Town of Windham emergency shelters are needed. These shelters will be used in the event of evacuation of people within the inundation zone, associated with a flash flooding event resulting from a dam failure.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)WIN-2
Name of Action or Project:	Back-up Power
Action or Project Description:	Provide for emergency generators at Town of Windham emergency shelters.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$100,000
Plan for Implementation	
Responsible Organization:	Town of Windham
Action/Project Priority:	Medium Priority
Timeline for Completion:	2016
Potential Fund Sources:	Capital Improvement Budget, HMA grant if project is part of a larger mitigation project, NYRCR (CDBG), PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	Town of Windham Emergency Management
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Windham
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Implement comprehensive flood mitigation actions in high risk areas.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)WIN-4
Name of Action or Project:	Local Flood Analysis Flood Mitigation Actions
Action or Project Description:	<p>Work cooperatively with GCSWCD, NYCDEP, and other funders to implement comprehensive flood mitigation actions in high risk areas described in the Local Flood Analysis from 2015:</p> <ol style="list-style-type: none"> 1) Remove existing structures out of the floodway (HRA #3), specifically homes located at 120 County Rte 65, and at 109 County Route 65 (status unknown). These are located in the FEMA floodway and should be removed. 2) Implement Alt. 4.2 in LFA: Replace Main Street (Rt. 23) bridge and create floodplain bench on Mitchell Hollow Creek by acquiring and relocating three commercial structures (5327, 5330 and 5331 State Rte. 23). Passed BCA. Significant flood reduction potential 3. Implement Alt. 4.3 – floodplain enhancement downstream of Church Street which would require buying out and relocating GNH Lumber.
Summary of Evaluation	
Benefits (losses avoided)	
Estimated Cost	\$6 million (mostly due to Rt. 23 bridge replacement)
Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Windham
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2020
Potential Fund Sources:	FEMA HMGP, NYCFFBO, CWC FHMIP, GCSWCD SMIP, NYSDOT (bridge replacement)
Local Planning Mechanisms to be Used in Implementation, if any:	Municipality, (likely through flood advisory committee and NFIP administrator)
Progress Report	
Date of Status Report:	No report at this time.
Report of Progress:	
Evaluation of Effectiveness:	

Action Worksheet

Name of Jurisdiction:	Town of Windham
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The Mad Brook stream bank needs structural stabilization to ensure continued functionality and flood protection.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)WIN-6
Name of Action or Project:	Mad (Pratt) Brook Stream Bank Restoration Alternatives
Action or Project Description:	Continue to support the study of Mad (Pratt) Brook stream bank restoration alternatives.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Windham Highway Department
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	NYRCR, Catskill Watershed Corp, Town
Local Planning Mechanisms to be Used in Implementation, if any:	Town of Windham Highway Department
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Windham
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Survey of road drainage and condition alternatives is needed.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)WIN-7
Name of Action or Project:	Road Drainage and Condition Survey
Action or Project Description:	Perform a town-wide survey of road drainage and condition alternatives.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Windham Highway Department
Action/Project Priority:	(High, Medium, or Low) Priority
Timeline for Completion:	
Potential Fund Sources:	Town of Windham Operating Budget, CDBG/PDM connecting to a specific project
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Town of Windham
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	WWTP & Water systems need protection
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(T)WIN-3
Name of Action or Project:	WWTP and Water Systems
Action or Project Description:	Consolidation with Ski Windham complete.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Town of Windham
Action/Project Priority:	High Priority
Timeline for Completion:	
Potential Fund Sources:	
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Athens
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Union Street Culvert Replacement- <i>Two different culverts. One culvert dropped.</i>
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Sleeve the culvert with a smaller pipe. Still being considered but not the preferred approach.
Action or Project Intended for Implementation	
Action/Project Number:	(V)ATH-1
Name of Action or Project:	Culvert Replacement
Action or Project Description:	Replace culvert and widen roadway.
Summary of Evaluation	
Benefits (losses avoided)	\$125,000
Estimated Cost	\$150,000
Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Department of Public Works
Action/Project Priority:	Medium Priority
Timeline for Completion:	2016
Potential Fund Sources:	Private materials donation. FEMA Hazard Mitigation Grant Program funds FEMA Pre-Disaster Mitigation Program funds. NYSCWSRF
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report:	No report at this time.
Report of Progress:	
Evaluation of Effectiveness:	

Action Worksheet

Name of Jurisdiction:	Village of Athens
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	In addition to the main sewer plant in the Village, Brick Row has a small sewer plant that serves the residents of Brick Row, the second historic district in the Village. This sewer plant is in a flood zone on the Hudson River at the end of Brick Row. The Village is involved in talks with the Sleepy Hollow Lake management to build a series of pump stations which would remove the Brick Row Waste Water Plant from operation and pump the sewage from SHL and Brick Row directly to the main plant. Problems with the Brick Row site would be mitigated by this action.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Remove existing plant and construct pump station to direct sewage flow to Main Plant Remove existing plant and replace with a new plant.
Action or Project Intended for Implementation	
Action/Project Number:	(V)ATH-2
Name of Action or Project:	Brick Row Sewer Plant
Action or Project Description:	Removal of this plant and construction of pump station and a force main. System would be a public/private partnership with a local development.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$750,000 \$750,000-\$1.7 M
Plan for Implementation	
Responsible Organization:	Village of Athens
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2019
Potential Fund Sources:	FEMA Hazard Mitigation Grant Program funds FEMA Pre-Disaster Mitigation Program funds. NYSCWSRF
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Athens
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The system is old and inadequate to deal with the amount of stormwater that flows into the basements of residences and the Village Sewer plant. Some progress has been made in the Union/Constantine Court area, but much is left to be done. Much of the drainage dates back to the 1900's, and much doesn't even exist, leaving water running on the surface. Certain areas along state road tend to flood with regularity. Much of the natural drainage area was previously filled with dredging residue. Perhaps larger culverts would alleviate some of the flooding. Drainage throughout the Village remains a costly issue to face.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	<i>A wide range of corrective actions would be cost prohibitive. The study would enable the Village to set priorities.</i>
Action or Project Intended for Implementation	
Action/Project Number:	(V)ATH-3
Name of Action or Project:	Village of Athens Drainage System
Action or Project Description:	Perform a full study of the drainage system in the Village of Athens.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$50,000 A study would cost \$100,000.
Plan for Implementation	
Responsible Organization:	Village of Athens
Action/Project Priority:	Low Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	FEMA Hazard Mitigation Grant Program funds FEMA Pre-Disaster Mitigation Program funds. NYSCWSRF
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Athens
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	In addition to a new drainage system and in conjunction with the sewage plant and drainage system work, new sewer lines should be placed where necessary. These are old and when they break and leak, they add to the high flow to the sewer plant.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Replacement of the water lines was rejected as being too costly to even consider.
Action or Project Intended for Implementation	
Action/Project Number:	(V)ATH-4
Name of Action or Project:	New Sewer I & I Work
Action or Project Description:	Consider replacement of sewer. Ongoing I&I work and the rehab of manholes and sewer mains.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$50,000 per event. \$5.0 M
Plan for Implementation	
Responsible Organization:	Village of Athens
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2019
Potential Fund Sources:	FEMA Hazard Mitigation Grant Program funds FEMA Pre-Disaster Mitigation Program funds. NYSCWSRF
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Athens
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Consider relocation of Public Works Building. The Department of Public works Building is on the Hudson River and houses the Department of Public Works and their equipment. The building is in a flood zone and all equipment needs to be removed during a heavy rain event because of flooding (the machinery shed is a particular concern). However, the problem of cost for this project remains an issue.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Expansion of the existing building. Village does not own the surrounding property.
Action or Project Intended for Implementation	
Action/Project Number:	(V)ATH-5
Name of Action or Project:	Relocate Department of Public Works Building
Action or Project Description:	The Department of Public Works should have a new building erected outside of the flood zone near the fire department building.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Potential losses of \$300,000. \$1.5 M. Current building is structurally unsound
Plan for Implementation	
Responsible Organization:	Village of Athens
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2018
Potential Fund Sources:	FEMA Hazard Mitigation Grant Program funds FEMA Pre-Disaster Mitigation Program funds, NYSCWSRF
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Athens
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	<p>The Village of Athens Sewage plant is located right on the Hudson River in the flood zone on Water Street and Market Streets. Storm water previously entered the plant and created high inflow and infiltration and created a violation of the SPDES permit for required usage of the plant. Renovation of the Main Waste Water Treatment was initiated after the development of the last plan.</p> <p>The renovation of the Main Waste Water Plant is now complete, eliminating several potential sources of storm damage. New clarifiers, a new sludge press, waterproof equipment and better drainage upgrades have helped to mitigate storm effects. Electrical service to plant has been relocated to higher area within the plant. An underground fuel tank has been removed. When the basement flooded in 2014, due to human error, the VFD's were moved out of the flood zone and the heat was converted to electric resulting in further effective mitigation. A second clarifier was constructed and the old clarifier and manhole were elevated considerably above previous flood levels. Capacity was also increased. A total of 4.6 million dollars was invested in those upgrades. Approximately \$600,000, of that amount went into the treatment of I & I with very positive results. The consent order from the NYS DEC due to high inflow and infiltration has been lifted. While the rehabbed plant is not flood proof, several steps were taken to make it more resistant to natural hazards.</p>
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)ATH-6
Name of Action or Project:	Wastewater Treatment Plant Flood Mitigation
Action or Project Description:	New influent pumps should be purchased to assure that increased inflow during storms can be properly handled.
Summary of Evaluation	
Benefits (losses avoided)	
Estimated Cost	\$20,000
Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Village of Athens
Action/Project Priority:	Medium Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	In house
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report:	No report at this time.
Report of Progress:	
Evaluation of Effectiveness:	

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Repetitive flooding of the NYS Route 385/CSX underpass frequently results in closure of the main route into and out of the Village.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXX-1
Name of Action or Project:	Rt 385/CSX Underpass
Action or Project Description:	Complete drainage assessment and design/implement improvements to remedy repetitive flooding of the NYS Route 385/CSX underpass. Remedies would include improvements to conveyance system and reconfiguration of SW outfall to eliminate back water effect when Coxsackie creek is at flood stage.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$2 Million
Plan for Implementation	
Responsible Organization:	NYS DOT/Village of Coxsackie
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	NYS DOT, CSX Rail, Village of Coxsackie, PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Drainage from Apple Blossom Lane and east to Matthew Lane and Luke Ave.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Complete drainage assessment and design/implementation of drainage improvements to remedy a repetitive flooding problem at the development known as Flach Development on Apple Blossom Lane, and the avenues of Matthew, Mark, and Luke and Howard Drive.
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXK-17
Name of Action or Project:	Drainage from Apple Blossom Lane and east to Matthew Lane and Luke Ave.
Action or Project Description:	Design and install drain piping. Replace approximately 70 water meters with remote read models.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	<p>Relieve the standing water caused by the slope of the area trapped in resident's back yards between street located storm drains. This lack of proper drainage is causing extensive flooding of basements and crawlspaces resulting in structural damage to homes, and street flooding, which freezes in winter months leaving dangerous conditions. Most of the crawl spaces along the street are flooded repeatedly and several of the homes have had to replace masonry elements and/or rotten sill plates. Water meters were placed in the crawl spaces and most of those homes cannot get in to read the meters. Sheds/pools etc. have been built across a swale there after construction. This has interrupted a diversion flow off houses on Apple Blossom Lane to run north along all the Matthew Lane houses to the access road down the street.</p> <p>Estimated cost is between \$500,000 and \$700,000.</p>
Plan for Implementation	
Responsible Organization:	Village of Coxsackie
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	HMGP, Other grants
Local Planning Mechanisms to be Used in Implementation, if any:	Village Engineer, Village DPW
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Drainage on lower Church St., Franklin St. and South River St.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	Complete drainage assessment and design/implementation of drainage improvements to remedy a repetitive flooding problem.
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXX-16
Name of Action or Project:	Drainage on lower Church Street/Franklin Street and South River Street
Action or Project Description:	Design and install corrective measures.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	There is a high flow diversion that comes from the creek running in the gully south of lower Church Street. There is a pipe there that takes some of the flow when it is high and carries it down the street between 102 South River St. and 1 Franklin St. The area is subject to further damage of getting blown out again by future flooding. Estimated cost is between \$300,000 and \$600,000.
Plan for Implementation	
Responsible Organization:	Village of Coxsackie
Action/Project Priority:	Low
Timeline for Completion:	2016-2017
Potential Fund Sources:	HMGP, Other grants
Local Planning Mechanisms to be Used in Implementation, if any:	Village Engineer, village DPW
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Instructions

Name of Jurisdiction:	<i>Give the name of your municipality</i>
Name of Haz. Mit. Plan:	<i>Name of the Hazard Mitigation Plan when it is a Multi-Jurisdictional Plan</i>
Risk / Vulnerability	
Problem being Mitigated:	<i>Describe the specific problem or area of concern. Each Action Worksheet should describe a unique problem. A well written problem statement is key to a successful mitigation action.</i>
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	<i>For each problem, consider different types of mitigation actions/projects. Document this consideration by naming the potential actions/projects considered and by explaining why each is not being implemented. The documentation of alternatives encourages comprehensive thinking and facilitates the preparation of grant applications.</i>
Action or Project Intended for Implementation	
Action/Project Number: Name of Action or Project:	<i>Give each action a unique number and name (title) for easy reference. It is recommended that the municipality's initials be part of the action number to avoid confusion in multi-jurisdiction plans. For example, the City of Long Beach might use the number LB-1 for their first action.</i>
Action or Project Description:	<i>Describe the work to be done. It should be a unique statement of work, not a generic statement. Sources, such as FEMA's Mitigation Ideas publication, include generic actions to trigger the brainstorming of specific actions that could be taken. These generic actions must be refined into specific actions that address the specific problem at hand.</i>
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	<i>Summarize the evaluation of the action/project. Part of this evaluation must be a consideration of the benefits (losses avoided) and costs for the project. Describe any other factors and how they affected the decision. Factors such as technical, legal, environmental, social, and political considerations. The capacity of the jurisdiction to undertake this work should also be considered.</i>
Plan for Implementation	
Responsible Organization:	<i>This should be the name of a department or agency, not the name of the municipality.</i>
Action/Project Priority:	<i>Assign a project priority – high, medium, and low.</i>
Timeline for Completion:	<i>State the target time when the action/project will be completed. Other timeline information might also be provided, such as the estimated start date. All actions must have a point in time when they will be completed in order to be considered a mitigation action as defined by FEMA. Actions which are "ongoing" (e.g. maintenance) reduce risk for the short-term and may be very worthy activities, but they do not meet the definition of mitigation action for this plan. Mitigation action for this plan must reduce risk for the long-term.</i>
Potential Fund Sources:	<i>Multiple sources of potential funding should be listed when appropriate.</i>
Local Planning Mechanisms to be Used in Implementation, if any:	<i>Other plans (e.g. land use plans) and processes (e.g. capital budgeting process) are often means through which mitigation actions can be more easily implemented. Consider the use of local planning mechanisms and identify any existing planning mechanisms that will be used to implement this action/project.</i>
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	<i>In the future this space may be used to report on progress. Leave this space blank until it is time to complete a status report.</i>

Action Worksheet

Example

Name of Jurisdiction:	Town of London, Bristol County NY
Name of Haz. Mit. Plan:	Bristol County Multi-Jurisdictional Hazard Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The Taunton River is subject to ice jams near River Road. On multiple occasions homes in this area have been flooded. Homeowners have incurred high rebuilding costs, over and above insurance claims. Traffic along this thoroughfare is disrupted during flood events.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	<p><u>Taunton River Rock Removal</u> – Remove the large rocks from the river that catch ice flows. This alternative is not being pursued because the financial costs would be very high and the effectiveness of this is in doubt. It would also jeopardize the viability of the river as a fishing destination.</p> <p><u>Acquire Homes</u> – Offer to purchase the affected homes. Upon taking ownership, remove the homes and return the land to its natural state. This alternative is not being pursued because homeowners do not want to leave the community. Removal of these homes would also diminish the town's tax base.</p> <p><u>Educate River Road Homeowners</u> – Distribute a brochure to River Road homeowners describing the probability of future flooding and suggesting possible mitigation steps they may take. This option is not being pursued because the homeowners are well aware of the risk and the mitigation actions they may take. They have already several smaller / affordable mitigation actions. They cannot afford to do more.</p>
Action or Project Intended for Implementation	
Action/Project Number:	L-1: River Road Home Elevations Program
Name of Action or Project:	
Action or Project Description:	Offer to partially fund the elevation of homes that have been multiple times over the past thirty-years. When homeowners accept this offer, homes will be elevated above base flood evaluation and according to NYS building code.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	Partially funding home elevations makes this option affordable to homeowners and avoids a lessening of the town's tax base. The mitigation action would avoid future flood damage of about \$750,000. The cost of the elevation program is expected to be just under \$500,000. The program would be voluntary, making it more socially and politically acceptable.
Plan for Implementation	
Responsible Organization:	Town Planning Department
Action/Project Priority:	High Priority
Timeline for Completion:	An application for a FEMA grant will be made in year 1 and the program should be completed within 3 years.
Potential Fund Sources:	FEMA Hazard Mitigation Grant Program (HMGP) funds FEMA Pre-Disaster Mitigation Program (PDM) funds
Local Planning Mechanisms to be Used in Implementation, if any:	The administration of this activity will be added to Planning Department's annual work plan.
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	North side of the road has been collapsing for 30 years and is sliding down the embankment.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXX-2
Name of Action or Project:	Church Street Stabilization
Action or Project Description:	Stabilize Church Street (from 56-58 Church Street).
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$500,000 - \$750,000
Plan for Implementation	
Responsible Organization:	Village of Coxsackie
Action/Project Priority:	High Priority
Timeline for Completion:	2017-2020
Potential Fund Sources:	Local or DOT
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Cossackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Reduce flooding along the Cossackie creek.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXK-3
Name of Action or Project:	Flood Attenuation Basins
Action or Project Description:	Work cooperatively with the Town of Cossackie to undertake the design and implementation of a series of shallow flood attenuation basins to reduce flooding along the Cossackie creek. Initial assessments indicate that 4-6 structures placed on strategic waterways feeding the Cossackie Creek would have an immediate benefit. Such structures would be similar to an existing structure already constructed by the Greene County IDA on an unnamed tributary located east of NYS Route 81. Basins would be designed as wetland cells and would provide secondary benefits due to wetland creation as well as habitat value for endangered species known to be in this area. Potential sites include former farm land located on the grounds of the Cossackie and Greene Correctional facilities.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$500,000
Plan for Implementation	
Responsible Organization:	Village of Cossackie/Town of Cossackie
Action/Project Priority:	Medium Priority
Timeline for Completion:	2017-2020
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Currently only 1 of 3 intake gates that regulate water flow is functioning.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXX-11
Name of Action or Project:	Gate House Intake at Climax Reservoir
Action or Project Description:	Repair the intake gates so all three are functioning as intended.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$500,000
Plan for Implementation	
Responsible Organization:	Village of Coxsackie
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Slope failure has occurred and southbound lane is collapsing.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXX-4
Name of Action or Project:	Stabilize Kings Road
Action or Project Description:	Stabilize the west side of Kings Road.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$500,000-700,000
Plan for Implementation	
Responsible Organization:	Village of Coxsackie
Action/Project Priority:	Medium Priority
Timeline for Completion:	2017-2020
Potential Fund Sources:	PDM, HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Cocksackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Improve drainage between the Getty station and the rescue squad on Mansion Street to avoid flooding in local cellars and mosquito breeding.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXX-5
Name of Action or Project:	Mansion Street Drainage
Action or Project Description:	Design and install corrective measures.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$300,000 – 500,00
Plan for Implementation	
Responsible Organization:	Village of Cocksackie
Action/Project Priority:	Medium Priority
Timeline for Completion:	2016-2017
Potential Fund Sources:	PDM, HMGP/CDBG
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Retaining wall needs to be stabilized and drainage is needed to prevent wall failure and avoid danger of collapse of the four houses that are 14' below the wall on New Street between 44 and 52 on the northbound lane.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXK-6
Name of Action or Project:	Retaining Wall and Drainage on New Street
Action or Project Description:	Rebuild the retaining wall and provide drainage in-wall to prevent wall failure and avoid danger of collapse of the four houses.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$300,000 - \$500,000
Plan for Implementation	
Responsible Organization:	Village of Coxsackie
Action/Project Priority:	High Priority
Timeline for Completion:	2017 - 2020
Potential Fund Sources:	PDM, HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Need to remedy drainage and sliding problems to prevent road failure and avoid danger of collapse on north side of Noble Street.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXK-7
Name of Action or Project:	Drainage Assessment and Improvements for Noble Street
Action or Project Description:	Complete a drainage assessment and design/implement improvements to remedy drainage and sliding problems to prevent road failure and avoid danger of collapse on the north side of Noble Street.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$300,000 - \$500,000
Plan for Implementation	
Responsible Organization:	Village of Coxsackie
Action/Project Priority:	Medium Priority
Timeline for Completion:	2017-2020
Potential Fund Sources:	HMGP, other grants
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The Village monitors and maintains the creek between the two reservoirs. Contaminants currently enter the water system (creek) as water flows between the two reservoirs, requiring more chemicals to provide safe drinking levels.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXK-15
Name of Action or Project:	Pipe Connecting Two Reservoirs
Action or Project Description:	Install a pipe between Climax and Medway Reservoirs.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$2,000,000
Plan for Implementation	
Responsible Organization:	Village
Action/Project Priority:	Low Priority
Timeline for Completion:	2017-2020
Potential Fund Sources:	PDM/HMGP/NYSDEC
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Cossackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	17 - 27 Riverside Avenue: The two houses and road are vulnerable to ground failure by river.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXX-8
Name of Action or Project:	Riverside Avenue Retaining Wall to Address Slope Failure
Action or Project Description:	Install retaining wall or sheet pilings to stop slope failure.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	
Plan for Implementation	
Responsible Organization:	Village of Cossackie
Action/Project Priority:	Medium Priority
Timeline for Completion:	2017-2020
Potential Fund Sources:	PDM, HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Spillway at lower reservoir is deteriorated and needs complete overhaul.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXX-12
Name of Action or Project:	Spillway at Lower Reservoir
Action or Project Description:	Design/implement a complete overhaul of the spillway.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$500,000
Plan for Implementation	
Responsible Organization:	Village
Action/Project Priority:	Medium Priority
Timeline for Completion:	2017 - 2020
Potential Fund Sources:	Dam Safety Program
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The water distribution system and sewer lines, including mains, valves, hydrants and most every component are aging.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXX-15
Name of Action or Project:	Water Line Replacement
Action or Project Description:	Replace nearly 40 miles of distribution system
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$40,000,000 (\$1,000,000/mi)
Plan for Implementation	
Responsible Organization:	Village
Action/Project Priority:	Low Priority
Timeline for Completion:	2017 - 2020
Potential Fund Sources:	NY Rural Water Association
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Need additional water storage capacity
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXX-14
Name of Action or Project:	Water Tank
Action or Project Description:	Purchase and install a new 2 million gallon water tank.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$2,000,000
Plan for Implementation	
Responsible Organization:	Village
Action/Project Priority:	High Priority
Timeline for Completion:	2019
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	Eliminate repetitive flooding problems and overloading of the West Coxsackie sewer pump station.
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXX-9
Name of Action or Project:	West Coxsackie Sewer Trunk Line
Action or Project Description:	Relocation of West Coxsackie sewer trunk line along the Coxsackie Creek.
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$500,000 - \$750,000
Plan for Implementation	
Responsible Organization:	Village of Coxsackie
Action/Project Priority:	High Priority
Timeline for Completion:	2017 – 2020
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Coxsackie
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan
Risk / Vulnerability	
Problem being Mitigated:	The Wastewater treatment plan was built in 1973
Potential Actions/Projects (not being Implemented at this time)	
Actions/Projects Considered with Summary Evaluation of Each:	
Action or Project Intended for Implementation	
Action/Project Number:	(V)CXX-10
Name of Action or Project:	Wastewater Treatment Plant for Infrastructure
Action or Project Description:	Replace the Wastewater Treatment Plant
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$10 Million
Plan for Implementation	
Responsible Organization:	Village of Coxsackie
Action/Project Priority:	High Priority
Timeline for Completion:	2016-2019
Potential Fund Sources:	PDM/HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

Action Worksheet

Name of Jurisdiction:	Village of Hunter																										
Name of Haz. Mit. Plan:	Greene County Multijurisdictional All Hazards Mitigation Plan																										
Risk / Vulnerability																											
Problem being Mitigated:	A stormwater infrastructure assessment was conducted in the Village of Hunter and identified swales, culvert inlet/outlets and flood prone areas that would benefit from best management practice retrofits to decrease stormwater runoff and associated flood hazards during storm events. For example, Stormwater from Glen Avenue, Margarenten and a section of Route 23A discharge to Mad Brook. Mad Brook also receives drainage from a large area of undeveloped area north of Route 23A. Mad Brook discharges into the Schoharie Creek. There are four swales and four culverts located along Glen Avenue and Looking Glass Road that represent potential sediment source areas.																										
Potential Actions/Projects (not being Implemented at this time)																											
Actions/Projects Considered with Summary Evaluation of Each:	<p>Culverts in poor condition, listed below, have been determined to represent potential flood and sediment source areas and should be assessed for proper storm conveyance. Swales have also been identified that need upgrading and stabilization using the "New York Standards and Specifications for Erosion and Sediment Control" specification for grassed waterways and the specification for rock outlet protection. An estimated 5,200 linear feet of swale within the incorporated Village of Hunter should be stabilized using erosion control blankets followed by seeding. In swales where there is a continual base flow the center of the channel should be rock lined.</p> <p>BMP's for retrofitting problem swales within the Village of Hunter will be part of the action proposed. A summary of culvert inlets and culvert outlets that could potentially represent a flood and sediment source problem with the Village are provided below. Areas of erosion and runoff patterns in bare soil were observed at either the inlet or outlet of these culverts. Roads with culverts that had either problem inlets and/or outlets included:</p> <table style="width: 100%; border: none;"> <tr> <td>VOH 1 – Berry</td> <td>VOH 2 - Botti</td> </tr> <tr> <td>VOH 3 – Bridge</td> <td>VOH 4 - Brook</td> </tr> <tr> <td>VOH 5 – Central</td> <td>VOH 6 - Clearview</td> </tr> <tr> <td>VOH 7 - Colonels Drive</td> <td>VOH 8 – Ethel Ct.</td> </tr> <tr> <td>VOH 9 – Gaby</td> <td>VOH 10 - Garfield</td> </tr> <tr> <td>VOH 11 - Hunter Lane</td> <td>VOH 12 - Hunter Road</td> </tr> <tr> <td>VOH 13 – Lake Dr.</td> <td>VOH 14 - Linda</td> </tr> <tr> <td>VOH 15 - Lookout Mntn.</td> <td>VOH 16 - Maple</td> </tr> <tr> <td>VOH 17 – Mountain</td> <td>VOH 18 - Overlook</td> </tr> <tr> <td>VOH 19 – Pine</td> <td>VOH 20 – Point Breeze</td> </tr> <tr> <td>VOH 21 – Riverside</td> <td>VOH 22 - Route 23A</td> </tr> <tr> <td>VOH 23 - Route 296</td> <td>VOH 24 - Rusk Hollow</td> </tr> <tr> <td>VOH 25 - Scribner</td> <td></td> </tr> </table>	VOH 1 – Berry	VOH 2 - Botti	VOH 3 – Bridge	VOH 4 - Brook	VOH 5 – Central	VOH 6 - Clearview	VOH 7 - Colonels Drive	VOH 8 – Ethel Ct.	VOH 9 – Gaby	VOH 10 - Garfield	VOH 11 - Hunter Lane	VOH 12 - Hunter Road	VOH 13 – Lake Dr.	VOH 14 - Linda	VOH 15 - Lookout Mntn.	VOH 16 - Maple	VOH 17 – Mountain	VOH 18 - Overlook	VOH 19 – Pine	VOH 20 – Point Breeze	VOH 21 – Riverside	VOH 22 - Route 23A	VOH 23 - Route 296	VOH 24 - Rusk Hollow	VOH 25 - Scribner	
VOH 1 – Berry	VOH 2 - Botti																										
VOH 3 – Bridge	VOH 4 - Brook																										
VOH 5 – Central	VOH 6 - Clearview																										
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VOH 15 - Lookout Mntn.	VOH 16 - Maple																										
VOH 17 – Mountain	VOH 18 - Overlook																										
VOH 19 – Pine	VOH 20 – Point Breeze																										
VOH 21 – Riverside	VOH 22 - Route 23A																										
VOH 23 - Route 296	VOH 24 - Rusk Hollow																										
VOH 25 - Scribner																											
Action or Project Intended for Implementation																											
Action/Project Number:	(V)HUN-1																										
Name of Action or Project:	Stormwater Retrofit Program																										
Action or Project Description:	Hydrologic and hydraulic modeling should be performed on all culverts to assess proper size to convey the 100 year base flood.																										
Summary of Evaluation Benefits (losses avoided) Estimated Cost Other Factors Considered	\$1,000,000																										

Plan for Implementation	
Responsible Organization:	Village of Hunter Highway Department
Action/Project Priority:	High – Low Priority
Timeline for Completion:	An application for a FEMA grant will be made in year 1 prioritizing the problem culverts above and the H/H modeling program should be completed within 3 years. (2017-2020)
Potential Fund Sources:	FEMA Hazard Mitigation Grant Program (HMGP) funds FEMA Pre-Disaster Mitigation Program (PDM) funds
Local Planning Mechanisms to be Used in Implementation, if any:	The administration of this activity will be added to Village of Hunter's and Highway Department's annual work plan.
Progress Report	
Date of Status Report: Report of Progress: Evaluation of Effectiveness:	No report at this time.

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Jurisdictional Annex I

Town of Ashland

Town Profile

The Town of Ashland is located in the northwestern portion of Greene County at the northern border of the Catskill Park and at the Schoharie County line. See Table I-1.

History: Early settlements in the area were abandoned during the American Revolution but resettled in 1788. The Town was officially founded in 1848 by carving out portions of the Towns of Windham and Prattsville.

Form of Government: The Town is governed by a five-member Town Board consisting of the Town Supervisor and four Trustees. The Town Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs.

Growth and Development Trends: The July 2007 Greene County *Comprehensive Economic Plan*¹ notes that the Town is looking to add residential development areas that were previously subdivided and located along major transportation routes. Development in these locations is noted as being generally desirable for weekend visitors and potential property owners moving to the area from more urbanized areas to the south. In 2012, a sewer and water district was implemented in the Town. U.S. Census statistics show that the Town grew from 752 to 784 people between 2000 and 2010 (see Table I-1), and the number of housing units increased from 603 to 679.

Recent Hazard Events

In the last 5 years, there were a few storms that significantly impacted the Town, most notably Hurricane Irene.

Hurricane Irene (2011): In general, the Mountaintop Towns in Greene County were hit hard and saw damage and destruction from significant flooding (*please provide details of what was damaged? any dollar values?*) beyond anything in recent memory. The Town of Ashland was one of those communities.

Summary of Vulnerabilities

Town Contact Information

PRIMARY POINT OF CONTACT:

Richard E. Tompkins, Supervisor
Ashland Fire House/Town Hall
12094 Route 23
Ashland, NY 12407
518.734.3636
Email: ashadmin@mhicable.com

ALTERNATIVE POINT OF CONTACT:

Justine L. Koehler, Town Clerk & Records
Management Officer
Ashland Fire House/Town Hall
12094 Route 23, Ashland, NY 12407
518.734.3636
Email:[insert here]

Table I-1: Town of Ashland Statistics

2010 Population	Total Land Area	Land/Water Area
784	25.96 sq. mi.	25.96/0 sq. mi.

Table I-2: Number of Parcels in Flood Hazard Areas, Town of Ashland

¹ <http://greeneconomy.com/departments/planning-economic-development/services/economic-development/#plan-ecodev>

The Town of Ashland is one of Greene County’s Mountaintop Towns located on the north border of the Catskill Park. Because of its location in the hills, flooding is a significant concern. Table I-2 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

Floodway	100-Year Floodplain	500-Year Floodplain
96	226	243

Source: 2015 FEMA Flood Insurance Rate Map

As shown in Figure I-1, there is one critical facility located in the floodplain in the Town of Ashland: the community septic system.

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*² (HMP) are described below.

Planning (legal) and Regulatory: The Town, with the assistance of the Green County Soil and Water Conservation District, will undertake a Local Flood Analysis (LFA) in 2016 to identify flood vulnerabilities and potential mitigation measures. The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: In addition to the Town Board, the Town has a Town Clerk, Deputy Clerk, Administrative Assistant, Code Enforcement Officer, Highway Superintendent, Tax Collector, two Town Justices, a Court Clerk, Attorney, Dog Warden, and Historian. The Town also has a contract with an engineering firm to provide and enhance administrative and technical capabilities.

The Town also has an eight-member Planning Board and a historical association.

Relevant Documents and Ordinances

- ✓ Building Code (*please provide date*)
- ✓ Subdivision Ordinance (2002)
- ✓ NFIP Flood Damage Prevention Ordinance (2008)
- ✓ *Flood Management/ Basin Plan* (1987)
- ✓ *Regional Stream Management Plan* (adopted in 2008), includes MOU with Greene County Soil and Water Conservation District

² <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

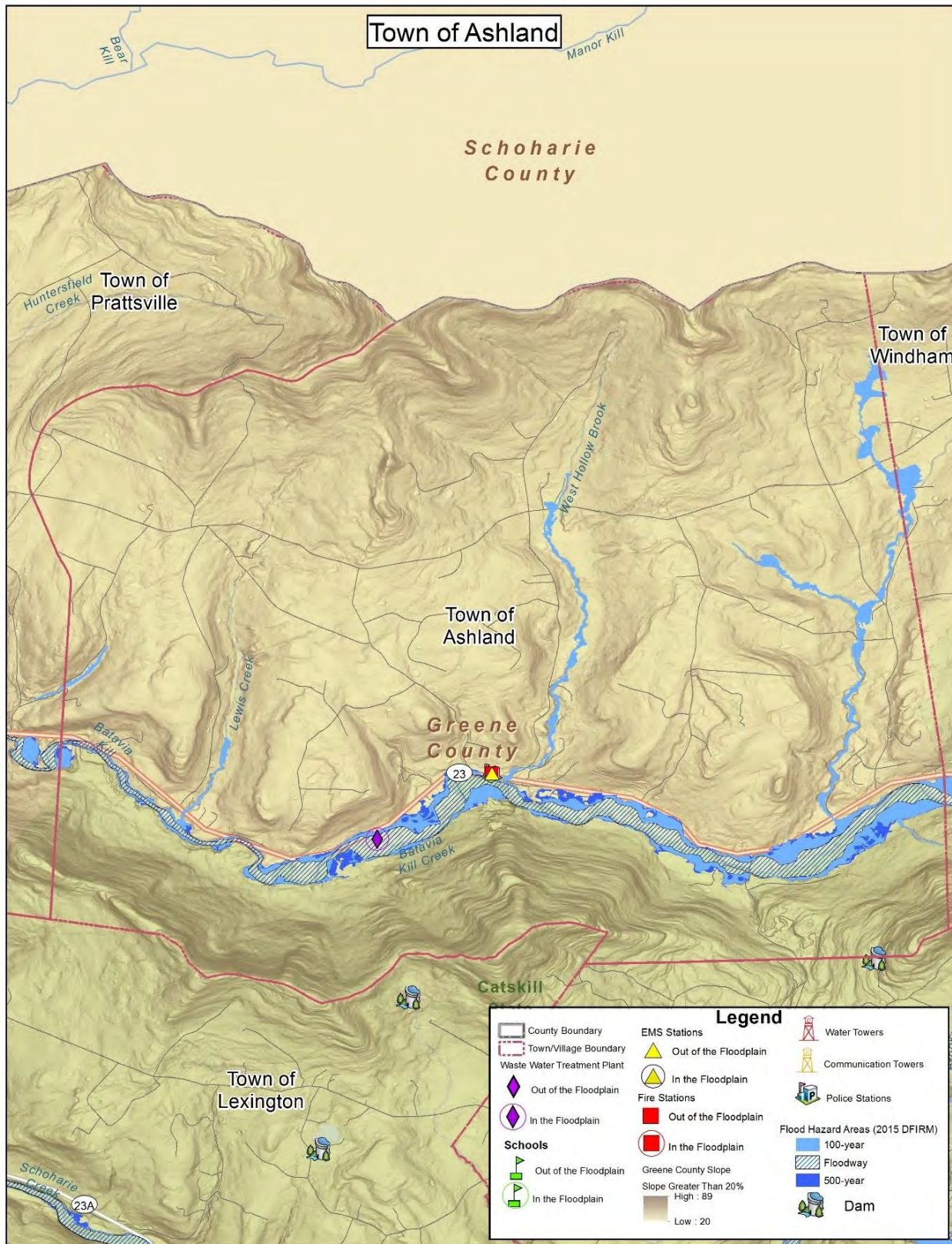


Figure I-1: Town of Ashland Hazard Area Map

Financial: Since the 2009 HMP, the Town has prepared a Catskill Watershed Corporation (CWC) *Flood Hazard Mitigation Implementation Plan* (FHMIP). The CWC’s FHMI Program was developed to help fund projects that reduce flood impacts within the Catskill watershed. Funded projects include property protection measures, floodplain reclamation actions, public infrastructure protection, and property buyout/relocation. Projects are typically funded through an LFA under the New York City Department of Environmental Protection’s Stream Management Program.

Education and Outreach: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP. The Town is currently a FEMA Community Rating System (CRS) Eligible Community (Community #360147).

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: There is one significant project the Town of Ashland has implemented since the last HMP (date): a backup power system for the local Emergency Management System, Fire National Incident Management Structure. This project is a mitigation initiative identified in the 2009 HMP. The Town Hall and Fire Department are co-located on the same property and are relatively new, having been opened in 2011 after the existing structure was destroyed in a fire the previous year. During Hurricane Irene, the building served as a shelter for citizens displaced during the storm. Table xx shows the hazard mitigation actions completed or in progress.

Table I-3: Summary of Mitigation Actions, Town of Ashland

Mitigation Action	Project Status
EMS/Fire Backup Power System	Complete
Backup Power for Highway Department	Ongoing (Long Term)

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Ashland has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)ASH-1: Local Flood Analysis – The Town will be conducting an LFA in 2016 to identify flood vulnerabilities and potential mitigation measures.
- (T)ASH-2: Backup Power for EMS/Fire local NIMS structure – The Town is supportive of the effort to provide backup power for the local EMS/Fire NIMS structure.
- (T)ASH-3: Emergency Operations Center in Town Hall – Enhance the function of Town Hall to serve as a community center in emergencies.
- (T)ASH-4: Culvert and Catch Basin Improvements – Replace or repair culverts and catch basins that have been determined to present potential sediment sources, culverts in poor structural condition, or culverts with erosion at the inlet or outlet. Specific locations are identified in the Action Worksheet.

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

Jurisdictional Annex II

Town of Athens

Town Profile

The Town of Athens is located along the Hudson River at the eastern end of Greene County. See Table II-1.

History: The Town of Athens was established in 1815 from parts of the Towns of Catskill and Coxsackie. The Hudson-Athens Ferry service was a major influence on the Town and area until 1935 when the Rip Van Winkle Bridge opened, eliminating the need for the ferry. The Town has more than 300 buildings that are listed on national and state historic registers; the buildings include many examples of the predominant styles of the 18th and 19th centuries. (Source: *Town of Athens Website*).

Form of Government: The Town is governed by a Town Board composed of the Supervisor and four Council Members. The Town Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs. Each Council Member serves a 4-year term and the Supervisor serves a 2-year term.

Growth and Development Trends: Potential growth areas in the Town are identified in the 2007 Greene County *Comprehensive Economic Development Plan*.¹ This plan notes that at the time the plan was written, the following growth was warranted: commercial/office at the intersection of Route 9W and Schoharie Turnpike; commercial/retail on Main Street from Water St. to Warren St (in the Village); light industrial in the vicinity of the Travco Industrial Park; and waterfront development uses along the Hudson River, including parks and recreation, and water-related businesses such as a marina and restaurant.

The Town of Athens and Village of Athens have a joint *Comprehensive Plan* (2007) that recommends considering extending public water service to commercial properties at the intersection of Route 9W and Schoharie Turnpike, but no further, to keep development in the desired growth area and prevent creating a long commercial strip along 9W.

U.S. Census statistics show that the Town of Athens (excluding the Village of Athens) grew from 2,296 to 2,421 people between 2000 and 2010 (see Table II-1), and the number of housing units increased from 1,179 to 1,363.

Village Contact Information

PRIMARY POINT OF CONTACT:

Robert Butler, Supervisor
2 First Street
Athens, NY 12015
518.945.1052
Email: [\[insert email\]](#)

ALTERNATIVE POINT OF CONTACT:

Linda M. Stacey, Town Clerk & Tax Collector
2 First Street
Athens, NY 12015
518.945.1052
Email: lstacey@townofathensny.com

**Table II-1:
Town of Athens Statistics**

2010 Population	Total Land Area	Land/Water Area
2,421	24.26 sq. mi	22.83/1.44 sq. mi

Village of Athens not included

¹ <http://greeneconomy.com/departments/planning-economic-development/services/economic-development/#plan-ecodev>

Recent Hazard Events

In the last 5 years, there have been a few storms that were significant for the Town.

[please provide more information]

Summary of Vulnerabilities

The Town of Athens is one of Greene County’s River Towns located along the Hudson River. Flooding occurs in low lying areas. Table II-2 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

As shown in Figure II-1, there are no critical facilities located in the floodplain in the Town of Athens.

Table II-2: Number of Parcels in Flood Hazard Areas

Floodway	100-Year Floodplain	500-Year Floodplain
26	346	272

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*² (HMP) are described below.

Planning (legal) and Regulatory: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP. The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: In addition to the Town Board, the Town has a Town Clerk, Highway Department, Code Enforcement Officer, Police Department, three Fire Departments and several volunteer boards and committees.

Financial: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

Education and Outreach: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

Relevant Documents and Ordinances

- ✓ Town of Athens and Village of Athens joint *Comprehensive Plan* (2007)
- ✓ Site Plan Review [date?]
- ✓ Building Code [date?]
- ✓ Zoning Ordinance [date?]
- ✓ Subdivision Ordinance [date?]
- ✓ NFIP Flood Damage Prevention Ordinance [date?]
- ✓ *Growth Management Plan* [date?]
- ✓ *Floodplain Management/Basin Plan* [date?]
- ✓ *Stormwater Management Plan/Ordinance* [date?]
- ✓ *Emergency Response Plan* [date?]

² <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

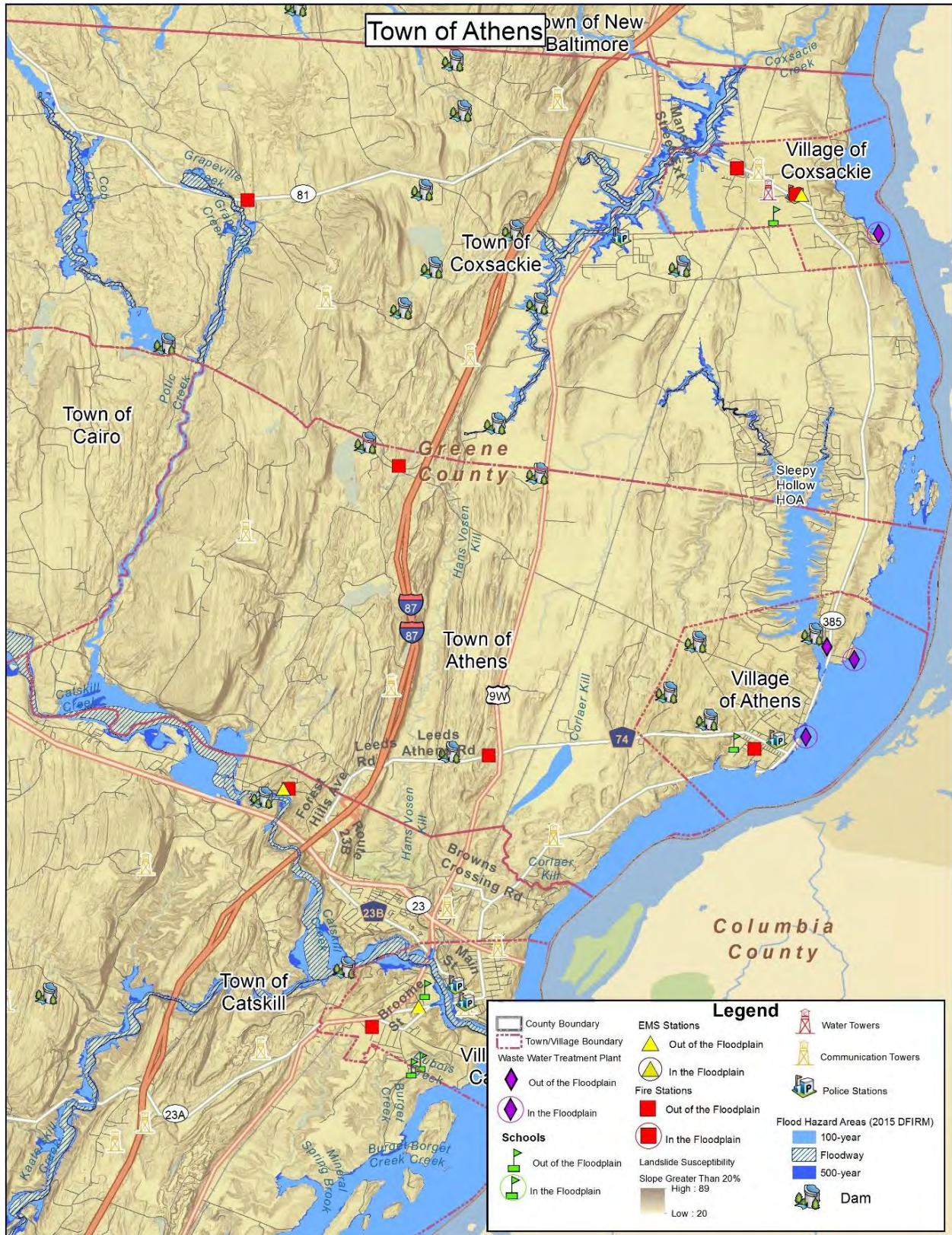


Figure II-1: Town of Athens Hazard Area Map

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: In the last 5 years, the Town of Athens has not undertaken any identifiable or confirmable completed or in progress mitigation actions to reduce long-term vulnerability.

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Athens has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)ATH-1: Emergency Communications Upgrade – Update to the P25 Compliance and expand the radio communications system. Conduct a radio study throughout the Town to better understand exactly how to enhance radio communications. Apply to the FCC for a license to have own frequency for use by the Town Highway and other public safety agencies. Upgrade physical equipment for Town agencies, particularly radios which will be P25 compliant, and work with the Fire Departments to understand how to best begin upgrading their equipment.
- (T)ATH-2: Box Culvert Replacement – Replace the undersized culvert on Schoharie Turnpike. This culvert has led to localized flooding and some road damage during heavy rain and spring runoff events.
- (T)ATH-3: Automatic Standby Generator – Purchase a standby generator to provide sufficient and consistent backup power supply capability.

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

Jurisdictional Annex III

Village of Athens

Village Profile

The Village of Athens is located in Greene County along the west bank of the Hudson River within the eastern portion of the Town of Athens. See Table III-1.

History: The land that is currently the Village of Athens was purchased from the Makicanni Tribe in 1655 and became three settlements: Loonenburg (1685), Esperanza (1794), and Athens (1800). The Village of Athens was incorporated in 1805 and was a port on the Hudson-Athens Ferry (Source: *Athens Street Festival website*). It thrived as a hub for shipbuilding, brick making, and ice harvesting. In 1935, when the Rip Van Winkle Bridge opened just 4 miles to the south, it eliminated the need for the ferry. The Village of Athens architecture is much the same as it was in the 1800s and there are more than 300 buildings in the Village that are on national and state historical registers (Source: *Athens Village Website*).

Form of Government: The Village is governed by a Village Board comprised of the mayor and four trustees. The Village Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs. Each member serves a 2-year term.

Growth and Development Trends: According to the 2007 Greene County *Comprehensive Economic Development Plan*¹, the Village of Athens commercial/office growth is encouraged at the intersection of Route 9W and Schoharie Turnpike. Commercial growth is encouraged on Second Street and State Route 385 in the adaptive reuse of historic structures and waterfront-related development is encouraged along the Hudson River. Light industrial growth is encouraged in the vicinity of the Travco Industrial Park. The Village of Athens has a joint *Comprehensive Plan* (2007) with the Town of Athens and a *Local Waterfront Revitalization Plan* (1999).

The Village of Athens, despite some areas of development, has seen a relatively stable population since the early 2000s. The Village was previously under a consent order for its wastewater treatment, creating a significant obstacle to development in the Village, but this has been lifted. U.S. Census statistics show that the Village shrank from 1,695 to 1,668 people between 2000 and 2010 (see Table III-1), while the number of housing units increased from 793 to 885.

Town Contact Information

PRIMARY POINT OF CONTACT:

Christian H. Pfister, Mayor

2 First Street

Athens, NY 12015

518.945.1257/1551

Email: christianp@mhccable.com

ALTERNATIVE POINT OF CONTACT:

Michael Ragaini, Building Inspector

2 First St

Athens, NY 12015

518.945.1551/965.1046

Email: [insert here]

Table III-1: Village of Athens Statistics

2010 Population	Total Land Area	Land/Water Area
1,668	4.6 sq. mi.	3.4/1.2 sq. mi.

¹ <http://greenegovernment.com/departments/planning-economic-development/services/economic-development/#plan-ecodev>

Recent Hazard Events

In the last 5 years, there have been a few storms that were significant for the Village of Athens, most notably Hurricane Irene and Superstorm Sandy.

Hurricane Irene (2011): While the River Towns did not experience as much damage as the Mountaintop area of Greene County, there was measurable damage to the public sector. Damage from Hurricane Irene caused financial losses in the Village of about \$40,000. Substantial debris clearance and damage to the Main Waste Water Treatment Plant accounted for most of the documented damage. There was also destruction at the Municipal Building with the loss of the boiler.

Superstorm Sandy (2012): Superstorm Sandy resulted in damage claims close to \$25,000. The claims were focused on debris cleanup and repairs to the Main Waste Water Treatment Plant necessitated after a tidal surge sent up to 4 feet of water into the basement of the Treatment Plant, damaging monitoring devices and contaminating an oil tank.

Summary of Vulnerabilities

The Village of Athens is one of Greene County's River Towns located along the Hudson River.

Flooding occurs adjacent to the Hudson River, along major tributaries, and steep slopes. Table III-2 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

Table III-2: Number of Parcels in Flood Hazard Areas, Village of Athens

Floodway	100-Year Floodplain	500-Year Floodplain
0	241	272

Source: 2015 FEMA Flood Insurance Rate Map

As shown in Figure III-1, the Village of Athens has two critical facilities located in the floodplain:

- The Village of Athens Sewage Plant: This plant is located on the Hudson River in the flood zone at the intersection of Water Street and Market Street.
- Brick Row Sewer Plant: This sewer plant is in a flood zone on the Hudson River and is within an historic district.

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*² (HMP) are described below.

² <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

Planning (legal) and Regulatory: There have not been many changes in capabilities for reducing long-term vulnerability since the 2009 HMP. The Village has a number of relevant documents and ordinances listed at right (see text box), including a joint Comprehensive Plan with the Town of Athens.

Administrative and Technical: In addition to the Village Board, the Village has a Village Clerk, Department of Public Works, Police Department, Fire Departments, and Code Enforcement Officer as well as several volunteer boards and committees. The Village also has a consulting engineer and a volunteer fire chief, both provide and enhance the Village's administrative and technical capabilities. The Code Enforcement Officer position is a shared position with the Village of Catskill and the Village of Coxsackie, which reduces the Village's capacity.

Financial: Dollars available for reducing long-term vulnerabilities in the Village have shrunk rather than expanded. However, the Village has recently embarked on a municipal sharing project with the Town of Athens. The Village and Town are currently experimenting on joint management of the two public works crews; if successful, this would greatly enhance planning and operational resources for the Village.

Education and Outreach: There have not been any identifiable or confirmable changes in the capabilities for reducing long-term vulnerability since the 2009 HMP.

Relevant Documents and Ordinances

- ✓ Town of Athens and Village of Athens joint *Comprehensive Plan* (2007)
- ✓ Zoning Ordinance [date?]
- ✓ Subdivision Ordinance [date?]
- ✓ Site Plan Review [date?]
- ✓ Building Code [date?]
- ✓ Local Waterfront Revitalization Program (LWRP) (1999)
- ✓ Flood and Historical Ordinances (2008)

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: In the last 5 years, the Village of Athens has undertaken a number of actions to mitigate the effects of flooding. Table III-3 shows the hazard mitigation actions described in the 2009 HMP that have been completed or are in progress.

Village of Athens Sewer Plant: The Village has progressed in its updates to the Village of Athens Sewer Plant located on Water and Market Streets in the flood zone along the Hudson River, with the result that the plant is no longer under an order of consent from the NYS DEC due to high inflow and infiltration.

During past storm events, storm water had entered the plant and created high inflow and infiltration, resulting in a violation of the SPDES permit for required usage of the plant. The Village invested a total of \$4.6 million dollars to upgrade the sewage treatment plant by installing a new clarifier and new drying beds, and upgrading the drainage, among other improvements. The Village's effort will help advance development opportunities in the Village while also preventing future violations. While the rehabilitated plant is not floodproof, the upgrades applied by the Village will make it more resistant to flooding events.

Infiltration and Inflow Upgrades: Approximately \$600,000 of the \$4.6 million dollars was spent on the treatment of infiltration and inflow, with very positive results. When the basement flooded in 2014, due to human error, the VFD's were moved out of the flood zone and the heat was converted to electric, resulting in further effective mitigation.

Municipal Building Drainage. Drainage was also installed around the Municipal Building to draw water away from the basement and furnace room in particular. To date, this effort has been successful with no additional flooding.

The Village will continue to look for opportunities to correct other infiltration and inflow problems since completed efforts have proven to be very effective.

Brick Row Waste Water Plant. The Village is currently involved in talks with the Sleepy Hollow Lake management to build a series of pump stations to allow the Brick Row Waste Water Plant to be removed from operation. Instead, sewage would be pumped from Sleepy Hollow Lake and Brick Row directly to the main plant (Village of Athens Sewer Plant). Problems with the Brick Row Waste Water Plant would be mitigated by this action.

Emergency Shelter. The emergency shelter action is no longer needed as the firehouse has a generator and it has been determined to make a better shelter than the community center gym.

Table III-3: Summary of Mitigation Actions, Village of Athens

Mitigation Action	Project Status
Village of Athens Sewer Plant	Complete
Infiltration and Inflow Upgrades	In Progress
Municipal Building Drainage	Complete
Brick Row Waste Water Plant	In Progress
Emergency Shelter in Community Center Gym	No Longer Needed – Firehouse is used as a shelter

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Village of Athens has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (V)ATH-1: Culvert Replacement – Replace culvert and widen the roadway on Union Street.
- (V)ATH-2: Brick Row Sewer Plant – Remove this sewer plant in the floodplain and replace it with a pump station to pump sewage to the main sewer plant in the Village. Studies are underway with Sleepy Hollow Lake to combine the two systems.
- (V)ATH-3: Village of Athens Drainage System – Undertake a full study of the drainage system in the Village of Athens, including new culverts and drains throughout the Village.
- (V)ATH-4: New Sewer and Water Lines – Provide new sewer and water lines where necessary. Continue infiltration and inflow rehabilitation of manholes and sewer mains.
- (V)ATH-5: Relocate Department of Public Works Building – The building is in a flood zone and needs to be moved.
- (V)ATH-6: Wastewater Treatment Plant Flood Mitigation – Purchase new influent pumps to ensure that increased flow during storms can be properly handled.

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

Jurisdictional Annex IV

Town of Cairo

Town Profile

The Town of Cairo is located in the southern portion of Greene County at “the Crossroads of the Catskills,” approximately 35 miles south of the City of Albany and 10 miles west of the Hudson River. A portion of the Town is located within the Catskill Park, and the Catskill Creek flows through the Town. See Table IV-1.

History: Most early settlement was scattered throughout the Town. However, James Barker and his wife, Elizabeth Wooer, arrived in 1765 and settled a large tract of land along the Catskill Creek. They brought 23 tenant farm families to the area from London, England. The 6000-acre settlement was named “Woodstock” after the English Manor house in which he was born. Despite hardships, the settlement prospered. In 1801, construction of the Susquehannah Turnpike turned Cairo Village into a destination point; services and other industries flourished, though farming long remained the predominant occupation. The Town of Cairo was officially established as Canton in 1803 by carving out parts of Cocksackie, Freehold, and Catskill. The name was changed to Cairo in 1808 (*Source: Town of Cairo website*).

Form of Government: The Town is governed by a Town Supervisor and Board comprised of four Council members. The Town Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs.

The Town also has a Town Clerk, Superintendent of Highways, Building and Code Enforcement office, Highway Department, Ambulance Service, two Fire Departments, a Police Department, Water and Sewer Department, and several volunteer boards and committees.

Growth and Development Trends: The Town’s *Comprehensive Plan* (2003) describes many issues and opportunities for the Town. It recognizes that growth should be focused on the Main Street corridor in the hamlet and that appropriate economic development should be permitted and encouraged while still maintaining the Town’s small town and rural character. The *Comprehensive Plan* encourages residential development in specific locations, particularly within South Cairo due to the availability of easily developable land. The July 2007 Green County *Comprehensive Economic Development Plan*¹ reiterates the goals of the Town’s *Comprehensive Plan* and notes an increase in development (predominantly residential) in the 3 years preceding 2007 .

U.S. Census statistics show the Town grew from 6,355 to 6,670 people between 2000 and 2010 (see Table IV-1), and the number of housing units increased from 3,322 to 3,654.

Town Contact Information

PRIMARY POINT OF CONTACT:

Daniel A. Benoit, Town of Cairo
P.O. Box 728
Cairo, NY 12413
518.965.4636
Email: supervisor@townofcairo.com

ALTERNATIVE POINT OF CONTACT:

Tara Rumph, Town Clerk
512 Main Street
Cairo, NY 12413
518-622-3120
Email: cairoclerk@yahoo.com

Table IV-1: Town of Cairo Statistics

2010 Population	Total Land Area	Land/Water Area
6,670	60.08 sq. mi.	59.83/0.25 sq. mi.

¹ <http://greeneconomy.com/departments/planning-economic-development/services/economic-development/#plan-ecodev>

Recent Hazard Events

The Town of Cairo’s recent hazard events are listed in Table XX. In the last 5 years there have been a few storms that were significant for the Town, most notably Hurricane Irene and Superstorm Sandy.

Hurricane Irene (2011): While the River Towns did not suffer the same damage during Hurricane Irene as the Mountaintop Towns of Greene County and by all accounts the Town of Cairo was not nearly as hard hit as nearby communities, the Town still experienced flooding issues, particularly on Moorehouse Road, which typically floods in heavy rain events.

Superstorm Sandy (2012): As with Hurricane Irene and most major rainfall events, Moorehouse Road flooded during Superstorm Sandy, cutting off access to homes and limiting emergency accessibility.



Woodstock Dam (courtesy, Greene County Emergency Services)

Summary of Vulnerabilities

The Town of Cairo is one of Greene County’s Valley Towns located at the foothills of the Catskill Mountains. Flooding often occurs in low lying areas during rain events. Table XX details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

As shown in Figure IV-1, there are no critical facilities within the floodplain in the Town of Cairo.

Table XV-2: Number of Parcels in Flood Hazard Areas, Town of Cairo

Floodway	100-Year Floodplain	500-Year Floodplain
272	692	716

Source: 2015 FEMA Flood Insurance Rate Map

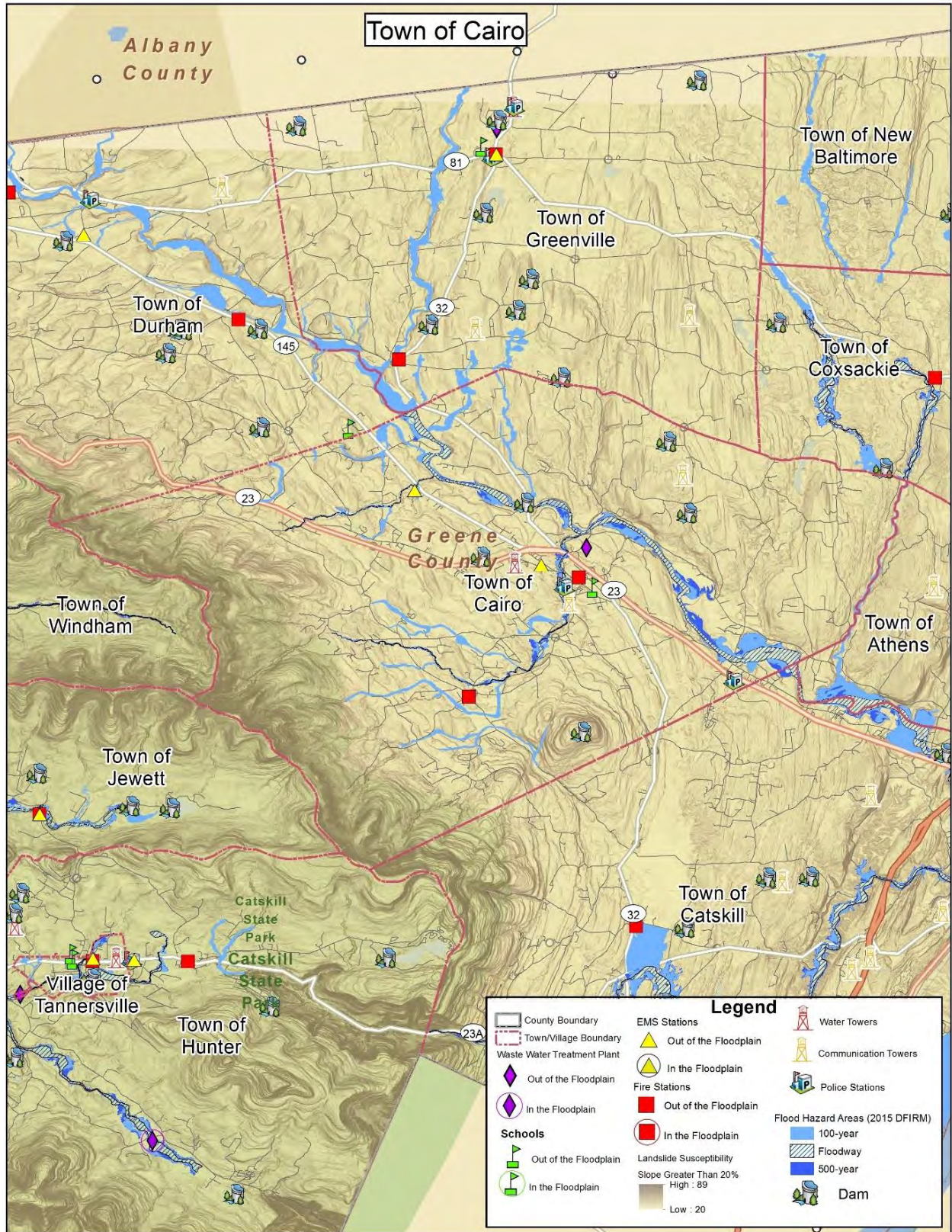


Figure IV-2: Town of Cairo Hazard Area Map

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*² (HMP) are described below.

Planning (legal) and Regulatory: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP. The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: The Town has several paid staff including a Town Clerk, Superintendent of Highways, Building and Code Enforcement office, Highway Department, Ambulance Service, two Fire Departments, a Police Department, and Water and Sewer Department and has a Supervisor and four council members.

Financial: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

Education and Outreach: There haven’t been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP update.

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: In the last 5 years, the Town of Cairo has not undertaken any identifiable or confirmable completed or in-progress mitigation actions to reduce long-term vulnerability due to resource constraints.

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Cairo has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation action:

- (T)CAI-1: Moorehouse Road Elevation Program – Undertake a study to determine the size of replacement for an existing undersized 42-inch culvert and raise the elevation of the road accordingly.

Details about the proposed hazard mitigation action can be found in the individual Action Worksheets.

Relevant Documents and Ordinances

- ✓ *Comprehensive Plan* (2003)
- ✓ *Main Street Strategy* (2009)
- ✓ Building Code [date?]
- ✓ Subdivision Ordinance [date?]
- ✓ NFIP Flood Damage Prevention Ordinance [date?]

² <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

Jurisdictional Annex V

Town of Catskill

Town Profile

The Town of Catskill is located in southeastern Greene County. The Town is partially within the Catskill Park and also has Hudson River frontage. U.S. 9W and I-87 pass through the Town. Hamlets within the Town include Palenville, Leeds, and Jefferson Heights. See Table V-1.

History: The area of the Town of Catskill was purchased in 1678 and settlement soon followed. When the Town was established in 1788, it was part of Albany County. The Town grew with the addition of land from the Town of Woodstock in 1800, but some land area was lost to the formation of the Towns of Cairo and Athens.

Form of Government: The Town is governed by the Supervisor and four Council members, elected to staggered terms. The Town Council sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs.

Growth and Development Trends: The Town of Catskill has a joint *Comprehensive Plan* with the Village of Catskill. With a portion of the Town within the Catskill State Park, growth has primarily been concentrated in the vicinity of the hamlets and adjacent to the Village of Catskill.

The Town has lost some population since 2000. U.S. Census statistics show that from the Town grew from 7,457 to 7,694 people between 2000 and 2010 (see Table V-1), and the number of housing units increased from 3,652 to 4,083 (not including the Village of Catskill).

Recent Hazard Events

In the last 5 years, there have been a few storms that were significant for the Town, most notably Hurricane Irene and Superstorm Sandy.

Hurricane Irene (2011): [add text here that describes the damage]

Superstorm Sandy (2011): [add text here that describes the damage]

Summary of Vulnerabilities

The Town of Catskill is one of Greene County's River Towns located along the Hudson River. Flooding occurs in the area around the Kaaterskill Creek and the Catskill Creek. The eastern portion of the Town has areas of steep slopes with landslide potential. As seen in Figure V-I, the Town of Catskill Hazard Area Map shows no critical facilities within the floodplain in the Town.

Town Contact Information

PRIMARY POINT OF CONTACT:

Doreen P. Davis, Supervisor
439 Main Street
Catskill, NY 12414
518.943.2141 x 8
Email: supervisor@townofcatskillny.gov

ALTERNATIVE POINT OF CONTACT:

Patrick McCulloch,
Deputy Highway Superintendent
439 Main Street
Catskill, NY 12414
518.731.2718
Email: PMcCulloch@townofcatskillny.gov

Table V-1: Village of Catskill Statistics

2010 Population	Total Land Area	Land/Water Area
7,694	61.30 sq. mi.	58.16 /3.15 sq. mi.

Village of Catskill not included

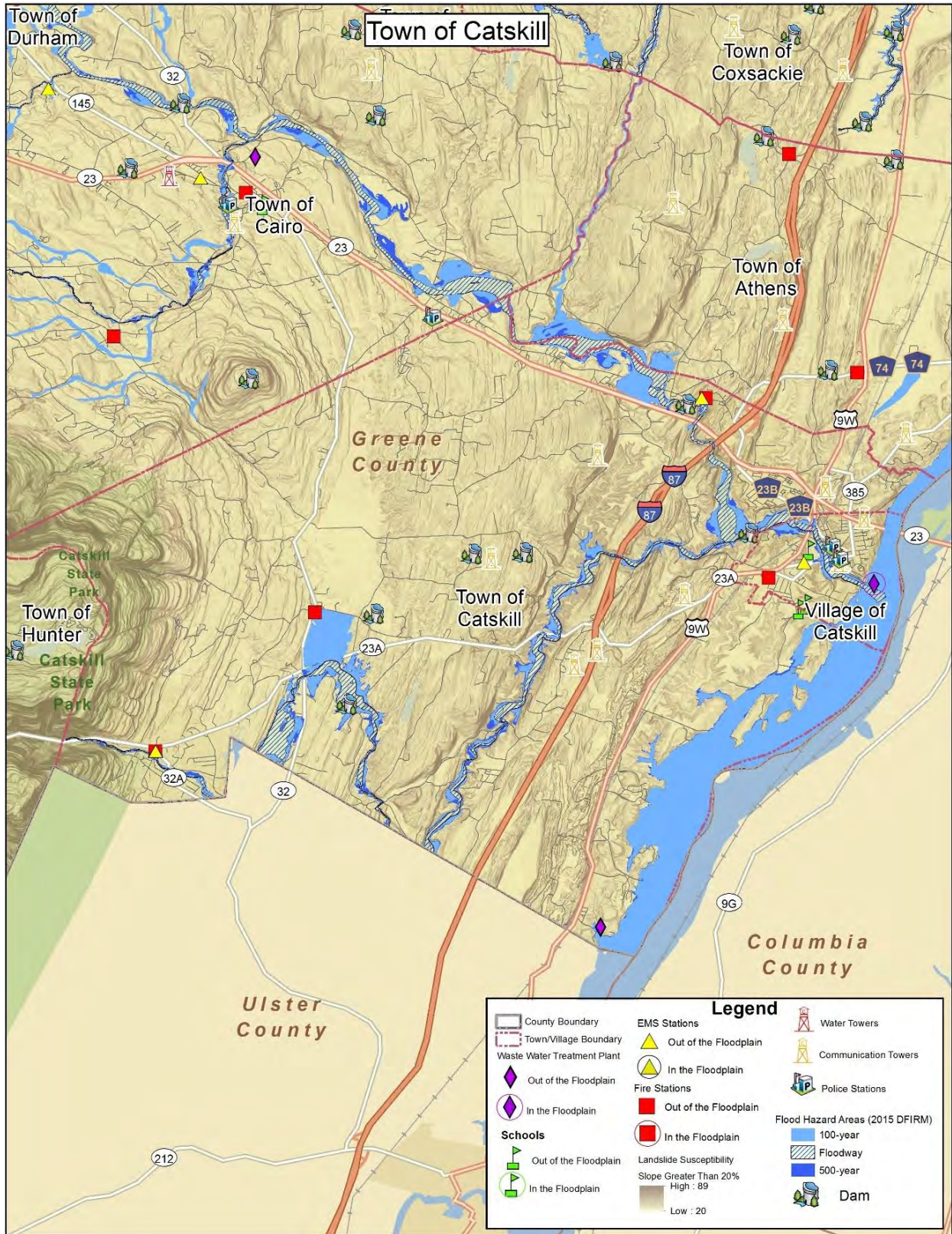


Figure V-1: Town of Catskill Hazard Area Map

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*¹ (HMP) are described below.

Planning (legal) and Regulatory: There have not been very many changes in capabilities for reducing long-term vulnerability since the 2009 HMP. The Town has a joint *Comprehensive Plan* with the Village of Catskill. The Town has a number of relevant documents and ordinances listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: In addition to the Town Board, the Town has a Clerk and Deputy Clerk, a Highway Department, a Code Enforcement Officer, and an Assistant Code Enforcement Officer. There are four fire departments and an Ambulance service. The Town also has a consulting engineer who provides and enhances administrative and technical capabilities.

Financial: There have not been any identifiable or confirmable changes in the capabilities for reducing long-term vulnerability since the 2009 HMP.

Education and Outreach: There have not been any identifiable or confirmable changes in the capabilities for reducing long-term vulnerability since the 2009 HMP.

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: In the last 5 years, the Town of Catskill completed three projects, following Hurricane Irene:

1. Woodstock Avenue Retaining Wall Replacement - \$940,000 (construction cost only)
2. Route 23A Culvert Replacement/Plunge Pool - \$100,000 (construction cost only)
3. Mill Street/Kaaterskill Avenue Rip Rap - \$334,500 (construction cost only)

Table V-2: Summary of Mitigation Actions, Town of Catskill

Mitigation Action	Project Status
Woodstock Avenue Retaining Wall Replacement	Complete
Route 23A Culvert Replacement/Plunge Pool	Complete
Mill Street/Kaaterskill Avenue Rip Rap	Complete
Pennsylvania Avenue Bridge	Proposed Project (pending grant application)

Relevant Documents and Ordinances

- ✓ *Comprehensive Plan* [date?]
- ✓ Zoning Ordinance [date?]
- ✓ Subdivision Ordinance [date?]
- ✓ Site Plan Review [date?]
- ✓ Building Code [date?]
- ✓ NFIP Flood Damage Prevention Ordinance (2008)
- ✓ *Emergency Response Plan* [date?]

¹ <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Catskill has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)CAT-1: Pennsylvania Avenue Bridge – Repairs to serious undermining of two existing abutments caused during Hurricane Irene.
- (T)CAT-2: Game Farm Road Culvert Replacement – Undersized bridge and flooding damage to road. Replace with precast box culvert.
- (T)CAT-3: Snake Road – Undersized culverts, erosion endangering a house. Replace and upsize culverts and 2 install plunge pools to stop erosion.
- (T)CAT-4: Bogart Road Culvert Replacement – Replace undersized 4 ft diameter culvert with a box culvert.

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

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Jurisdictional Annex VI

Village of Catskill

Village Profile

The Village of Catskill is located on the banks of the Hudson River in Greene County along the northeast portion the Town of Catskill and on the southern border of the Town of Athens. See Table VI-1.

History: The Village of Catskill was part of a land purchase made in 1684. The Village was incorporated in 1806.

Table VI-1: Village of Catskill Statistics

2010 Population	Total Land Area	Land/Water Area
4,081	2.86 sq. mi.	2.28/0.58 sq. mi.

Village Contact Information

PRIMARY POINT OF CONTACT:

Vincent Seeley, Village President
422 Main Street, 3rd Floor
Catskill, NY 12414
518.943.3830
Email: vseeley@villageofcatskill.net

ALTERNATIVE POINT OF CONTACT:

Nancy Richards, Community Development Coordinator
422 Main Street, 3rd Floor
Catskill, NY 12414
518.943.3830
Email: nrichards@villageofcatskill.net

Form of Government: The Village is governed by a Village Board composed of the Village President and four Trustees. The Village Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs.

Growth and Development Trends: The July 2007 Greene County *Comprehensive Economic Development Plan*¹ noted several potential growth areas for residential, commercial, industrial, and government/community property. Subsequent to the 2007 plan, the Village drafted a joint *Town/Village Comprehensive Plan* (2007) and in 2009 an LWRP document.

The 2009 LWRP noted that the Village is home to the Greene County offices, has the largest downtown in the County, and in many respects serves as the business, commerce, and social hub for Greene County. The LWRP details several potential redevelopment and revitalization actions aimed at increasing residential residency and new retail businesses in the Village. These proposed actions included improving the physical condition of the downtown area while maintaining its historic qualities, linking the downtown to a proposed improved waterfront, and recruiting tourist-based businesses that appeal to the local population.

U.S. Census statistics show that the Village shrank from 4,392 to 4,081 people between 2000 and 2010 (see Table VI-1), and the number of housing units decreased from 2,048 to 2,029.

Recent Hazard Events

In the last 5 years, there have been a few storms that were significant for the Village, most notably Hurricane Irene and Superstorm Sandy.

Hurricane Irene (2011): While the River Towns did not suffer the same damage as the Mountaintop Towns in Greene County, there was measurable damage to the public sector.

¹ <http://greenegovernment.com/departments/planning-economic-development/services/economic-development/#plan-ecodev>

Hurricane Irene caused flooding of the Catskill Creek, resulting in extensive damage to the historic Black Bridge; the Village submitted a funding request to FEMA.

Superstorm Sandy (2012): The Village suffered approximately \$62,000 of damage to its Wastewater Treatment Plant during Superstorm Sandy.

Summary of Vulnerabilities

The Village of Catskill is one of Greene County’s River Towns along the Hudson River. Flooding occurs in low lying areas and the Village is impacted by major rain events. The Village experienced flooding at the Wastewater Treatment Plant during Hurricane Irene and Superstorm Sandy.

Table VI-2 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

As shown in Figure VI-1, there is one critical facility located in the floodplain: the Town’s Wastewater Treatment Plant.



*Damage from Hurricane Irene on the Catskill Creek.
Source: Greene County Emergency Services*

Table VI-2: Number of Parcels in Flood Hazard Areas, Village of Catskill

Floodway	100-Year Floodplain	500-Year Floodplain
67	227	279

Source: 2015 FEMA Flood Insurance Rate Map

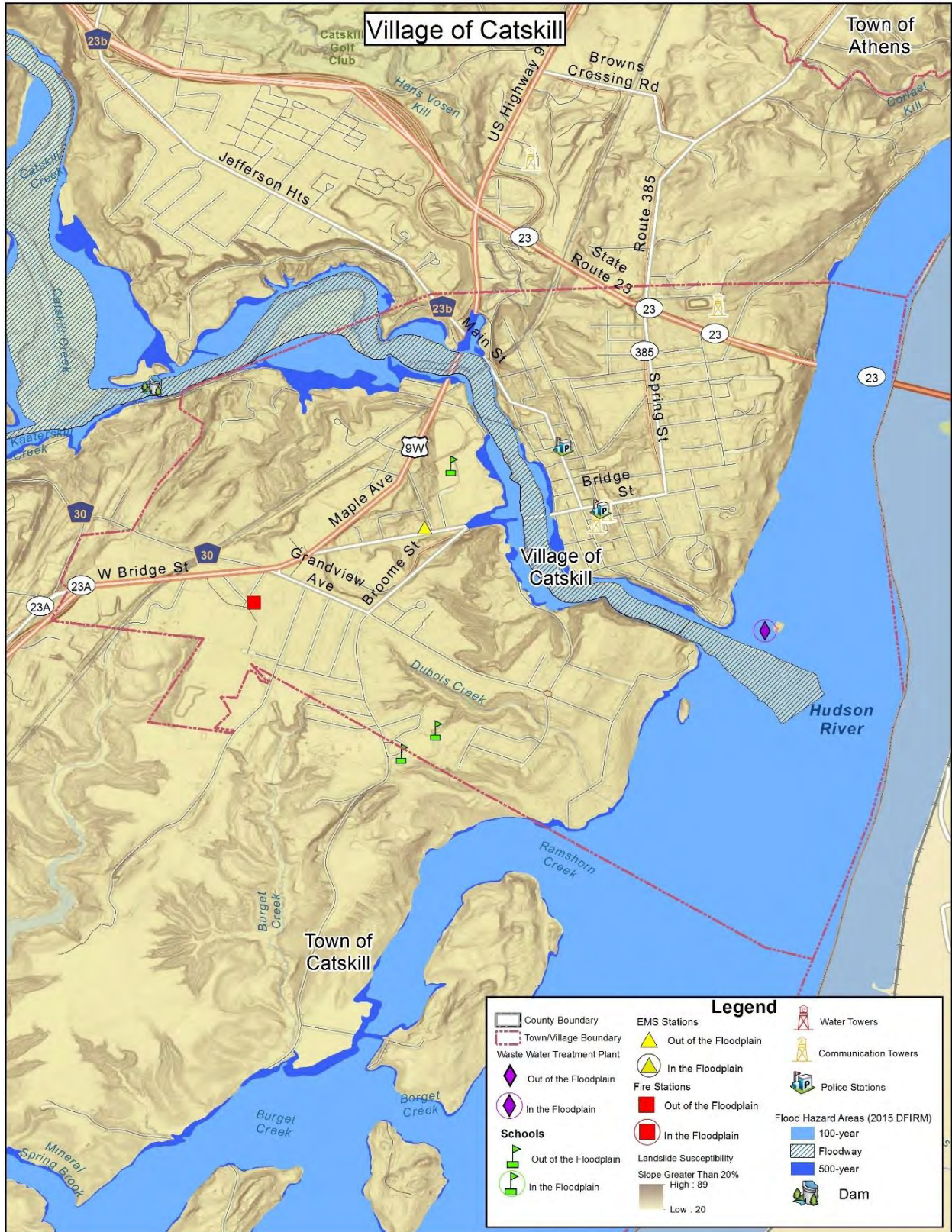


Figure VI-1: Village of Catskill Hazard Area Map

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*² (HMP) are described below.

Planning (legal) and Regulatory: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: In addition to the Village Board, the Village has a Clerk, Code Enforcement Officer, Community Development Coordinator, Secretary to the Building Department, Highway Superintendent, Water Department, Fire Department, Police Department, and Sewer Department. The Village hires specialists (consultants) as needed to supplement its staffing needs.

Financial: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

Education and Outreach: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: In the last 5 years, the Village of Catskill, in cooperation with Greene County, secured a \$2.24M grant (in 2014) to restore the Black Bridge over the Catskill Creek as part of the Catskill Creek Walking Loop (PIN 1759.71). See Table VI-3.

Proposed Hazard Mitigation Actions: In addition to the Green County actions discussed in this Plan, the Village of Catskill has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (V)CAT-1: Wastewater Treatment Plant Flood Mitigation – Proposed mitigation actions include extending the height of the concrete wall, install aluminum plates on all glass doors and windows of the building, and installing outward opening doors on the wetwell and drywell outside entrances.
- (V)CAT-2: Implementation of Resilient Catskill Plan – This action includes implementing projects noted in the *Resilient Catskill Plan*.

² <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

Relevant Documents and Ordinances

- ✓ Downtown and Waterfront Revitalization Strategy (2009)
- ✓ *Joint Town/Village Comprehensive Plan* (2007)
- ✓ Zoning Regulations [date?]
- ✓ Building Code [date?]
- ✓ NFIP Flood Damage Prevention Ordinance (2008)
- ✓ *Floodplain Management/Basin Plan* [date?]
- ✓ Site Plan Review Requirements [date?]

Table VI-3: Mitigation Actions, Village of Catskill

Mitigation Action	Project Status
Historic Black Bridge Repairs	In Progress [confirm status]

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

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Jurisdictional Annex VII

Town of Coxsackie

Town Profile

The Town of Coxsackie is located along the west bank of the Hudson River in Greene County. U.S. Route 9W and I-87 run through the Town. Hamlets include Earlton and Climax. See Table VII-1.

History: The settlement of the Town of Coxsackie began in the seventeenth century around 1652 as part of the development of New Netherlands. The Town of Coxsackie was founded in 1788. In 1790, land from the Town of Coxsackie became the Town of Durham and subsequently additional land went to the Towns of Cairo, Greenville, New Baltimore, and Athens when they were formed.

Form of Government: The Town is governed by the Supervisor and four Council members. The Council sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs.

Growth and Development Trends: The Town has a joint *Comprehensive Plan* (2007) with the Village of Coxsackie. The plan encourages commercial growth along Route 9W and light industrial growth at the Greene Business & Tech Park, the Kalkberg Commerce Park, and the Fountain Flats Park. The Town's zoning ordinance provides for the use of Planned Developments (PDD) and has a section on natural resource protection standards. The subdivision ordinance provides for conservation subdivisions. The Sleepy Hollow Lake development is partially within the Town of Coxsackie. A two million gallon water tank from the Village of Coxsackie will support some Town projects that have been proposed.

U.S. Census statistics show that the Town of Coxsackie (not including the Village) grew from 5,989 to 6,105 people between 2000 and 2010 (see Table VII-1), and the number of housing units increased from 1,482 to 1,673.

Recent Hazard Events

Superstorm Sandy (2012) was the most significant event to affect the Town of Coxsackie during the past 5 years, during which storm surge came up the Hudson River. [insert description of damage that was caused by flooding]

Town Contact Information

PRIMARY POINT OF CONTACT:

Richard K. Hanse, Supervisor
16 Reed Street
Coxsackie, New York 12051
518.731.2727
Email: coxsackiesupervisor@statetel.com

ALTERNATIVE POINT OF CONTACT:

Michael Tighe, Highway Superintendent
16 Reed Street
Coxsackie, New York 12051
518.731.2718
Email: info@coxsackie.org

Table VII-1: Town of Coxsackie Statistics

2010 Population	Total Land Area	Land/Water Area
6,105	35.82 sq. mi.	34.69/1.12 sq. mi.

Village of Coxsackie not included

Summary of Vulnerabilities

The Town of Coxsackie is one of Greene County's River Towns located along the Hudson River. Flooding occurs in low lying areas along creeks and streams. Table XX details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

As shown in Figure VII-1, there are no critical facilities located in the floodplain in the Town of Coxsackie.

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*¹ (HMP) are described below.

Planning (legal) and Regulatory: There have not been very many changes in capabilities for reducing long-term vulnerability since the 2009 HMP. The Town has a number of relevant documents and ordinances, as listed at right, including a joint Comprehensive Plan with the Town of Coxsackie.

Administrative and Technical: The Town has a Town Clerk, Police Department, Fire Department, Ambulance, Highway Department, and Code Enforcement Officer. The Town also has a Supervisor and Council members as well as a consulting land surveyor to provide and enhance administrative and technical capabilities.

Financial: There have not been any identifiable or confirmable changes in the capabilities for reducing long-term vulnerability since the 2009 HMP.

Education and Outreach: There have not been any identifiable or confirmable changes in the capabilities for reducing long-term vulnerability since the 2009 HMP.

Table VII-2: Number of Parcels in Flood Hazard Areas, Town of Coxsackie

Floodway	100-Year Floodplain	500-Year Floodplain
252	588	623

Source: 2015 FEMA Flood Insurance Rate Map



*Heavy rains in 2010
(Courtesy, Greene County Emergency Services)*

Relevant Documents and Ordinances

- ✓ *Comprehensive Plan* (2007)
- ✓ *Zoning Ordinance* (2008)
- ✓ *Natural Resource Protection Standards* [also 2008?]
- ✓ *Subdivision Ordinance* [date?]
- ✓ *Site Plan Review* [date?]
- ✓ *Building Code* [date?]
- ✓ *NFIP Flood Damage Prevention Ordinance* (2008)
- ✓ *Floodplain Management / Basin Plan* [date?]
- ✓ *Emergency Management Plan* [date?]

¹ <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

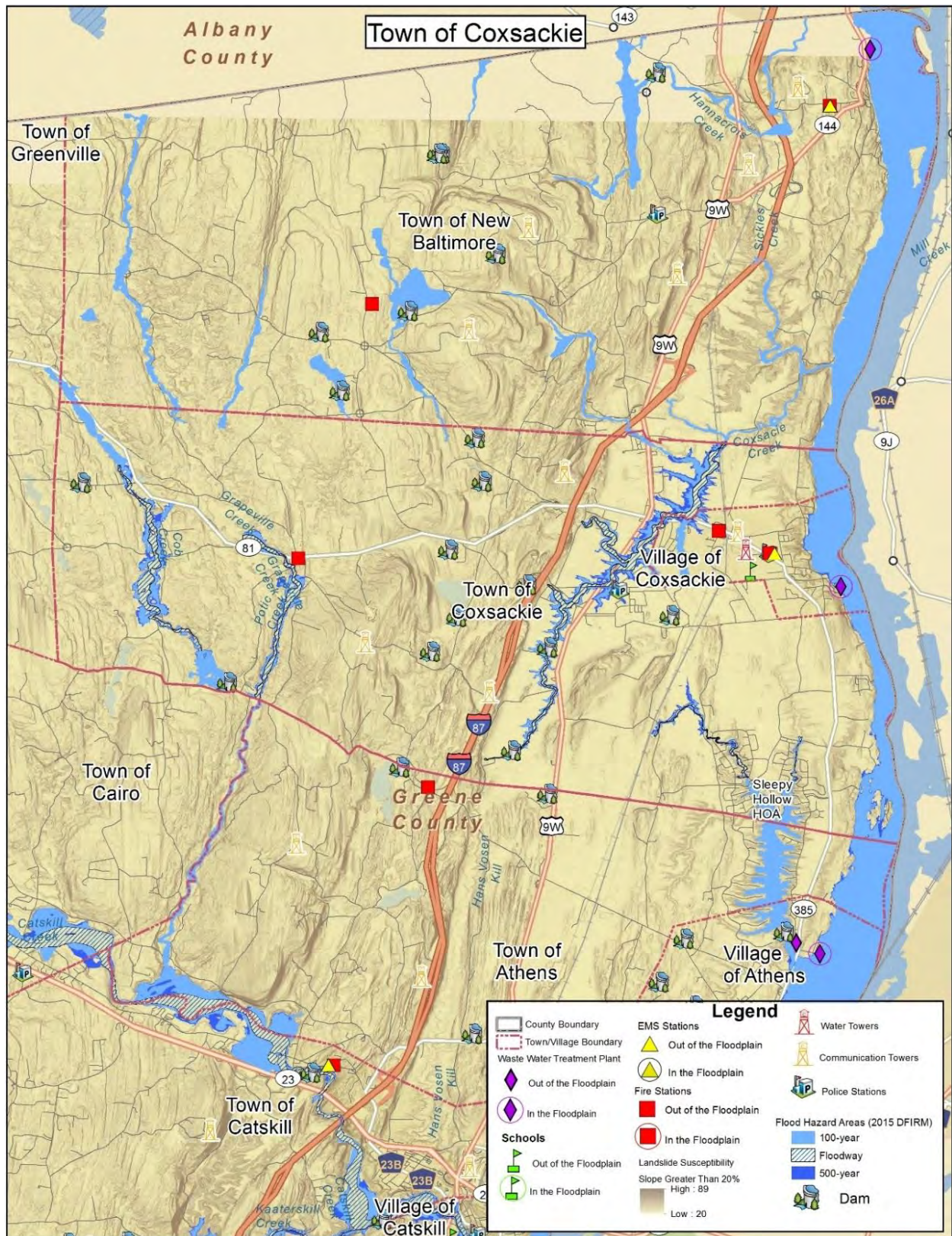


Figure VII-1: Town of Cocksackie Hazard Area Map

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: The Town of Coxsackie has not shown any identifiable or confirmable completed or in progress mitigation actions for reducing long-term vulnerability in the past 5 years.

Table VII-3 shows the hazard mitigation actions described in the 2009 HMP that have been completed or are in progress.

Table VII-3: Summary of Town of Coxsackie Mitigation Actions Completed or In Progress

Mitigation Action	Project
?	?

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Coxsackie has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)CXX-1: Potic Creek Road – Install new larger box culverts to replace undersized stone box culverts. Widen and raise the road 2 feet higher than present elevation.
- (T)CXX-2: Honey Hollow Road – Replace two existing corrugated metal culverts with two concrete box culverts.
- (T)CXX-3: Vandenburg Road – Replace five failing galvanized culverts.
- (V)CXX-3: Flood Attenuation Basins – Work cooperatively with the Village of Coxsackie to undertake the design and implementation of a series of shallow flood attenuation basins to reduce flooding along Coxsackie Creek (*see the Village of Coxsackie Annex/Worksheet*).

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

Jurisdictional Annex VIII

Village of Coxsackie

Village Profile

The Village of Coxsackie is in Greene County along the west bank of the Hudson River, near U.S. Route 9W. See Table VIII-1.

History: The Upper Village (known as West Coxsackie) was the first settlement in the Village. At the start of the 1800s, the area where the Village now sits was purchased by Eliakim Reed, where he established a small wharf. The business district of the Village was laid out in 1810 and grew rapidly due to the shipping of farm goods and ice to the New York City area by way of the Hudson River. The Village of Coxsackie was incorporated on April 5, 1867.

Form of Government: The Village is governed by the Mayor and four Trustees. The Trustees sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs.

Growth and Development Trends: The Village has a joint *Comprehensive Plan* with the Town of Coxsackie. The Town is anticipating growth as a result of a proposed development of 150-250 modular homes to be developed within 5 years. Additionally, there are some proposed water supply and wastewater treatment plant upgrades underway, as well as a 2 million gallon water tank to supply Village and nearby Town residents—these projects will enhance development and promote growth.

The Village of Coxsackie's *Comprehensive Plant* encourages commercial growth in West Coxsackie and residential growth in its vicinity. Waterfront-related development is encouraged along the Hudson River with residential growth around the downtown. Industrial growth is encouraged in the Bailey Street vicinity. The Town's zoning ordinance (2008) provides for the use of Planned Development Districts and has a section on natural resource protection standards..

U.S. Census statistics show that the Village shrunk from 2,895 to 2,813 people between 2000 and 2010, and the number of housing units increased from 1,307 to 1,324. See Table VIII-I.

Village Contact Information

PRIMARY POINT OF CONTACT:

Mark R. Evans, Mayor
119 Mansion Street
Coxsackie, NY 12051
518x731.5555
Email: mevans@statetel.com

ALTERNATIVE POINT OF CONTACT:

Nikki Berezna, Village Clerk
119 Mansion St.
Coxsackie, NY 12051
518.731.2718
Email: nberezna@villageofcoxsackie.com

**Table VIII-1:
Village of Coxsackie Statistics**

2010 Population	Total Land Area	Land/Water Area
2,813	2.59 sq. mi.	2.17/0.42 sq. mi.



*Flooding during Hurricane Irene
Source: Greene County Emergency Services*

Recent Hazard Events

In the last 5 years, there have been a few storms that were significant for the Village, most notably Hurricane Irene and Superstorm Sandy in 2012 was the most significant event in Village of Cossackie where storm surge came up the Hudson River. Historically, the last significant event was an ice jam in the Hudson River that flooded the downtown in 1996.

Summary of Vulnerabilities

The Village of Cossackie is one of Greene County's River Towns located along the Hudson River. Flooding occurs in low lying areas including the underpass of the CSX Railway, along the Cossackie Creek, and along the Hudson River. Table VIII-2 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

As seen in Figure VIII-2, there is one critical facility located in the floodplain: the Village's wastewater treatment plant.

Besides flooding, the risk analysis summarized in Chapter 4 of the main plan document notes that the Village has the potential for some of the greatest wind damages in the County.

Table VIII-2: Number of Parcels in Flood Hazard Areas

Floodway	100-Year Floodplain	500-Year Floodplain
15	146	189

Source: 2015 FEMA Flood Insurance Rate Map



Figure VIII-2: Village of Cossackie Hazard Area Map

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*¹ (HMP) are described below.

Planning (legal) and Regulatory: There have not been very many changes in capabilities for reducing long-term vulnerability since the 2009 HMP. In addition to the joint Comprehensive Plan with the Town of Coxsackie, the Town has a number of relevant documents and ordinances listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: In addition to the Mayor and Board of Trustees, the Village has a Village Clerk and Deputy Clerk, Department of Public Works, Police Department, Fire Department, Ambulance, Water Department, Wastewater Department, Highway Department, and Code Enforcement Officer. The Code Enforcement Officer position is a shared position with the Village of Catskill and the Village of Athens, which reduces the Village’s capacity. The Village also has a consulting engineer and land surveyor who provides and enhances its administrative and technical capabilities.

Financial: There have not been any identifiable or confirmable changes in the capabilities for reducing long-term vulnerability since the 2009 HMP.

Education and Outreach: There have not been any identifiable or confirmable changes in the capabilities for reducing long-term vulnerability since the 2009 HMP.

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: In the last 5 years, the Village of Coxsackie completed a drainage assessment and designed and implemented drainage improvements to remedy a repetitive flooding problem at the Bailey Street railroad crossing. Repetitive flooding frequently resulted in road closure cutting off a critical access route into and out of the Village. The Village received a \$590,000 grant for sewer line work on Bailey, Raymond, and Cato Streets, completed in 2015. The Village also used a \$30,000 grant to start engineering design for an upgrade to its wastewater treatment plant, pump station, and collection piping (an estimated \$10 million project).

Relevant Documents and Ordinances

- ✓ *Comprehensive Plan* (2007)
- ✓ Zoning Ordinance (2008)
- ✓ Natural Resource Protection Standards [date?]
- ✓ Subdivision Ordinance [date?]
- ✓ Site Plan Review [date?]
- ✓ Building Code [date?]
- ✓ NFIP Flood Damage Prevention Ordinance (2008)
- ✓ Snow Emergency Parking Regulations [date?]
- ✓ *Floodplain Management / Basin Plan* [date?]

¹ <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

Table VIII-3: Mitigation Actions, Village of Coxsackie

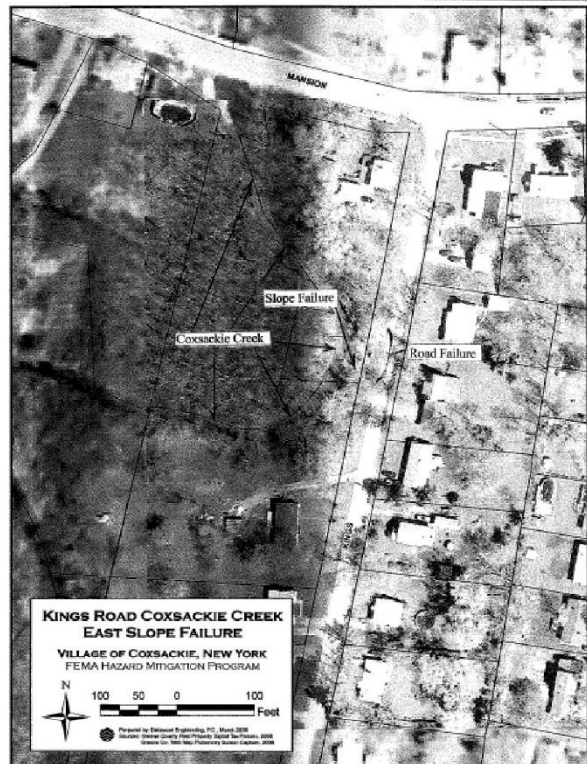
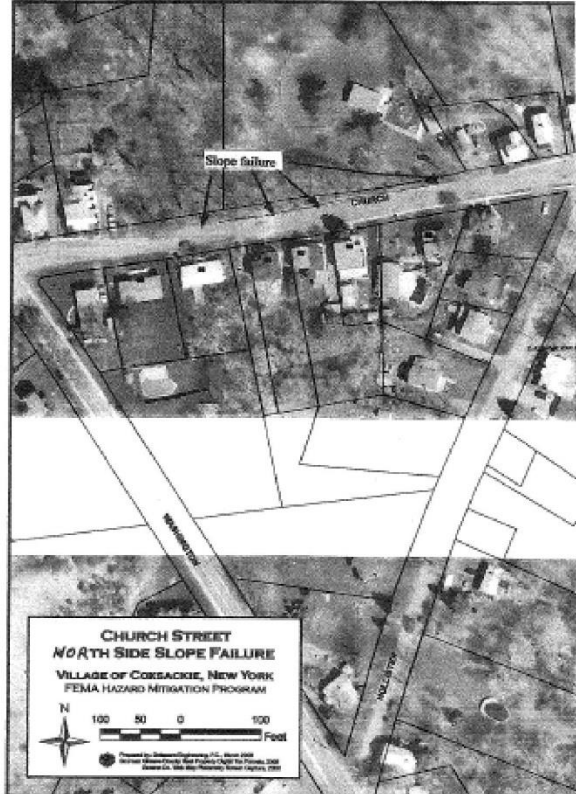
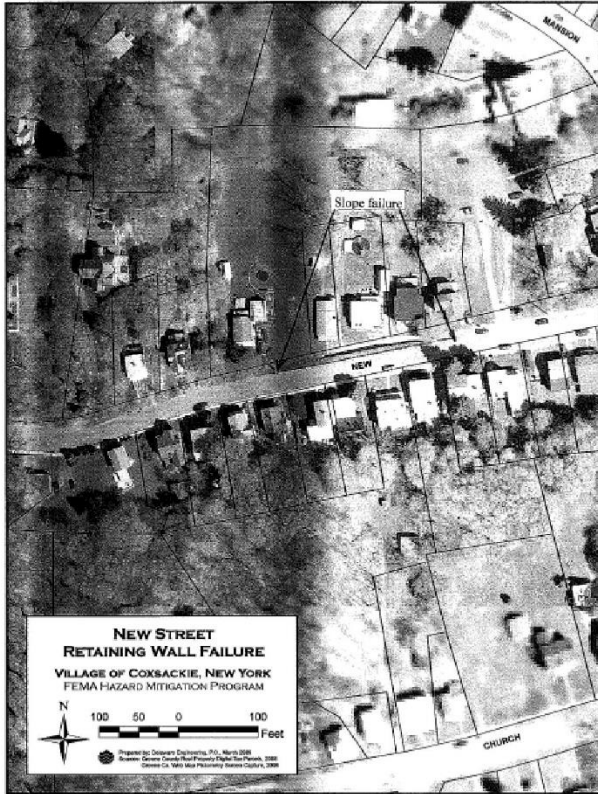
Mitigation Action	Project Status
Bailey Street Railroad Crossing	Complete
Sewer Line work on Bailey, Raymond and Cato Streets	Complete
Upgrade to wastewater treatment plant, pump station and collection piping	In Progress

Proposed Hazard Mitigation Actions: In addition to the Green County actions discussed in this Plan, the Village of Coxsackie has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (V)CXK-1: Rt. 385/CSX Underpass – Complete drainage assessment and design/implement improvements to remedy repetitive flooding of the underpass.
- (V)CXK-2: Church Street Stabilization – The north side of the road has been collapsing for decades and is sliding down the embankment. Stabilize Church Street (from #56 to #58 Church Street).
- (V)CXK-3: Flood Attenuation Basins – Work cooperatively with the Town of Coxsackie to undertake the design and implementation of a series of shallow flood attenuation basins to reduce flooding along Coxsackie Creek (*Cross-referenced in Town of Coxsackie Jurisdictional Annex*).
- (V)CXK-4: Stabilize Kings Road – Stabilize the west side of Kings Road. Slope failure has occurred and the southbound lane is collapsing.
- (V)CXK-5: Mansion Street Drainage – Improve drainage between the Getty station and the rescue squad on Mansion Street to avoid mosquito breeding and flooding in local cellars.
- (V)CXK-6: Retaining Wall and Drainage on New Street – Retaining wall needs to be stabilized and drainage is needed to prevent wall failure and avoid danger of collapse of the four houses that are 14 ft below the wall on New Street, between #44 and #52 on northbound lane.
- (V)CXK-7: Drainage Assessment and Improvements for Noble Street – Complete drainage assessment and design/implement improvements to remedy drainage and sliding problems to prevent road failure and avoid danger of collapse on north side of Noble Street.
- (V)CXK-8: Riverside Avenue Retaining Wall to Address Slope Failure – Install retaining wall or sheet pilings to stop slope failure from #17 to #27 Riverside Avenue.
- (V)CXK-9: West Coxsackie Trunk Line – Relocate West Coxsackie sewer trunk line along the Coxsackie Creek to eliminate repetitive flooding problems and overloading to the West Coxsackie sewer pump station.
- (V)CXK-10: Wastewater Treatment Plant – Replace the wastewater treatment plant.
- (V)CXK-11: Gate House Intake at Climax Reservoir – Replace broken gates as only one of three gates currently work. Built in 1935, these gates regulate water flow to the plant.
- (V)CXK-12: Spillway at Lower Reservoir – The spillway is deteriorated and needs a complete overhaul.

- (V)CXX-13: Pipe connecting the Two Reservoirs – Contaminants currently enter the water system as water flows between the two reservoirs.
- (V)CXX-14: Water Tank – Provide additional storage capacity by installing a new 2 million gallon tank.
- (V)CXX-15: Water Line Replacement – Replace the nearly 40 miles of aging distribution system.
- (V)CXX-16: Drainage on lower Church Street/Franklin Street/South River Street – Complete drainage assessment and design/implement drainage improvements to remedy a repetitive flooding problem.
- (V)CXX-17: Drainage from Apple Blossom Lane and east to Matthew Lake and Luke Avenue – Complete a drainage assessment and design/implement drainage improvements to remedy repetitive flooding issues.

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Details about each of the proposed hazard mitigation actions can be found in the individual Action Worksheets.

Jurisdictional Annex IX

Town of Durham

Town Profile

The Town of Durham is located in Greene County approximately 24 miles northwest of the Village of Catskill and 30 miles south of the City of Albany. The Town’s boundaries stretch along the foothills of the Catskill Mountains and the Catskill Creek’s valley floor to the south to some of the highest terrain in the County at Mt. Pisgah to the northwest. See Table IX-1.

History: The Town was settled by people of European descent and in just 30 years grew to a population of approximately 2,900. The borders of the Town were established in 1836 when a significant portion of the Town was carved off to form Conesville in Schoharie County. Farming was the primary way of life for the Town’s residents, though many businesses thrived, most notably several foundries.

The Susquehanna Turnpike, opened in 1801, played a major role in the Town by connecting the Village of Catskill through the Durham Valley to what was then New Durham. The Town thrived until the opening of the Erie Canal in 1825, which significantly impacted the Town. Around this time, tourism began to flourish in the Town and it, along with second homes, remains a vital economic component today. (Source: *Town of Durham Website*).

Form of Government: The Town is governed by five elected officials comprised of a Supervisor and four Town Council members. The Town Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs. Each member serves a 2-year term.

Growth and Development Trends: The July 2007 Greene County *Comprehensive Economic Development Plan*¹ states that the Town wishes to see continued growth along the State Route 145 corridor to connect East Durham with the Hamlet of Durham making this a distinct corridor. The Town of Durham and community planners have actively pursued grants for the streetscape improvements and revitalization projects.

U.S. Census statistics show that the Town grew from 2,592 to 2,725 people between 2000 and 2010, and the number of housing units increased from 1,642 to 1,807 (see Table IX-1).

Recent Hazard Events

In the last 5 years there have been many severe rain and snow events that were significant for the Town, most notably Hurricane Irene and Superstorm Sandy. These two events did not affect that the Town in such a way that was significantly more notable or damaging than annual or periodic severe unnamed storms.

¹ <http://greenegovernment.com/departments/planning-economic-development/services/economic-development/#plan-ecodev>

Town Contact Information

PRIMARY POINT OF CONTACT:

William A. Carr Jr., Supervisor
7309 Rt. 81
East Durham, NY 12423
518.239.4248
Email: townsupervisor@durhamny.com

ALTERNATIVE POINT OF CONTACT:

Cindy Moore, Supervisors Clerk
7309 Rt. 81
East Durham, NY 12423
518.239.4248
Email: [insert]

Table IX-1: Town of Durham Statistics

2010 Population	Total Land Area	Land/Water Area
2,725	49.36 sq. mi	49.31/0.04 sq. mi

Summary of Vulnerabilities

The Town of Durham is one of Greene County’s Mountaintop Towns. Table IX-2 details the number of parcels that are located in or touch the floodway, 100- or 500-year floodplain(s).

As shown in Figure IX-1, there are no critical facilities (or police/fire station, etc.) located in the floodplain.

Table IX-2: Number of Parcels in Flood Hazard Areas, Town of Durham

Floodway	100-Year Floodplain	500-Year Floodplain
0	241	241

Source: 2015 FEMA Flood Insurance Rate Map

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*² (HMP) are described below.

Planning (legal) and Regulatory: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP. The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: In addition to the Town Board, the Town has a Building Code and Enforcement Office, Public Works Department, Ambulance Service, two fire companies, a police department, and several volunteer boards and committees.

Relevant Documents and Ordinances

- ✓ *Comprehensive Plan/Master Plan/General Plan* [date?]
- ✓ Building Code [date?]
- ✓ Subdivision Ordinance [date?]
- ✓ NFIP Flood Damage Prevention Ordinance (2008)
- ✓ Growth Management [date?]
- ✓ *Floodplain Management/Basin Plan* [date?]
- ✓ *Stormwater Management Plan/Ordinance* [date?]
- ✓ *Capital Improvements* [date?]
- ✓ *Open Space Plan* [date?]
- ✓ Economic Development Plan [date?]
- ✓ *Emergency Response Plan* [date?]
- ✓ Real Estate Disclosure Requirements [date?]
- ✓ Communications Tower Siting Ordinance [date?]
- ✓ *Scenic Byways Corridor Management Plan* [date?]

² <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

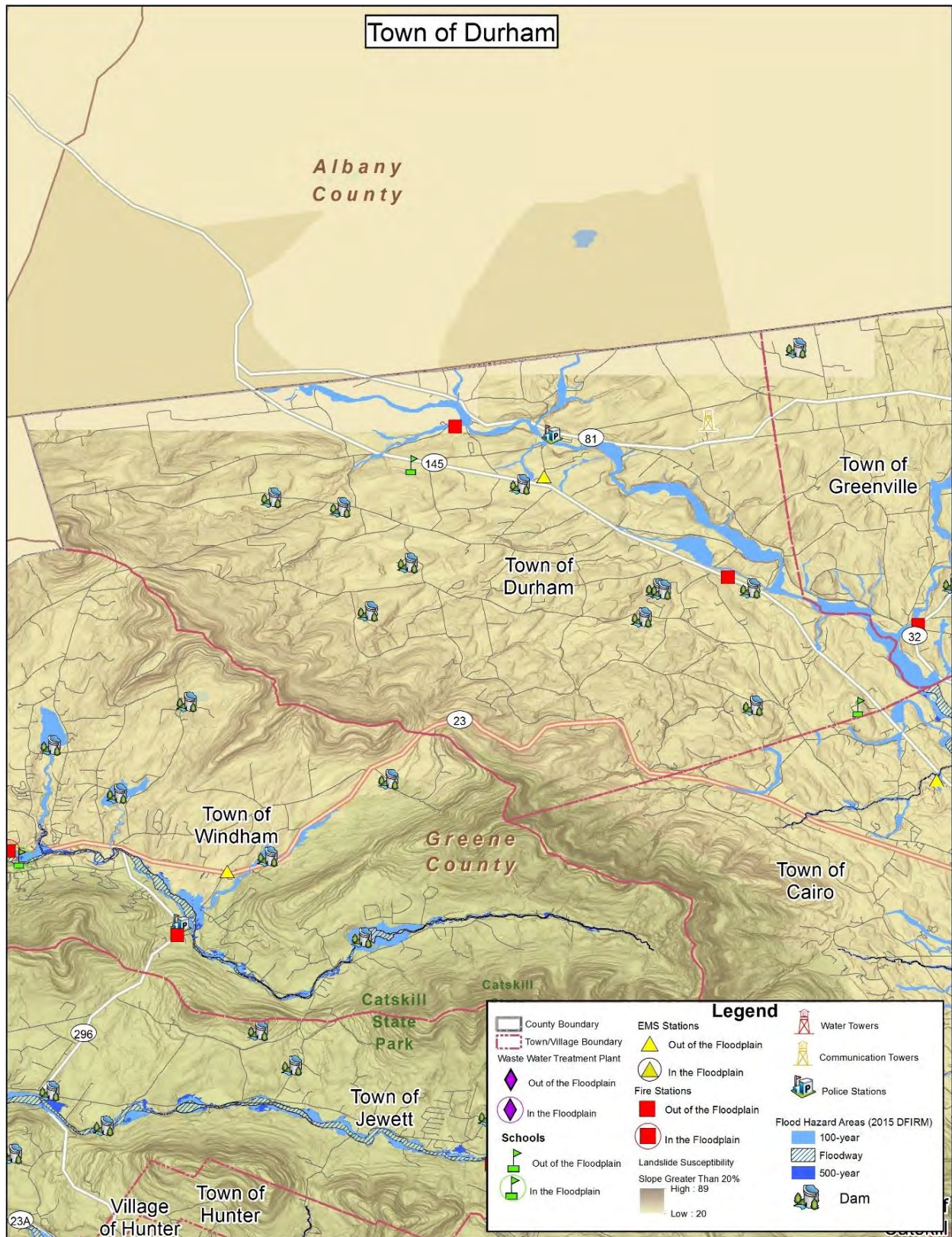


Figure IX-1: Town of Durham Hazard Area Map

Financial: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

Education and Outreach: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: In the last 5 years, the Town of Durham has not undertaken any identifiable or confirmable completed or in-progress mitigation actions to reduce long-term vulnerability due to resource constraints.

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Durham has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)DUR-1: Culvert Replacement 1 – Replace the current double 8 ft x 40 ft culverts with a single arched bottomless culvert. Regrade, re-set, and re-establish the road.
- (T)DUR-2: Culvert Replacement 2 – Replace the current 8 ft x 40 ft culvert with a 20 ft x40 ft culvert. Regrade, re-set, and re-establish the existing roadway.
- (T) DUR-3: Generator for Town Building – Replace the current generator with a 220 volt, single-phase diesel generator.

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

Jurisdictional Annex X

Town of Greenville

Town Profile

The Town of Greenville is a Valley Town centrally located along the border between Greene and Albany Counties. See Table X-1.

History: The Town of Greenville was settled in 1774, established in 1803 as a section of the Town of Coxsackie. The Town was briefly called the Town of Freehold, but the name Greenville was finalized in 1808. Once the turnpikes were established, the Town of Greenville used the transportation routes to its advantage for the transportation of goods and services.

Form of Government: The Town is governed by an elected Supervisor and Town Board consisting of four councilmen. The Town Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs. The Town also has a Town Clerk, Assessors Office, Highway Department, and Code Enforcement Office with two staff members.

Growth and Development Trends: The Town of Greenville has a *Comprehensive Plan* prepared in 2008. The Town is encouraging controlled smart growth with expansion of the commercial areas to allow for commercial business and expansion of housing around the hamlet areas (with expansions in water and sewer in those locations).

U.S. Census statistics show that the Town grew from 3,316 to 3,739 people between 2000 and 2010 (see Table X-1), and the number of housing units increased from 1,694 to 1,901.

Recent Hazard Events

In the last 5 years, there have been a few storms that were significant for the Town, in particular Hurricane Irene.

Hurricane Irene (2011): Hurricane Irene [please provide description of how Irene affected the Town].

Summary of Vulnerabilities

The primary vulnerability in the Town is flooding, which is a concern related to stormwater in particular. Table X-1 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

As shown in Figure X-1, there are no critical facilities located in the floodplain in the Town of Greenville.

Town Contact Information

PRIMARY POINT OF CONTACT:

Paul J. Macko, Supervisor
11159 Route 32, Pioneer Building
P.O. Box 38, Greenville, NY 12083
518.966.5055 x2
Email: pmackogrsuper@aol.com

ALTERNATIVE POINT OF CONTACT:

William Silk, Code Enforcement Officer
11159 Route 32, Pioneer Building
P.O. Box 38, Greenville, NY 12083
518.966.5055 x29
E-mail: codes@townofgreenillyen.com

Table X-1: Town of Greenville Statistics

2010 Population	Total Land Area	Land/Water Area
3,739	39.08 sq. mi	38.79/0.30 sq. mi

Table X-2: Number of Parcels in Flood Hazard Areas, Town of Greenville

Floodway	100-Year Floodplain	500-Year Floodplain
0	189	189

Source: 2015 FEMA Flood Insurance Rate Map

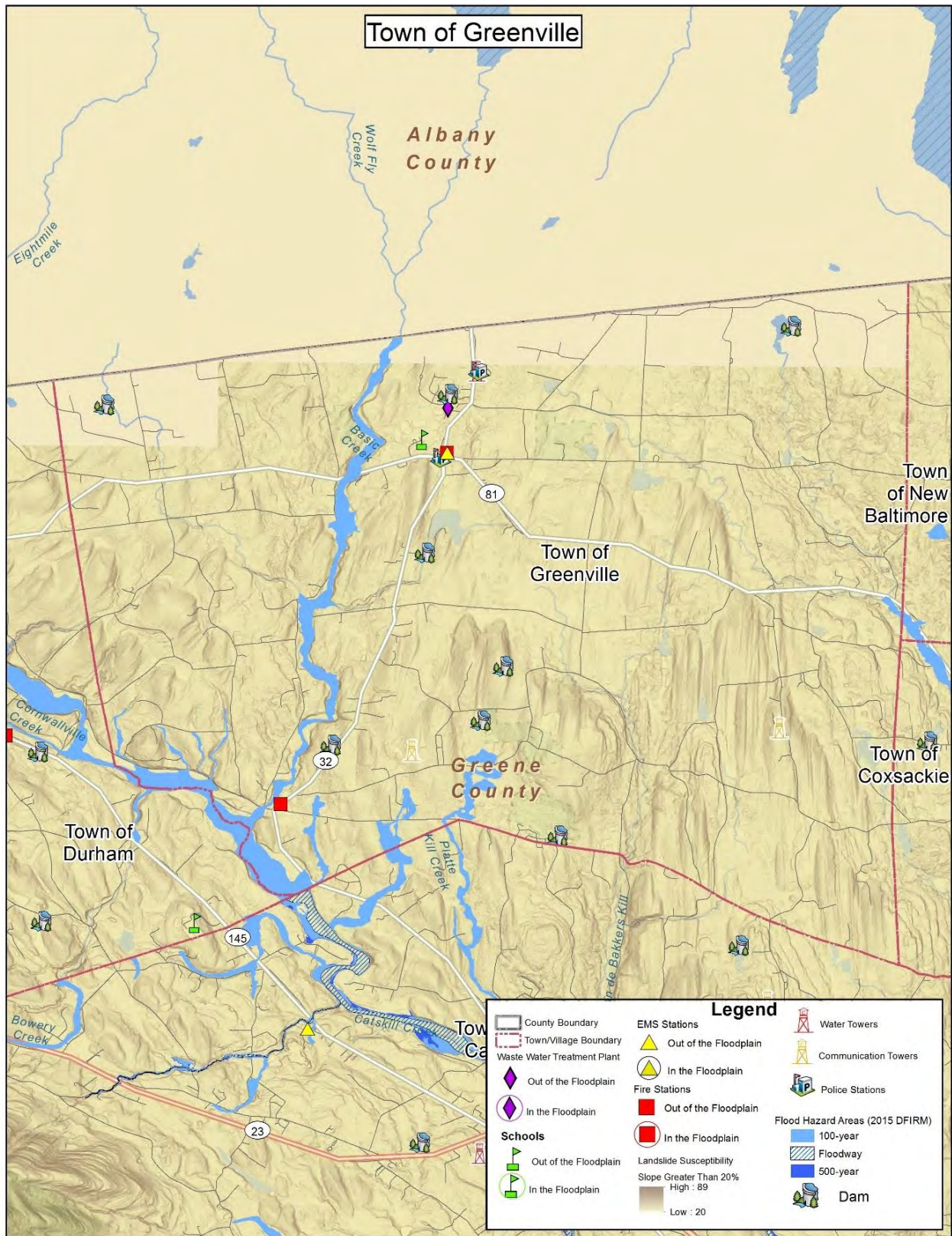


Figure X-1: Town of Greenville Hazard Area Map

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*¹ (HMP) are described below.

Planning (legal) and Regulatory: The Town has a *Comprehensive Plan* (2008) and recently adopted new a new zoning ordinance (2015). The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: The Town has a Town Clerk, Assessors Office, Highway Department, and Code Enforcement Office with two staff and a consulting engineer.

Financial: The Town has a consulting grant writer to assist with grant applications.

Education and Outreach: There have not been any identifiable or confirmable changes in the capabilities for reducing long-term vulnerability since the 2009 HMP.

Relevant Documents and Ordinances

- ✓ *Comprehensive Plan* (2008)
- ✓ Building Code (date?)
- ✓ Zoning Ordinance (2015)
- ✓ Site Plan Review Requirements (date?)
- ✓ Subdivision Ordinance (date?)
- ✓ NFIP Flood Damage Prevention Ordinance (effective date 2008)

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: The Town of Greenville has a pending HMGP grant submitted to FEMA in December, 2013, for a sewer district extension. The Town recently completed a zoning ordinance update in 2015. Table xx shows the hazard mitigation actions completed or in progress.

Table X-3: Summary of Town of Greenville Mitigation Actions Completed or In Progress

Mitigation Action	Project
Sewer District Extension	In Progress
Zoning Ordinance Update	Complete

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Greenville has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)GRE-1: Sewer District Extension – This project will increase the capacity of the waste water treatment plant to handle increased stormwater, fortify retaining walls along the Catskill Creek Watershed areas, resolve existing inflow and infiltration issues, and expand the sewer district to residential and commercial properties with failed or failing septic systems.

¹ <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

Details about the proposed hazard mitigation action can be found in the individual Action Worksheets.

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Jurisdictional Annex XI

Town of Halcott

Town Profile

The Town of Halcott is located in the southwest corner of Greene County along the Delaware County line. The Town is over an hour from Cairo or Town of Catskill by car and the drive requires traveling through Ulster and Delaware Counties. See Table XI-1.

The Town of Halcott is located in the east branch of the Delaware River watershed and as such many of the environmental and related programs within Greene County do not apply to the Town.

History: The land that is currently the Town of Halcott was first settled in 1813. George W. Halcott helped organize the Town and in 1851 the Board of Supervisors was petitioned to create the Town. The State legislature passed the petition in 1852. Dairy farming was the primary way of life for many in the Town though commercial businesses became prevalent as more people settled in the area. The population of the Town peaked in 1860 at 504.

Form of Government: The Town is governed by a Supervisor and four Town Council members, which form the Town Board. The Town Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs.

Growth and Development Trends: The July 2007 Greene County *Comprehensive Economic Development Plan*¹ notes that there had not been many developments in the preceding 3 years. The plan identifies Turkey Ridge as the catalytic development project; this project permitted residential development on lots of 5 acres or more within the approximately 300-acre Turkey Ridge site. The Plan further states that residents are satisfied with the current state of the Town and no areas are listed as targeted development areas.

U.S. Census statistics show that the Town grew from 193 to 258 people between 2000 and 2010 (see Table XI-1), and the number of housing units increased from 288 to 312.

Recent Hazard Events

In the last 5 years there have been a few storms that were significant for the Town, most notably Hurricane Irene and a snowstorm in 2014.

Hurricane Irene (2011): Hurricane Irene was the latest in a series of storms that have flooded and damaged parts of the Town. The storm damaged the Town's recycling center resulting in a clean-up/repair fee of \$9,472, a significant sum absorbed by the Town, which only has 258 residents.

¹ <http://greenegovernment.com/departments/planning-economic-development/services/economic-development/#plan-ecodev>

Town Contact Information

PRIMARY POINT OF CONTACT:

Alan S. White, Supervisor
22 Bruce Scudder Road
Halcott Center, NY 12430

[insert phone here: xxx.xxx.xxxx]

Email: supervisor@townofhalcott.org

ALTERNATIVE POINT OF CONTACT:

Pattie Warfield, Town Clerk
Town Clerk's Office
264 Route 3

Halcott Center, NY 12430

[insert phone here: xxx.xxx.xxxx]

clerk@townofhalcott.org

Table XI-1: Town of Halcott Statistics

2010 Population	Total Land Area	Land/Water Area
258	23.04 sq. mi.	23.04/0 sq. mi.

Flooding in the Town limits destroyed two County bridges and one Town bridge, all of which were repaired with FEMA funding for FEMA funding. FEMA funding was also used to repair the Town Highway Garage, which is partially within the 100-year flood zone.

2014 Major Snowstorm: A major snowstorm in 2014 dropped over 4 feet of snow, crippling the area and shutting down the Town for several days.

Summary of Vulnerabilities

The Town of Halcott is one of Greene County’s Mountaintop Towns. One of the Town’s major challenges is the fact that the Town is very isolated during the frequent flooding events. Over the last 15 years the Town has not been able to access their fire and emergency services, located in Fleischmanns, Delaware County, several times. Table XI-2 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

Table XI-2: Number of Parcels in Flood Hazard Areas, Town of Halcott

Floodway	100-Year Floodplain	500-Year Floodplain
0	165	165

Source: 2015 FEMA Flood Insurance Rate Map

As shown in Figure XI-1, there are no critical facilities located within the floodplain in the Town of Halcott. However, as noted above, emergency services for the Town are located in nearby Fleischmanns, as shown in Figure XI -2, which gets cut off from the Town during flood events.

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*² (HMP) are described below.

² <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

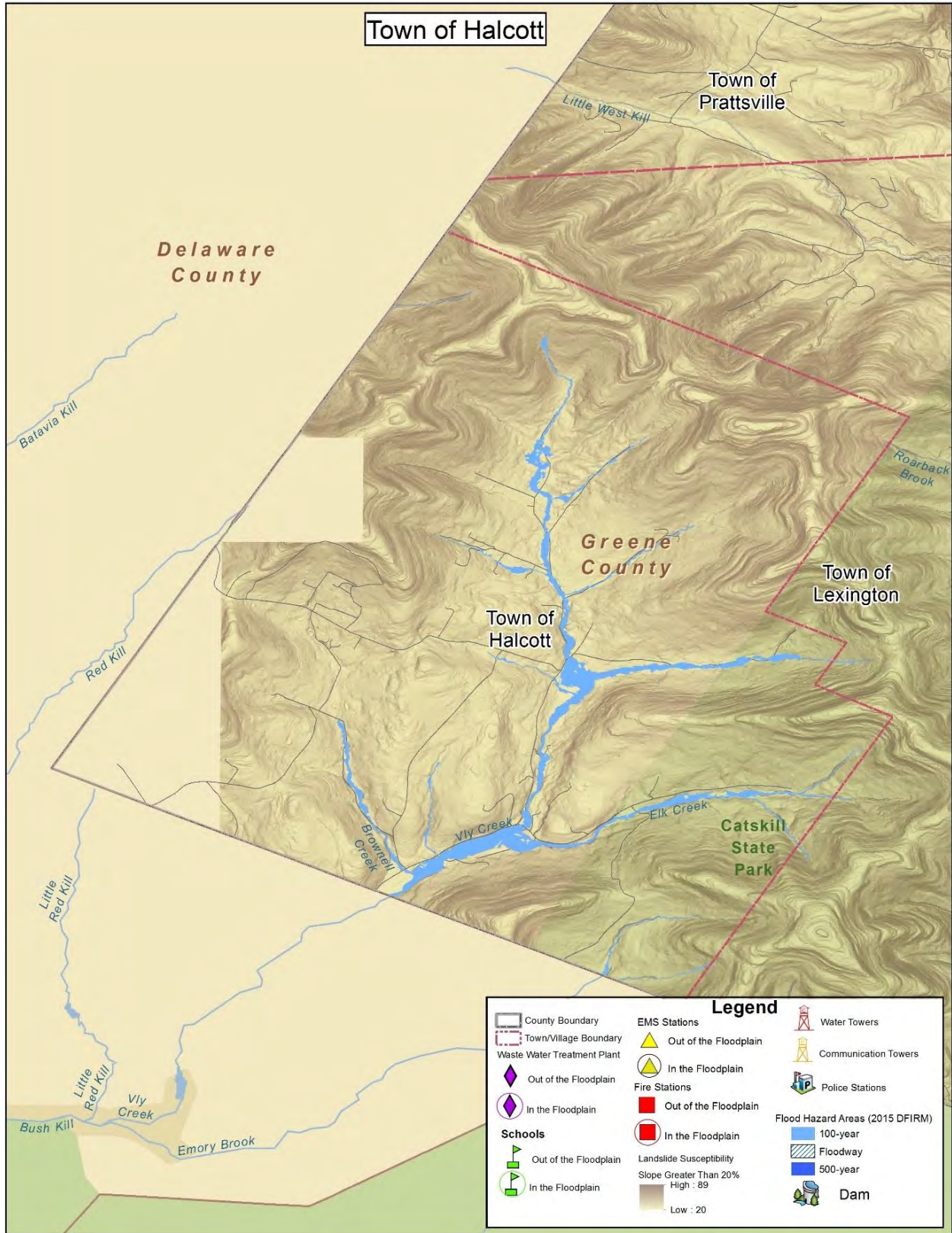


Figure XI-1: Town of Halcott Hazard Area Map

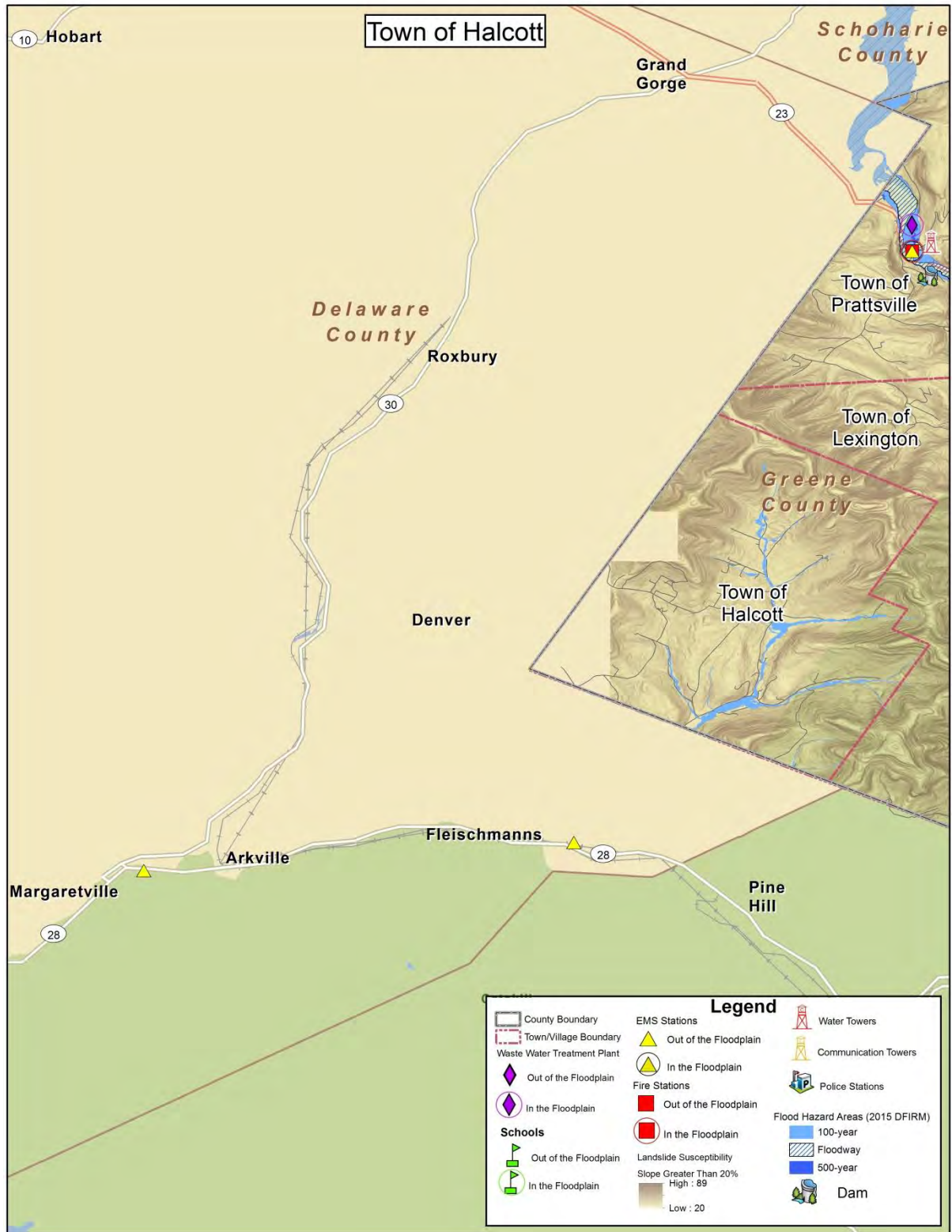


Figure XI-2: Critical Facilities located in Delaware County

Planning (legal) and Regulatory: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP. The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Relevant Documents and Ordinances

- ✓ Comprehensive Plan (2003)
- ✓ Farmland Protection Plan (2009)
- ✓ Land Use Code (2009)
- ✓ Building Code (2007)
- ✓ Zoning Ordinance (2009)
- ✓ Subdivision Ordinance (2009)
- ✓ NFIP Flood Damage Prevention Ordinance (2008)
- ✓ Floodplain Management/Basin Plan (2008)
- ✓ Site Plan Review Requirements (1989)
- ✓ Emergency Response Plan [date?]

Administrative and Technical: In addition to the Town Board, the Town has a Superintendent of Highways, Town Clerk, and Tax Collector. The Town Board members and the Planning Board have professional experience in engineering, road maintenance, land development, farming, heavy equipment operation, and institutional knowledge of the natural hazards in the Town.

Financial: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

Education and Outreach: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP update.

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: In the last 5 years, the Town has adopted a land use code. The Town is frequently cut off and isolated during flooding events, making everything from accessing necessities like grocery stores to getting emergency assistance when needed difficult, if not impossible, the Town of Halcott has secured property for the construction of a satellite fire truck facility. The facility is the Town’s top mitigation action priority but it does not currently have the funds necessary to construct the building. The estimate for construction is approximately \$150,000 *(please confirm estimate)*.

Table xx shows the hazard mitigation actions described in the 2009 HMP that have been completed or are in progress.

Table XI-3: Summary of Mitigation Actions, Town of Halcott

Mitigation Action	Project Status
Emergency Response Plan	Completed
Land Use Code	Completed

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Halcott has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)HAL-1: Satellite Fire Truck Building – Construct a satellite fire truck building on property already acquired.
- (T)HAL-2: Retrofit Recycling Station – Retrofit and expand the recycling center and expand it to include a solid waste collection option.

- (T)HAL-3: Townsend Hollow Road Culvert – *Need additional description and Action Worksheet.*

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

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Jurisdictional Annex XII

Town of Hunter

Town Profile

The Town of Hunter is located in the south-central portion of Greene County. It contains many of the high peaks of the Catskill Mountains including Hunter Mountain, the highest mountain in the County and second highest in the Catskills. The Town line borders Ulster County, NY, along its southern and part of its eastern edge. See Table XII-1.

History: The Town of Hunter, originally called Greenland, was formed from the territory of Windham in 1813. The Town was not officially renamed Hunter until the following year, 1814. Settlers arrived through one of three cloves: Kaaterskill, Platte, or Stony Clove. There are two incorporated Villages in the Town of Hunter: Hunter Village, originally called Edwardsville and incorporated in 1894, and Tannersville, which was incorporated in 1895. Though the land was hilly and rocky, most settlers farmed even if just to support the needs of their family. The Town had tanneries, lumber mills along streams, furniture factories using product from the lumber mills, and quarries that shipped stone to cities for use in sidewalks. The scenery brought about a booming tourism business with boarding houses and large hotels. Among the best known were the Catskill Mountain House, Hotel Kaaterskill, and the Laurel House. The railroads brought in even more people. The Town declined after the invention of the automobile, the Great Depression, and World War II, but the development of skiing destinations brought the Town back into vibrancy. Today, Hunter and Windham Mountains are major destinations. (Source: *Town of Hunter Website*).

Form of Government: The Town is governed by a Town Board composed of the Supervisor and four Trustees. The Town Board sets policy, approves the budget, adopts local laws, implements policies, and administers local affairs.

Growth and Development Trends: The Town's *Comprehensive Plan* (2000) notes that the population peaked in the early 1900s and has generally declined since that time. The Town (and Villages) population significant increases seasonally due to the number of people who own seasonal/second homes; some who visit stay in the area (see Table XII-1). The Town's *Comprehensive Plan* estimates that over half of the housing units in the Town (and Villages) are seasonal.

The 2007 Greene County *Comprehensive Economic Development Plan*¹ details growth plans more recent than the Town's *Comprehensive Plan*. It states that future growth is desired in both Hunter and Tannersville along the entire Route 23A corridor, which is the primary route through the area. The west side of Hunter Mountain is identified as an area where additional recreational uses and ski

¹ <http://greenegovernment.com/departments/planning-economic-development/services/economic-development/#plan-ecodev>

Town Contact Information

PRIMARY POINT OF CONTACT:

Daryl E. Legg, Supervisor
5748 Route 23a
Tannersville, NY 12485
518.589.6151 x 312
Email: townofhunter@yahoo.com

ALTERNATIVE POINT OF CONTACT:

Susan Graham or Lara Hamrah-Poladian
5748 Route 23a
Tannersville, NY 12485
518.589.6151
Email: townofhunter@yahoo.com

Table XII-1: Town of Hunter Statistics

2010 Population	Total Land Area	Land/Water Area
1,691	87.78 sq. mi	87.52/0.26 sq. mi

Villages not included

industry expansions is preferred. The residential and golf community of Wildcat Hollow is also identified as a potential growth area.

The Town negotiated with NYCDEP on the expansion of its designated hamlet areas; the agreement went into effect in 2010. The expanded areas have been identified as suitable for growth by the Town.

The Town also worked jointly with the Villages of Hunter and Tannersville on the *Hunter Corridor Study* (2010), which developed recommendations for the targeted development areas. The study includes a strong focus on storm water management and stream and floodplain protection.

In late 2015, an agreement was announced to sell Hunter Mountain. A news report from the Daily Freeman on December 1, 2015, quoted the buyer’s president and CEO as saying “Our roadmap for growth calls for a mix of organic growth and resort development as well as acquisitions that will let us build our portfolio of ski resorts in the attractive overnight and day-drive segments of the market.” Based on this information, it appears the new owners intend to expand the resort.

U.S. Census statistics show that the Town (not including the Villages) shrank from 1,783 to 1,691 people between 2000 and 2010, while the number of housing units increased from 1,696 to 1,753.

Recent Hazard Events

In the last 5 years, there were a few storms that were significant for the Town, most notably storms that occurred in 2011.

Hurricane Irene: Hurricane Irene dropped several inches of rain on the Town of Hunter. The resulting flash flooding of local streams caused significant damage to the infrastructure throughout the Town, including damage to more than 28 roads in the Town. The total damage assessment was approximately \$1.8 million.

Other Storms in 2011: Several other storms caused significant damage in 2011, resulting in an additional approximately \$75,000 in damage.

Summary of Vulnerabilities

The Town of Hunter is one of Greene County’s Mountain Towns located in the Catskill State Park. Table XII-2 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

As shown in Figure XII-1, there is one critical facility located in the floodplain in the Town of Hunter: the wastewater treatment plant.

Table XII-2: Number of Parcels in Flood Hazard Areas, Town of Hunter

Floodway	100-Year Floodplain	500-Year Floodplain
322	439	462

Source: 2015 FEMA Flood Insurance Rate Map

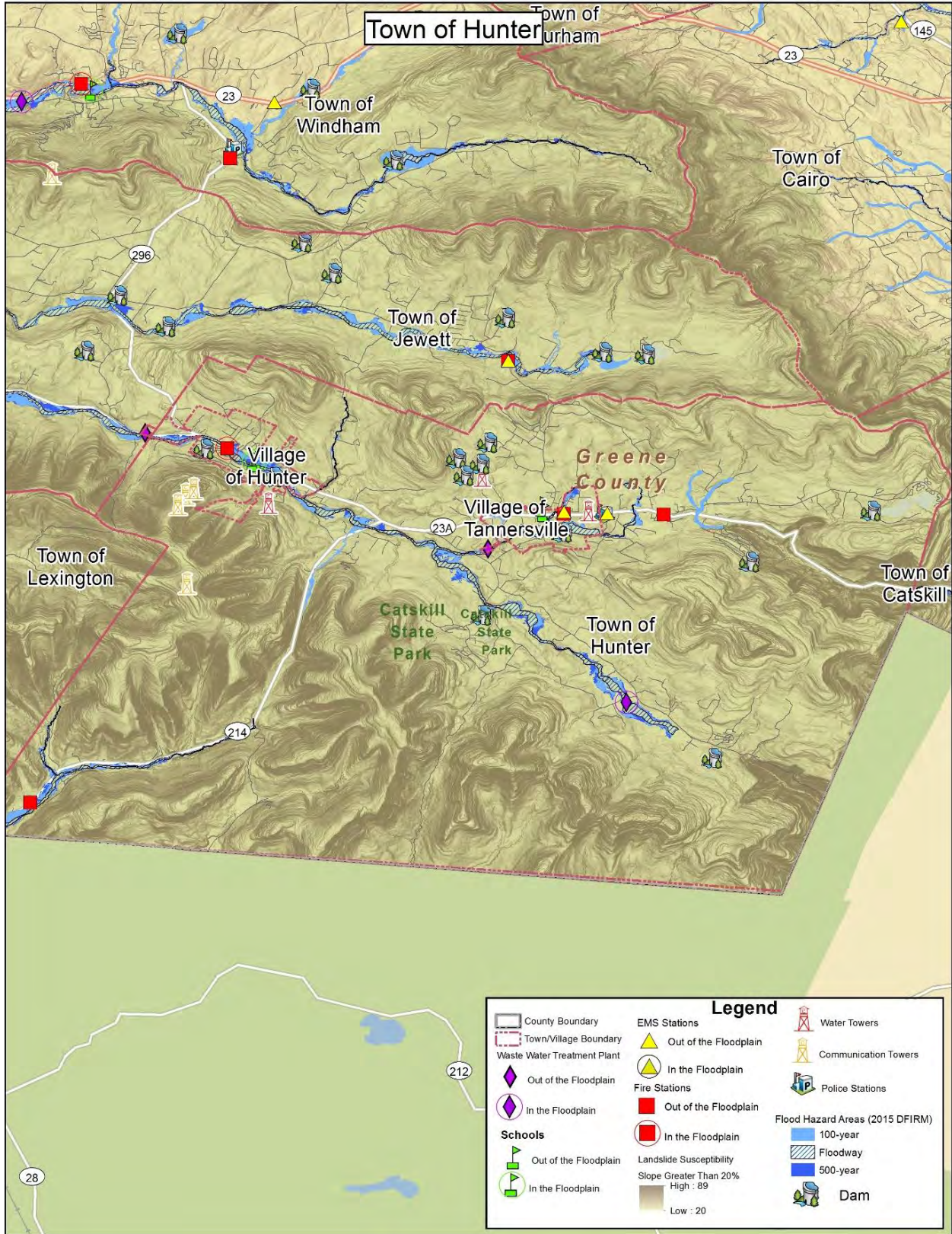


Figure XII-1: Town of Hunter Hazard Area Map

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*² (HMP) are described below.

Planning (legal) and Regulatory: In 2009, the Town was designated a Climate Smart Community. The *Hunter Corridor Regional Planning Study* was prepared in 2010. The Town is currently undertaking a comprehensive review of its site plan law and making recommendations for improvements. This effort is expected to be completed in early 2016.

The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: In addition to the Town Board, the Town has a Town Clerk, Enforcement/Building Inspector, Highway Superintendent, Police Department, Assessor, Attorney, Ambulance, Health Officer, and on-call engineering consultant. The Town also has a Town Planning Board.

Financial: The Town has a CWC FHMIP and CCCD Riparian Buffer Acquisition Program, both of which help reduce the Town’s long-term vulnerability to flooding.

Education and Outreach: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: In the last 5 years, the Town of Hunter has implemented a few mitigation actions. After Hurricane Irene, the Town replaced a bridge on Glen Park Road and supported the completion of a NYC DEP stream management program on the Schoharie Creek at Schoharie Street in the Village.

Table XII-3 shows the hazard mitigation actions described in the 2009 HMP that have been completed or are in progress.

Relevant Documents and Ordinances

- ✓ Building Code [date?]
- ✓ Subdivision Ordinance [date?]
- ✓ NFIP Flood Damage Prevention Ordinance [date?]
- ✓ Growth Management [date?]
- ✓ *Floodplain Management/Basin Plan* [date?]
- ✓ *Stormwater Management Plan*
- ✓ *Comprehensive Plan* (2000)
- ✓ Site Plan Review Requirements (under update)
- ✓ *Economic Development Plan* [date?]
- ✓ *Emergency Response Plan* [date?]
- ✓ *Regional Stream Management Plan* (2007) and MOU with GCSWCD
- ✓ *Hunter Corridor Regional Planning Study* (2010)

² <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

Table XII-3: Summary of Mitigation Actions, Town of Hunter

Mitigation Action	Project Status
Glen Park Road Bridge Replacement	Completed
Stony Clove Creek flood-related modifications	Completed
NYC DEP stream management program	Completed

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Hunter has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)HNT-1: Town-wide Stormwater Analysis Study – Undertake a storm water analysis to identify areas where current infrastructure (culverts, bridges, conveyance channels etc.) is inadequate to handle flood events. This should include development of an action plan that identifies priority projects appropriate for hazard mitigation funding and other funding availability and development of local stormwater management districts for the Villages of Hunter and Tannersville.
- (T)HNT-2: Scribner Hollow Road – Undertake a hydraulic and engineering study for the three culverts and in the same location and two additional private driveway pipes that are the responsibility of the Town. The stream also needs to be dredged, reshaped, and lined. An engineering study, stream hydraulics study, and action plan is needed.
- (T)HNT-3: Clum Hill Road Improvements – Conduct a drainage runoff study and engineered improvement plan to help prevent life threatening hazards that regularly occur on this road.
- (T)HNT-4: Plateau Mountain Road Improvements – Construct the already engineered recommendation for a replacement, either of the two alternatives: a three-sided culvert (18 ft, 6 inches x 6 ft) or bridge with dimensions of 35 ft (bottom) x 40 ft (top) x 6 ft.
- (T)HNT-5: Platte Clove Mountain Road – Undertake an engineering study and develop engineered plans to complete installation of new culvert pipes, water channels, retaining walls, guide rails, and resurfacing.
- (T)HNT-6: Local Stormwater Management District – Develop local stormwater management districts with the Village of Hunter and Tannersville. *(See also (T)HNT-1 – Town-wide Stormwater Analysis Study).*

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

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Jurisdictional Annex XIII

Village of Hunter

Village Profile

The Village of Hunter is located within the Town of Hunter in Greene County. It is entirely within the Catskill State Park and situated at the base of Hunter Mountain, home to the Hunter Mountain Resort. See Table XIII-1.

History: The land that is currently the Village of Hunter, so named in 1790, was once part of the Town of Hunter and originally called Edwardsville. Based on the significant stand of hemlock trees, Colonel William Edwards (for whom the land was originally named) encouraged others in 1816 to invest in his Tannery, which was the largest tanning factory in the world until an even larger tannery was built in nearby Prattsville., The Village was incorporated in 1894 as a municipality with its own local government and shortly thereafter, in 1896, it was incorporated into the Town of Hunter. Hunter Mountain Ski Bowl opened in 1959, with two chairlifts and snowmaking capability. The venture failed just 3 years later, but was taken over by local contractor Orville Slutzky and his brother, who built Hunter Mountain into the nationally renowned resort that it is today (*Comprehensive Plan*, 2002).

Form of Government: The Village is governed by a Board comprised of the Mayor and two Trustees. The Village Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs. All three officials serve 3-year terms.

Growth and Development Trends: In general, the area in/around the Village of Hunter has been experiencing steady growth with a mix of uses. The Village has seen adaptive reuse and infill development primarily consisting of retail and service type businesses. Hunter Mountain also underwent an expansion several years ago. In December 2015, it was announced that Hunter Mountain was being sold to a resort company, which has the potential to affect growth. The Route 23A corridor, which serves as Main Street in the Village, has also undergone development of a mix of uses from commercial to retail, services, and cultural-type uses. The Village has seen a significant increase in seasonal population due to the number of people who own seasonal or second homes in the area, as well as those that visit and stay in the area.

The July 2007 Greene County *Comprehensive Economic Development Plan*¹ states that the County encourages growth in the Villages of Hunter and Tannersville along the entire Route 23A corridor, the primary route through the area. The west side of Hunter Mountain, just outside the Village limits, is identified as an area where additional recreational uses and ski industry expansions is preferred. The Village worked jointly with the Town of Hunter and Village of Tannersville on the

¹ <http://greenegovernment.com/departments/planning-economic-development/services/economic-development/#plan-ecodev>

Town Contact Information

PRIMARY POINT OF CONTACT:

William Maley, Mayor
7955 Main St.
Hunter, NY 12442
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518.263.4020

ALTERNATIVE POINT OF CONTACT:

Charles Sweet,
Superintendent of Highways
7955 Main St.
Hunter, NY 12442
518.263.4690

Table XIII-1: Village of Hunter Statistics

2010 Population	Total Land Area	Land/Water Area
502	1.77 sq. mi.	1.74/0.03 sq. mi.

Hunter Corridor Regional Planning Study (2010), which developed recommendations for the targeted development areas. The study includes a strong focus on stormwater management and stream/floodplain protection(s).

U.S. Census statistics show the Village increased from 490 to 502 people between 2000 and 2010, (see Table XIII-1), and the number of housing units increased from 639 to 642.

Recent Hazard Events

In the past 5 years, there were a few storms that were significant for the Village, most notably Hurricane Irene.

Hurricane Irene (2011): The Village of Hunter was directly impacted by Hurricane Irene. Many pump stations needed to be cleaned after the storm and some properties had significant flows that indicated cracked laterals or sump pump issues. Flooding was an issue on Division Street and Maple Avenue and a culvert on Glen Avenue, which had been a longstanding issue, created problems during Irene.

Summary of Vulnerabilities

The Village of Hunter is one of Greene County’s Mountain Towns. Table XIII-2 details the number of parcels that are located in or touch the floodway, 100-floodplain, or 500-year floodplain.

Table XIII-2: Number of Parcels in Flood Hazard Areas, Village of Hunter

Floodway	100-Year Floodplain	500-Year Floodplain
132	224	258

As shown in Figure XI-1, there are three critical facilities in the Village located within the floodplain:

- Fire Company #1
- Two schools
- Dam at Dolans Lake

Source: 2015 FEMA Flood Insurance Rate Map

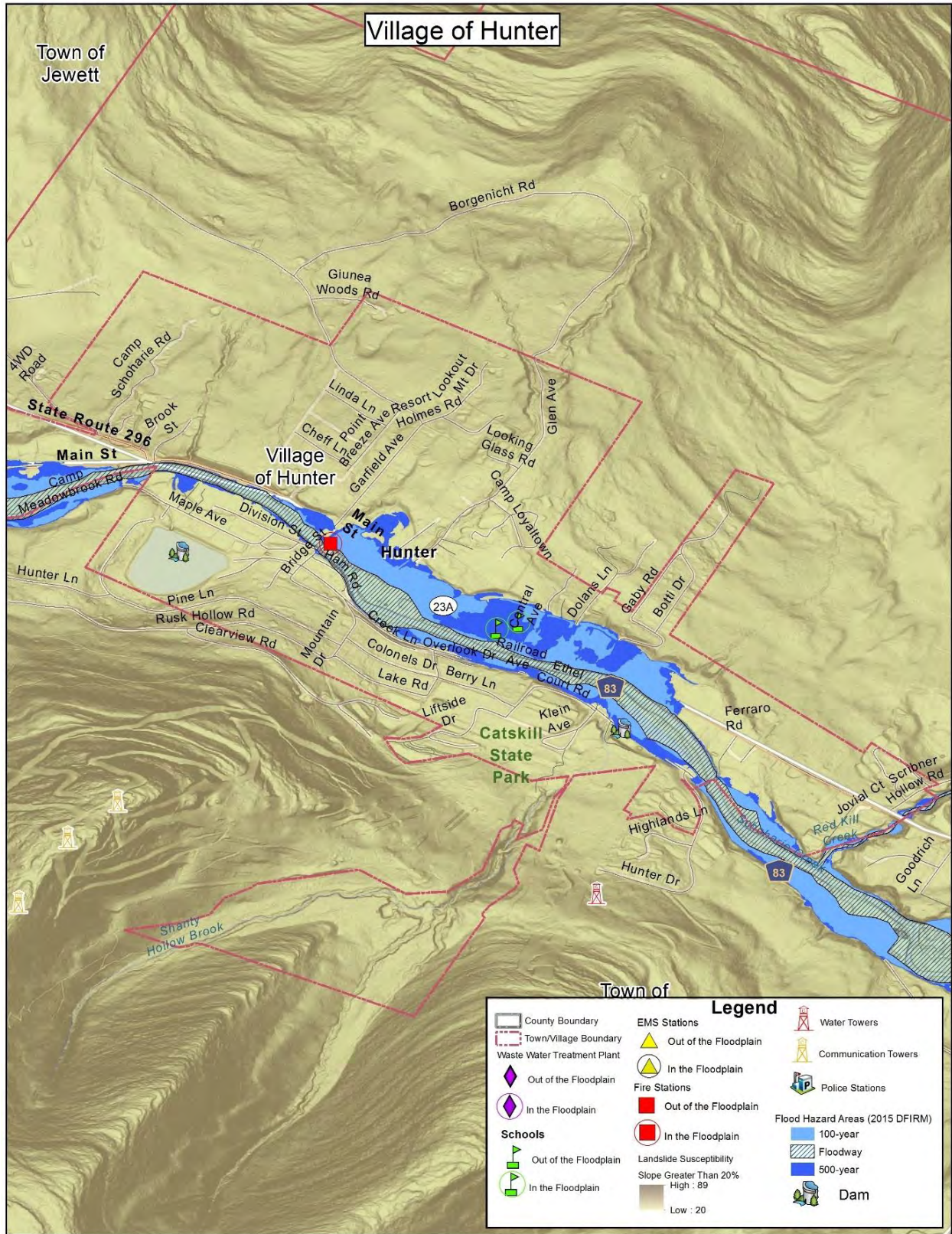


Figure XIII-1: Village of Hunter Hazard Area Map

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*² (HMP) are described below.

Planning (legal) and Regulatory: The *Hunter Corridor Regional Planning Study* was developed in 2010. Additionally, the Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: In addition to the Town Board, the Town has a Clerk/Treasurer, Deputy Clerk, Deputy Treasurer, Superintendent of Highways, Village Attorney, Building Inspector/Code Enforcement Officer, and a Planning Board and Zoning Board of Appeals.

Financial: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

Education and Outreach: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

Relevant Documents and Ordinances

- ✓ Building Code [date?]
- ✓ Zoning Ordinance [date?]
- ✓ Subdivision Ordinance [date?]
- ✓ NFIP Flood Damage Prevention Ordinance [date?]
- ✓ *Growth Management Plan* [date?]
- ✓ *Flood Management / Basin Plan* [date?]
- ✓ *Stormwater Management Plan/Ordinance* [date?]
- ✓ *Comprehensive Plan/Master Plan/General Plan* [2002?]
- ✓ *Capital Improvements Plan* [date?]
- ✓ Site Plan Review Requirements
- ✓ *Emergency Response Plan* [date?]
- ✓ Regional Stream Management Plan and MOU with GCSWCD [date?]
- ✓ *Hunter Corridor Regional Planning Study* (2010) [date?]

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: In the last 5 years, since the 2009 HMP, the Village has undertaken two mitigation actions. Table XIII-3 shows the hazard mitigation actions described in the 2009 HMP that have been completed or are in progress.

Table XIII-3: Summary of Mitigation Actions, Village of Hunter

Mitigation Action	Project Status
Glen Avenue Culvert Replacement	In Progress [Please confirm]

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Village of Hunter has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

² <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

- (V)HNT-1: Stormwater Retrofit Program – Hydrologic and hydraulic modeling should be performed on all culverts to assess proper size to convey the 100-year base flood, followed by retrofitting.
- (V)HNT-2: LFA – The Village will be conducting a local flood analysis in 2016 to identify flood vulnerabilities and potential mitigation measures (GCSWCD facilitating).
- (T)HNT-6: Local Stormwater Management District – Develop local stormwater management districts with the Village of Hunter and Tannersville. *(See also Town of Hunter Annex, stormwater analysis project).*

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

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Jurisdictional Annex XIV

Town of Jewett

Town Profile

The Town of Jewett is a Mountaintop Town located in Greene County within the northeastern part of the Catskill Park. See Table XIV-1.

History: The Town of Jewett was formed from the Towns of Hunter and Lexington on November 14, 1849. It is named for Freeborn G. Jewett, a justice of the Supreme Court.

Form of Government: The Town is governed by a Supervisor, a Deputy Supervisor, and three Town Board members. The Town Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs. The Town Board members have staggered 4-year terms.

The Town has four employees in the highway department as well as the elected Superintendent . Also elected are the Town Clerk/Tax Collector and Town Justice. Other employees include a part-time Tax Assessor, Town Attorney, Dog Warden, Health Official, and Assistant to the Supervisor.

The Town of Jewett has a Subdivision Ordinance enforced by a Planning Board and a Zoning Law enforced by a Zoning Board of Appeals, Code Enforcement Officer, and Zoning Enforcement Officer.

Growth and Development Trends: The Town has a 5-year *Comprehensive Plan* (2007 and reviewed in 2015). Growth is proposed in the Brittney Estates Subdivision on Round Hill Road (which is shared with the Town of Windham) and there is potential for additional growth at the Hunter Airport site in East Jewett off State Route 296, south of 23C.

U.S. Census statistics show that the Town of Jewett shrank from 970 to 953 people between 2000 and 2010 (see Table XIV-1), while the number of housing units increased from 1,026 to 1,182.

Recent Hazard Events

In the last 5 years, there have been a few storms that were significant for the Town, in particular a snow storm in 2010, Hurricane Irene in 2011, and Superstorm Sandy in 2012.

Snow Storm (February 2010): A severe snow storm dumped over 6 feet of snow on the area within a 2-day time frame in February 2010. There was no infrastructure damage and the equipment and highway staff performed exceptionally, working overtime to complete the needed actions. However, the volume and weight of snow prohibited the normal quick removal and some houses experienced roof damage/collapse due to the weight of the snow.

Hurricane Irene/Tropical Storm Lee (2011): Hurricane Irene and Tropical Storm Lee caused severe flooding in the Town. Hurricane Irene caused \$1,250,000 in damages in the Town.

Town Contact Information

PRIMARY POINT OF CONTACT:

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518.263.4646
E-mail: Michael.McCrary@townofjewett.org

Table XIV-1: Town of Jewett Statistics

2010 Population	Total Land Area	Land/Water Area
953	50.52 sq. mi	50.32/0.20 sq. mi

Superstorm Sandy (2012): During Superstorm Sandy, the Town experienced severe flooding when creeks and streams because raging rivers. Roads and property in areas near or on creeks and streams were damaged. A large debris clean-up effort was needed after the storm; the resulting debris may add residual risk for fires.

Summary of Vulnerabilities

The Town of Jewett is one of Greene County’s Mountaintop Towns, subject to significant snowfall. As such, power outages are a concern as are emergency communications, due to lack of cell phone coverage. Additionally, flooding was significant during Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy. Table XX details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

Table XIV-2: Number of Parcels in Flood Hazard Areas, Town of Jewett

Floodway	100-Year Floodplain	500-Year Floodplain
256	330	367

Source: 2015 FEMA Flood Insurance Rate Map

As shown in Figure XIV-3, there are no critical facilities located in the floodplain.



Figure XIV-1: Jewett Fire Department (jewettown.org)



Figure XIV-2: East Jewett Fire Department (jewettown.org)

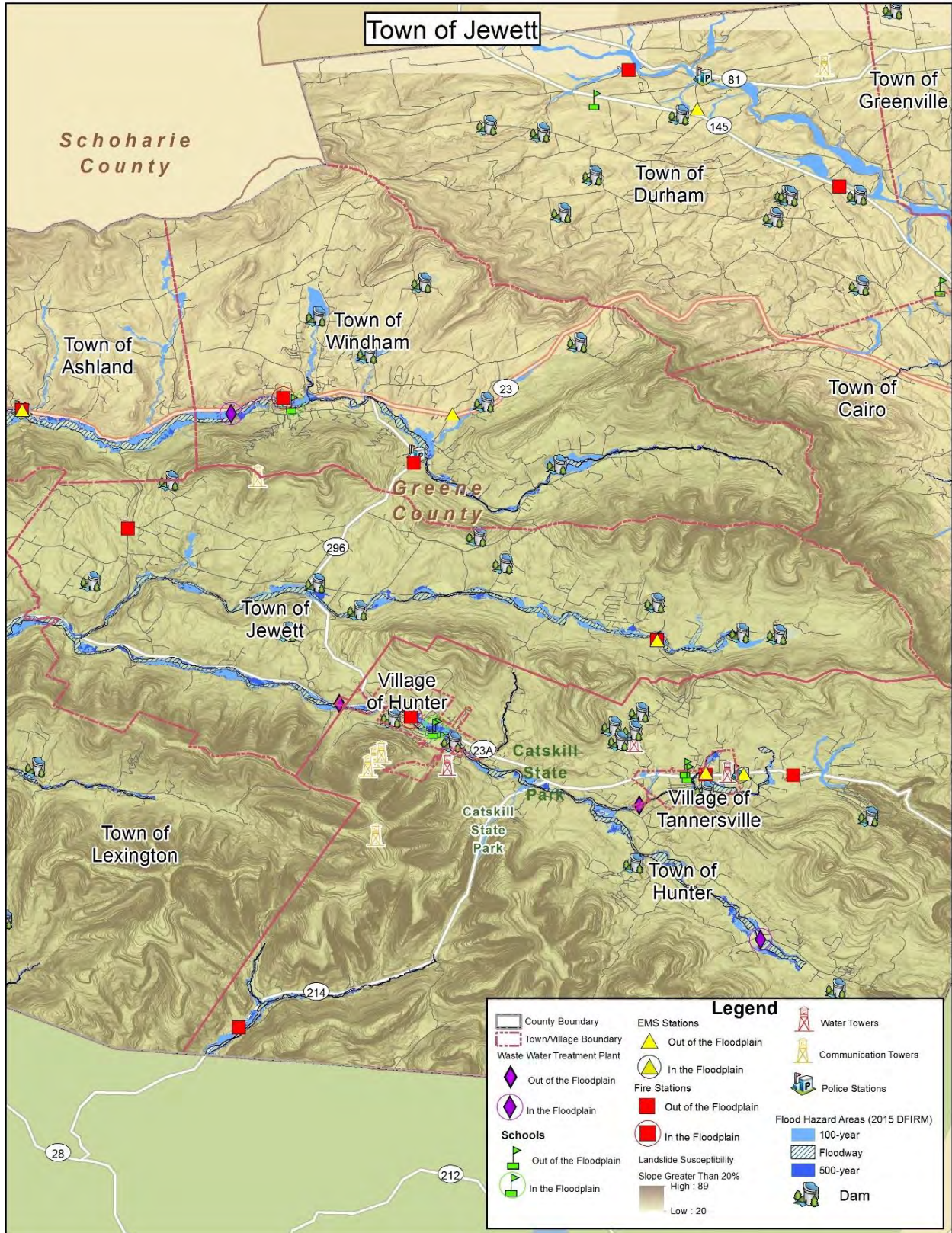


Figure XIV-3: Town of Jewett Hazard Area Map

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*¹ (HMP) are described below.

Planning (legal) and Regulatory: The Town has a 5-year *Comprehensive Plan* that was reviewed in 2015 and the Town is also currently reviewing its land use codes. The Town has an MOU with the GCSWCD to implement the *East Kill Stream Management Plan*. The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: The Town has four employees in the highway department plus the Superintendent, who is elected. Also elected are the Town Clerk/Tax Collector and Town Justice. Other staff includes a part-time Tax Assessor, Town Attorney, Dog Warden, Health Official, Assistant to the Supervisor, and a Code Enforcement Officer.

Financial: The Town has been successful in undertaking mitigation actions (as discussed below). There have not been any identifiable or confirmable changes in locally based financial capabilities for reducing long-term vulnerability since the 2009 HMP update.

Education and Outreach: There have not been any identifiable or confirmable changes in the capabilities for reducing long-term vulnerability since the 2009 HMP Update.

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: The Town of Jewett has completed a number of mitigation projects since 2008. The Town is also currently reviewing its codes (began in 2014). Table XIV-3 shows the hazard mitigation actions completed or in progress.

Table XIV-3: Summary of Town of Jewett Mitigation Actions Completed or In Progress

Mitigation Action	Project Cost and Details	Project Status
Griffen – Project #1852	\$25,746.39	Complete
Shadow Mountain Road – Project #1962	\$20,997.98 Surface washout, not able to mitigate	Complete
Upper Mill Hollow – Project #1971	\$91,508.22 Mitigated	Complete

¹ <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

Relevant Documents and Ordinances

- ✓ *Comprehensive Plan* (2007 and reviewed in 2015)
- ✓ Building Code (date?)
- ✓ Zoning Ordinance (date?)
- ✓ Site Plan Review Requirements (date?)
- ✓ Subdivision Ordinance (date?)
- ✓ NFIP Flood Damage Prevention Ordinance (2015)
- ✓ Floodplain Management/Basin Plan (2008)
- ✓ *Emergency Response Plan* (2006 and reviewed in 2010)
- ✓ East Kill Stream Management Plan (2008)

Mitigation Action	Project Cost and Details	Project Status
Pangman – Project #3208	\$5,055.92	Complete
Scribner – Project #3386	\$11,773.68	Complete
Scribner – Project #3392	\$12,670.08	Complete
Griffin – Project #3398	\$272,159.00 Mitigated	Complete
Beaches – Project #3410	\$191,419.80 Mitigated	Complete
Whaley Mill Hlw Project #3419	\$20,980.19	Complete
Whaley – Project #3995	\$65,332.19 Mitigated	Complete
Silver Spring – Project #4058	\$63,2440.50	Complete
Acorn – Project #4364	\$4,207.63	Complete
Townside Admin – Project #4451	\$1,497.71	Complete
Schoharie Creek - Project #4467	\$24,704.51	Complete
Carr Road – Project #4513	\$5,941.09 Mitigated with riprap	Complete
Bobillen – Project #4516	\$24,047.13	Complete
Little Timber – Project #5442	\$30,756.06	Complete
Butternut – Project #5446	\$2,784.64	Complete
Ryan Road – Project #5455	\$9,368.40	Complete
Peck – Project #5462	\$22,285.69	Complete
Ford Hills – Project #5811	\$15,857.03	Complete
Olander – Project #5813	\$36,408.14	Complete
Round Hills – Project #5817	\$13,485.56	Complete
Carr Road – Project #5839	\$9,457.89 Mitigated	Complete
Hauser – Project #5842	\$2,145.37 Mitigated	Complete
Boy Scout – Project #6004	\$1,943.61 Mitigated	Complete
Merwin – Project #6008	\$1,725.27	Complete
Hyer – Project #6024	\$10,540.88	Complete
Bailey – Project #6071	\$8,610.13	Complete
Wilderness – Project #6509	\$1,017.65	Complete
Rice – Project #6567	\$39,542.27	Complete

Mitigation Action	Project Cost and Details	Project Status
Barnum - Project #6771	\$5,257.58	Complete
Ford Hills – Project #8807	\$79,282.68 Mitigated	Complete
Town Hall – Project #5843	\$8,750.00	Complete
Apple Hill – Project #8750	\$8,750.00	Complete
Code Review	Code review underway, begun in 2014. Regulations related to solar panels, timber harvesting, erosion control, etc. are among the changes. The <i>Comprehensive Plan</i> will be reviewed every 10 years.	In Progress

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Jewett has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)JWT-1: Mitigate Town Hall – The Town Hall needs a shower and generator to qualify as a Red Cross Shelter.
- (T)JWT-2: Culvert Replacement on 23A-Wright Road – Enlarge the culvert under NYS Rt. 23A.

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

Jurisdictional Annex XV

Town of Lexington

Town Profile

The Town of Lexington is one of Greene County's Mountaintop Towns located in the southwest part of the county within the Catskill State Park. See Table XV-1.

History: The Town of Lexington was first settled in 1788 as part of the Town of Windham. It was officially separated and incorporated in 1813. The Town was first called New Goshen, after the Connecticut town that many of its early settlers came from, but was renamed a few months later to Lexington by Silas Fowler, a captain in the Revolutionary War.

Form of Government: The Town of Lexington consists of an elected board comprised of four Council members and as well as the Town Supervisor. The Town Board meets on the first Tuesday of each month. The Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs.

Growth and Development Trends: The Town of Lexington generally has a few homes built every year (about a dozen). A sewer district is being installed in the Hamlet of Lexington. Commercial growth is encouraged for the hamlet areas.

U.S. Census statistics show that the Town shrank from 830 to 805 people between 2000 and 2010 (see Table XV-1), while the number of housing units increased from 854 to 895.

Recent Hazard Events

In the past 5 years, there were a few storms that were significant for the Town, in particular Hurricane Irene.

Hurricane Irene (2011): Hurricane Irene [add details on the what happened during Irene – type of damage and dollar damage]

Summary of Vulnerabilities

Flooding is a concern in particular. Table XV-2 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

Town Contact Information

PRIMARY POINT OF CONTACT:

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3542 Route 42, PO Box 28
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ALTERNATIVE POINT OF CONTACT:

Adam Cross, Building Inspector
3542 Route 42, PO Box 28
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518.989.6476
Email: code@lexington.ny.com

Table XV-1: Town of Lexington Statistics

2010 Population	Total Land Area	Land/Water Area
805	79.72 sq. mi.	79.69/0.04 sq. mi.

Table XV-2: Number of Parcels in Flood Hazard Areas, Town of Lexington

Floodway	100-Year Floodplain	500-Year Floodplain
319	383	402

Source: 2015 FEMA Flood Insurance Rate Map



Damage on Route 42 from Hurricane Irene (courtesy, Greene County Emergency Services)

As shown in Figure XV-2, the Town’s wastewater treatment plant and fire station/EMS facility are located in the floodplain.

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*¹ (HMP) are described below.

Planning (legal) and Regulatory: The Town completed a Local Flood Analysis (LFA), funded by the New York City Department of Environmental Protection’s Stream Management Program, in 2015 for the Town’s two hamlets to model flood vulnerabilities and the effects of potential mitigation solutions. A Flood Advisory Committee was formed to guide the LFA process and long-term flood mitigation projects and initiatives in the Town. Recommendations are included in Town of Lexington’s proposed mitigation actions discussed below.

The Town also has a guidance document for improved site planning to mitigate stormwater runoff, reduce impervious surface, and preserve and enhance existing natural areas.

The Town has a number of other relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Relevant Documents and Ordinances

- ✓ *Comprehensive Plan* [date?]
- ✓ Building Code [date?]
- ✓ Zoning Ordinance (2005)
- ✓ Subdivision Ordinance (2005)
- ✓ *Emergency Response Plan* (2007)
- ✓ NFIP Flood Damage Prevention Ordinance (2008)
- ✓ *West Kill and Schoharie Stream Management Plans* (2008)
- ✓ Mountaintop Better Site Design Roundtable (*Recommended Model Development Principles*, 2012)
- ✓ *Local Flood Analysis* (2015)

¹ <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

Administrative and Technical: In addition to the Town Board, the Town has a Town Clerk, Assessor, Highway Department, and Building Inspector, and consulting engineers. A Memorandum of Understanding was adopted with GCSWCD for implementing the *Stream Management Plans*.

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Figure XV-2: Town of Lexington Hazard Area Map

Financial: While the Town has been successful in planning for its recovery post-Irene, there haven't been any identifiable or confirmable changes in locally based financial capabilities for reducing long-term vulnerability since the 2009 HMP.

The Town has access to Catskill Watershed Corporation (CWC) funding among other grant programs. The CWC's Flood Hazard Mitigation Implementation (FHMI) Program was developed to help fund projects that reduce flood impacts including property protection measures, floodplain reclamation projects, public infrastructure protection, and property buyout/relocation. Projects are typically funded through an LFA funded by the New York City Department of Environmental Protection's Stream Management Program.

Education and Outreach: The Town has conducted and completed outreach and education efforts since Hurricane Irene devastated the community.

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: The Town of Lexington recently completed an LFA planning effort in 2015.

Table XV-3: Summary of Mitigation, Town of Lexington

Mitigation Action	Project Status
LFA	Complete

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Lexington has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)LEX-1: Comprehensive Flood Mitigation – Proceed with comprehensive flood mitigation in Lexington Hamlet center through the projects described in the 2015 LFA:
 - Acquire and remove homes on south side of Route 13A
 - Acquire and remove Lexington Hotel
 - Lower the sewer pipe between Route 13A and Schoharie Creek
 - Create floodplain bench
 - Replace Route 42 bridge with larger span based on H/H modeling
- (T)LEX-2: Flood Mitigation along SR 23A and Banks Road– Mitigation of properties may include property-specific options (elevations) and conveyance/backwater mitigation projects.
- (T)LEX-3: Flood Mitigation near West Kill Creek – Pursue property-specific flood mitigation options in Lexington and West Kill Hamlets near the West Kill Creek.
- (T)LEX-4: Stream Stabilization along West Kill Creek – Stream stabilization needed to protect the bridge from structural damage during future floods.
- (T)LEX-5: Building Elevations on Spruceton Road and Route 42 within the 500-year Floodplain – Per the LFA (2015), elevate buildings in the floodplain, including five on Route 42 and one located east of Town Hall.
- (T)LEX-6: Elevate Buildings in 500-year Floodplain –, Elevate buildings three building on Spruceton Road, including Community Hall, and one on Route 42.

- (T) Lex-7: Beech Ridge Road Embankment Stabilization Project - Stabilize the embankment along part of the West Kill above Pushman's bridge on Rt. 42.

Details about each of the proposed hazard mitigation actions can be found in the individual Action Worksheets.

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Jurisdictional Annex XVI

Town of New Baltimore

Town Profile

The Town of New Baltimore is located in the northeast corner of Greene County along the Hudson River. It is bordered by Albany and Columbia Counties. I-87 and US 9W pass through the Town. See Table XVI-1.

History: The Town of New Baltimore dates back to 1713. The Town of New Baltimore was incorporated on March 15, 1811, from parts of the Town of Coxsackie. Prior to its incorporation, the Town had thriving mills and farms. Farming grew and continued through the years and still continues on a smaller scale today.

Form of Government: The Town of New Baltimore consists of an elected Board composed of four council members and as well as the Town Supervisor. The Town Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs.

Growth and Development Trends: The Town's 2007 *Comprehensive Plan* encourages the majority of the Town of New Baltimore to be low-density residential and agricultural uses with higher residential densities in Planned Unit Development and within the Hamlet of New Baltimore. Conservation subdivisions are required for major subdivisions in the Rural Residential/Agricultural District. The Town encourages commercial and mixed use growth along Route 9W with a development area encouraged near the I-87 and Route 9W corridor where existing development has taken place.

U.S. Census statistics show the Town shrank from 3,417 to 3,370 people between 2000 and 2010 (see Table XVI-1), while the number of housing units increased from 1,406 to 1,508.

Recent Hazard Events

The estimated dollar damage over the past 5 years from these natural disasters is about \$125,000.

Hurricane Irene (2011): *[please provide detail]*

Superstorm Sandy:

Summary of Vulnerabilities

The Town of New Baltimore is one of Greene County's Towns. Areas in the Town that are subject to flooding are Mill Street, in the area of the waste water pump station, and other low lying areas in the Hamlet of New

Town Contact Information

PRIMARY POINT OF CONTACT:

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**Table XVI-1:
Town of New Baltimore Statistics**

2010 Population	Total Land Area	Land/Water Area
3,370	43.03 sq. mi.	41.43/1.60 sq. mi.

**Table XV-2: Number of Parcels
in Flood Hazard Areas, Town of Lexington**

Floodway	100-Year Floodplain	500-Year Floodplain
2	310	310

Source: 2015 FEMA Flood Insurance Rate Map

Baltimore, which lies on the banks of the Hudson River. Table XVI-2 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

As seen in Figure XVI-1, the Town’s wastewater treatment plant is located in the floodplain.

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*¹ (HMP) are described below.

Planning (legal) and Regulatory: The Town is currently updating its *Comprehensive Plan*. Its *Emergency Response Plan* is reevaluated on an annual basis. The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: The Town has an Emergency Management Officer, a Town Clerk, two Deputy Clerks, an Assessor and Assessor’s Office, a Highway Department, and a Building Department. Highway personnel have undergone disaster preparedness training and are familiar with floodprone areas. The Emergency Management Officer has training in benefit-cost analysis.

Financial: There have not been any identifiable or confirmable changes in locally-based financial capabilities for reducing long-term vulnerability since the 2009 HMP.

Education and Outreach: There have not been any identifiable or confirmable changes for reducing long-term vulnerability since the 2009 HMP.

Relevant Documents and Ordinances

- ✓ *Comprehensive Plan* (2007)
- ✓ Building Code [date?]
- ✓ Zoning Ordinance (2009)
- ✓ Site Plan Review [date?]
- ✓ Subdivision Ordinance (2008)
- ✓ Emergency Response Plan [date?]
- ✓ NFIP Flood Damage Prevention

¹ <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

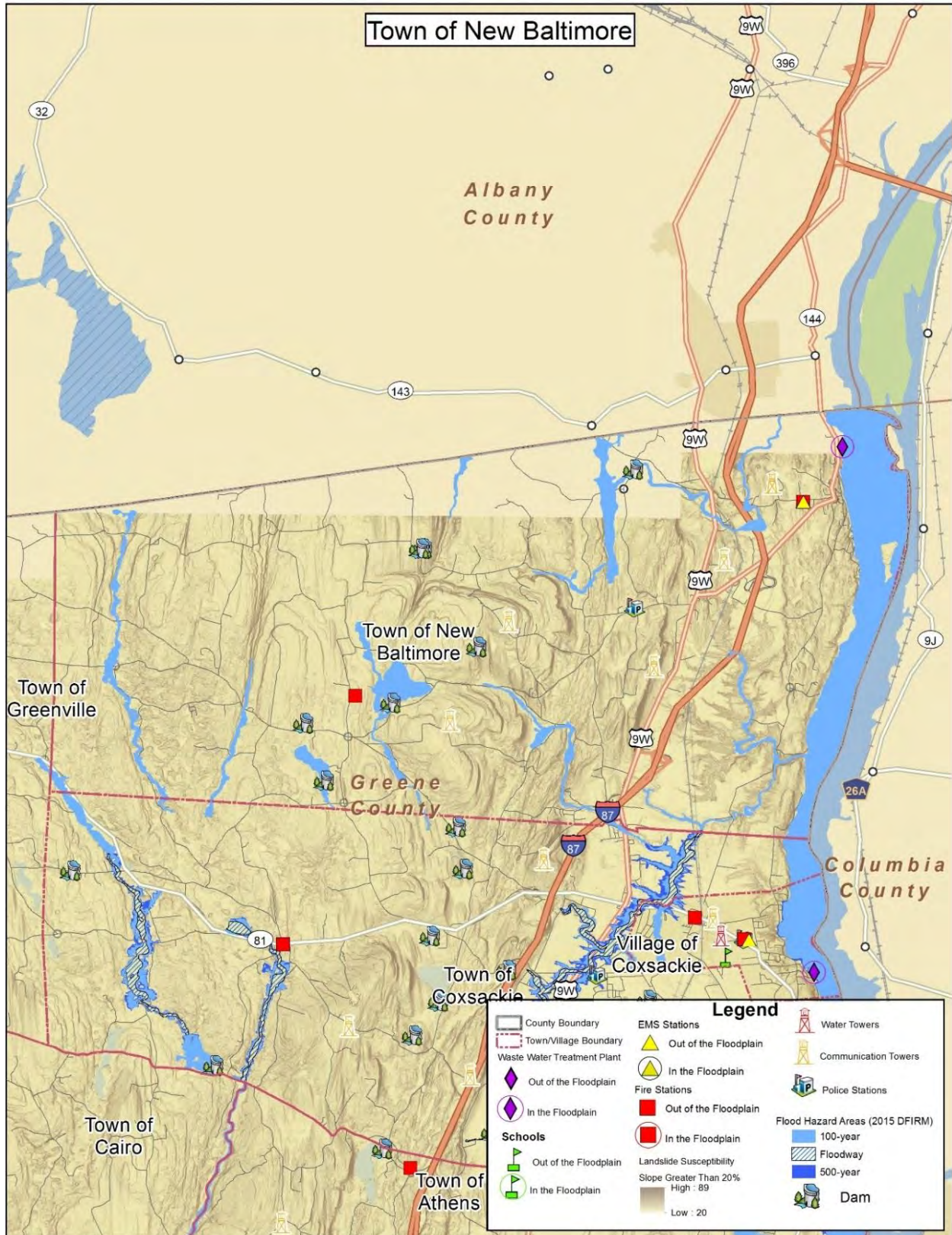


Figure XVI-1: Town of New Baltimore Hazard Area Map

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: The Town of New Baltimore has completed its previous mitigation projects and is currently working on updating its Comprehensive Plan

Table XVI-3: Summary of Mitigation Actions, Town of New Baltimore

Mitigation Action	Project Status
Mitigation in Floodprone Areas	Complete and Ongoing
Comprehensive Plan Update	In Progress

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of New Baltimore has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)NWB-1: Staff Training – Train all staff including code enforcement and building department regarding hazard mitigation.
- (T)NWB-2: Madison Avenue East Drainage System – Replace faulty drainage system on Madison Avenue East with a larger, more effective system.
- (T)NWB-3: Concrete Flood Wall at Waste Water Pump Station – Install a concrete flood wall at the waste water pump station to reduce the chances of it being flooded.
- (T)NWB-4: Medway Grapeville Fire Station Backup Power – Replace emergency standby generator as the current one is unrepairable due to its age.
- (T)NWB-5: Replacement of Wastewater Treatment Plant – Replace the current wastewater treatment plant.

Details about each proposed hazard mitigation actions can be found in the individual Action Worksheets.

Jurisdictional Annex XVII

Town of Prattsville

Town Profile

The Town of Prattsville is one of Greene County's Mountaintop Towns. It is located in the northwest corner of the county within the Catskill State Park. The Town shares its northern border with Schoharie County and its western border with Delaware County. See Table XVII-1.

History: The Town, originally called Schoharie Kill, was first settled around 1763. The Town of Prattsville was established in 1824 from portion of the Town of Windham. In 1848, some of the area of the Town was carved out to become the Town of Ashland. The Town was named after Zadock Pratt, a congressman and prominent citizen who built a tannery larger than any other in the world at the time. The population of the Town grew from 830 in 1830 to 1,989 in 1850. By 1845 all the hemlock bark had been extracted and Pratt was forced to close the tannery, which resulted in the loss of a significant amount of the population. (*Source: Prattsville Local Development Corporation website*).

Form of Government: The Town is governed by a Town Board that is composed of a Supervisor and four Council members. The Town Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs.

Growth and Development Trends: The U.S. Census shows that the Town grew from 665 to 700 people between 2000 and 2010 (see Table XVII-1), and the number of housing units increased from 406 to 506.

Recent Hazard Events

In the last 5 years, there have been a few storms that were significant for the Town, in particular Hurricane Irene.

Hurricane Irene (2011): Hurricane Irene resulted in record flooding of the Schoharie Creek, causing major damage and destroying large areas of the Town. Every structure located along Main Street was damaged or destroyed, including all 22 of the businesses in Town. Eleven houses collapsed, 15 were condemned and demolished, and more than 100 were damaged to the point that residents could not return to their homes. Despite the widespread damage and destruction, there were no fatalities.

Town Contact Information

PRIMARY POINT OF CONTACT:

Kory P. O'Hara
14517 Main St
Prattsville, NY 12468
Email: townsupervisor@gmail.com
518.299.3125

ALTERNATIVE POINT OF CONTACT:

Kathleen Sherman, Clerk
14517 Main St
Prattsville, NY 12468
518.299.6151

Table XVII-1: Town of Prattsville Statistics

2010 Population	Total Land Area	Land/Water Area
700	19.73 sq. mi.	19.63/0.11 sq. mi.

Summary of Vulnerabilities

The Town of Prattsville is one of Greene County’s Mountaintop Towns located within the Catskill State Park. Flooding along the Schoharie Creek is common and resulted in near destruction of the Village during Hurricane Irene. Table XVII-2 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

Table XVII-2: Number of Parcels in Flood Hazard Areas, Town of Prattsville

Floodway	100-Year Floodplain	500-Year Floodplain
80	219	234

Source: 2015 FEMA Flood Insurance Rate Map

The *NY Rising Community Reconstruction Plan* (2013) identified six structures as critical public facilities (listed below). As shown in Figure XVII-1, two of these—the Prattsville Rescue/Prattsville Hose Company and the community septic system—are located in the floodplain:

1. Greene County Sheriff Substation
2. Prattsville Fire Station/EMS
3. Prattsville Highway Garage
4. Prattsville Town Hall
5. Wastewater Treatment Plant
6. Prattsville Water Tower

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*¹ (HMP) are described below.

Planning (legal) and Regulatory: The Town has completed a Local Flood Hazard Mitigation Analysis (2013) and a NY Rising Community Reconstruction Plan (2014). The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: In addition to the Town Board, the Town has a Clerk, Bookkeeper, Building Inspector, Superintendent of Highways, and Assessor, as well as a Local Development Corporation and an on-call engineering firm.

Financial: While the Town has been very successful in obtaining significant financial assistance to help recover from Hurricane Irene, there has not been any identifiable or confirmable changes in locally-based financial capabilities for reducing long-term vulnerability since the 2009 HMP.

Relevant Documents and Ordinances

- ✓ *NY Rising Community Reconstruction Plan* (2014)
- ✓ *Local Flood Hazard Mitigation Analysis* (2013)
- ✓ Master Plan Renderings (2014)
- ✓ *Conceptual Streetscape Plan* (2013)
- ✓ Building Code [date?]
- ✓ Subdivision Ordinance [date?]
- ✓ NFIP Flood Damage Prevention Ordinance [date?]
- ✓ *Floodplain Management/Basin Plan*
- ✓ *Comprehensive Plan* [date?]
- ✓ *Capital Improvements Plan* [date?]
- ✓ Site Plan Review Requirements [date?]
- ✓ *Emergency Response Plan* [date?]
- ✓ *Regional Stream Management Plan and MOU with GCSWCD* [date?]

¹ <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>



Figure XVII-1: Town of Prattsville Hazard Area Map

Education and Outreach: The Town has conducted and completed extensive outreach and education efforts since Hurricane Irene devastated the community.

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: In the last 5 years (as of February 2015), the Town of Prattsville Local Development Corporation has successfully facilitated over \$6.3M in grants, administered a CDBG economic development grant of \$500,000, a streetscape grant of \$250,000, parks improvement grant of \$300,000, and provided oversight for the CDBG Housing and RARP grants totaling \$700,000.

Table XVII-2 shows the hazard mitigation actions described in the 2009 HMP that have been completed or are in progress.

Table XVII-2: Summary of Mitigation Actions, Town of Prattsville

Mitigation Action	Project Status
NY Rising Community Reconstruction Plan	Complete
Local Flood Hazard Mitigation Analysis	Complete
Master Plan Renderings	Complete
Conceptual Streetscape Plan	Complete
Route 23 Bridge Replacement(s) over Schoharie and Huntersfield Creeks	In-Progress (Expected Completion Summer 2016)

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Prattsville has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)PRA-1: “Made in Prattsville” Business Recovery Park – This is a multi-faceted project that includes relocating dimensional hardwoods out of the floodplain (and developing a relocation strategy), reclaiming 12 acres of floodplain on the Schoharie Creek in Prattsville’s business district, relocating the Huntersfield Creek outlet, removing berms, and undertaking channel dredging.
- (T)PRA-2: Berm and Floodplain Alteration – Undertake a survey to lower the berm below the State Route (SR) 23 bridge over [insert name of creek] to determine the potential flood reduction to nearby homes and properties.
- (T)PRA-3: Deepen and Widen the Schoharie Creek – Deepen and widen the creek in the vicinity of the business district using the HEC RAS modeling already performed as part of the 2014 Town of Prattsville Local Flood Analysis (LFA).
- (T)PRAT-4: SR 23 Bridge Replacement – Based on bridge modeling done in the 2014 LFA, replace the bridge with a larger span to pass higher flood flows.

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

Jurisdictional Annex XVIII

Village of Tannersville

Village Profile

The Village of Tannersville is located in Greene County within the Town of Hunter. It is entirely within the Catskill Park and located at the junction of Route 23A and Route 23C. See Table XVIII-1.

History: The land that is currently the Village of Tannersville started out in the nineteenth century as a center for tanneries and sawmills. The Village grew as a result of the Hunter Turnpike and became a destination vacation spot, which resulted in the development of hotels and boarding houses. The Village was incorporated in 1895.

Form of Government: The Village is governed by a Board comprised of the Mayor and four Trustees. The Village Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs.

Growth and Development Trends: The July 2007 Greene County *Comprehensive Economic Development Plan*¹ notes that commercial, retail, services, and cultural uses have been reintroduced and redeveloped along Main Street (Route 23A) in the Village. The Village is labeled in the plan as a growth area along the Route 23A corridor.

U.S. Census statistics show that the Village increased from 448 to 539 people between 2000 and 2010 (see Table XVIII-1), and the number of housing units increased from 505 to 557.

Recent Hazard Events

In the past 5 years, there were a few storms that were significant for the Village, most notably Hurricane Irene.

Hurricane Irene (2011): Hurricane Irene caused damage throughout the Village of Tannersville. At the end of 2011 into 2012, the NYCDEP undertook emergency reconstruction work to fix the damage caused by Hurricane Irene in the West of Hudson watershed, in which the Village lies.

Town Contact Information

PRIMARY POINT OF CONTACT:

Lee McGunnigle, Mayor
1 Park Lane
P.O. Box 967
Tannersville, NY 12485
518.589.5850
Email: voffice@hvc.rr.com

ALTERNATIVE POINT OF CONTACT:

Robin Dumont, Clerk-Collector
1 Park Lane
P.O. Box 967
Tannersville, NY 12485
518.589.5850
Email: voffice@hvc.rr.com

Table XVIII-1: Village of Tannersville Statistics

2010 Population	Total Land Area	Land/Water Area
539	1.2 sq. mi.	1.16/0.04 sq. mi.

¹ <http://greengovernment.com/departments/planning-economic-development/services/economic-development/#plan-ecodev>

Summary of Vulnerabilities

The Village of Tannersville is one of Greene County’s Mountaintop Towns. Table XVIII-2 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

As shown in Figure XVIII-1, there are no critical facilities located in the floodplain in the Village of Tannersville.

Table XVIII-2: Number of Parcels in Flood Hazard Areas, Village of Tannersville

Floodway	100-Year Floodplain	500-Year Floodplain
0	159	180

Source: 2015 FEMA Flood Insurance Rate Map

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*² (HMP) are described below.

Planning (legal) and Regulatory: The *Hunter Corridor Regional Planning Study* was developed in 2010. The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

Administrative and Technical: In addition to the Village Board, the Village has a Clerk/Collector, Deputy Clerk, Building Inspector/CEO, Health Officer, and a Village Planning and Zoning office.

Financial: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP update.

Education and Outreach: There have not been any identifiable or confirmable changes in capabilities for reducing long-term vulnerability since the 2009 HMP.

Relevant Documents and Ordinances

- ✓ Subdivision Ordinance [date?]
- ✓ Site Plan Review [date?]
- ✓ Flood Damage Prevention Ordinance [date?]
- ✓ Building Code [date?]
- ✓ Zoning Ordinance [date?]
- ✓ Growth Management [date?]
- ✓ *Floodplain Management/Basin Plan* [date?]
- ✓ *Comprehensive Plan/Master Plan/General Plan* [date?]
- ✓ *Emergency Response Plan* [date?]
- ✓ *Hunter Corridor Regional Planning Study* (2010)

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: In the last 5 years, the Village of Tannersville has undertaken one verifiable project: reconstruction and repair of Allen Road. Allen Road provides access to the Tannersville Wastewater Treatment Plant. Approximately 100 ft of pavement was washed out and exposed, damaging sewer and water lines. NYCDEP performed repair work on behalf of the Village, including reconstructing two barrel culverts with a single culvert; replacing utilities and guiderails; stabilizing slopes; removing debris; and rebuilding the road, ditches, and a gravel path.

² <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

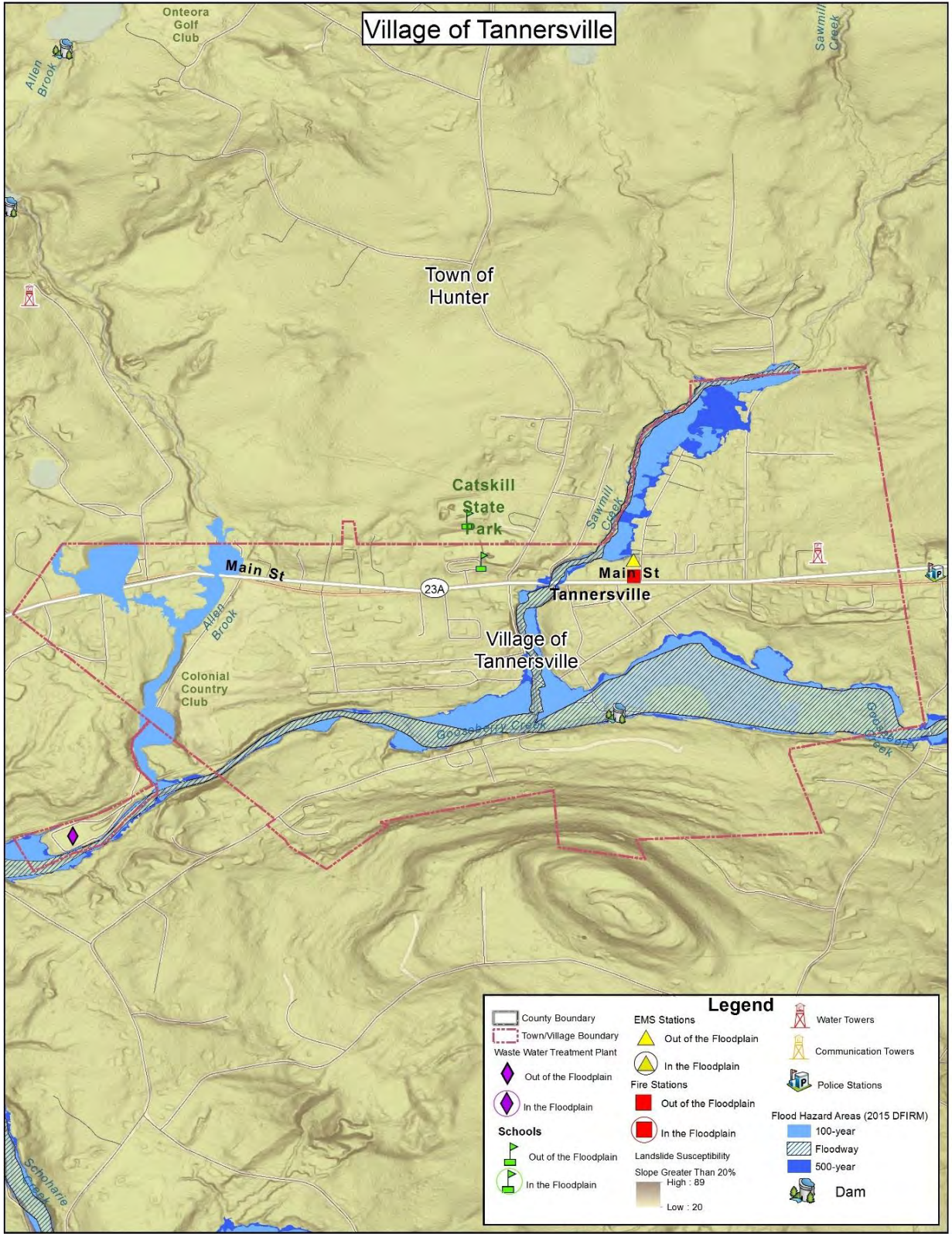


Figure XVIII-1: Village of Tannersville Hazard Area Map

Table XVIII-3 shows the hazard mitigation actions described in the 2009 HMP that have been completed or are in progress.

Table XVIII-3: Summary of Mitigation Actions, Village of Tannersville

Mitigation Action	Project Status
Reconstruction and Repair of a segment of Allen Road	Complete

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan-, the Village of Tannersville has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation action:

- (V)TAN-1: Reservoir #3 Mitigation – Undertake an engineering assessment to identify mitigation options and any additional problems.
- (V)TAN-2: Local Flood Analysis – A Local Flood Analysis is needed to assess feasibility of flood mitigation projects. This project is anticipated to occur in 2016 with oversight by the GCSWCD.
- (T)HNT-6: Local Stormwater Management District – Develop local stormwater management districts with the Village of Hunter and Tannersville. *(See also Town of Hunter stormwater analysis project).*

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

Jurisdictional Annex XIX

Town of Windham

Town Profile

The Town of Windham is a Mountaintop Town in the west-central part of Greene County, within the northern boundary of the Catskill State Park. The Batavia Kill flows past the Hamlet of Windham. See Table XIX-1.

History: The Town of Windham was formed in March 1798, as a part of Ulster County. On March 25, 1800, the Town became the western half of Greene County. The towns of Ashland, Halcott, Hunter, Jewett, Lexington, Prattsville and Windham were created from what some called “Old Windham.” In 1813, the towns of Lexington and Hunter were taken from the southern part of Windham. In 1833, the Town of Prattsville was created from the northwest corner of Windham and in 1848 the Town of Ashland was formed from parts of Prattsville and Windham.

Form of Government: The Town is governed by an elected Supervisor and Town Board consisting of four councilmen. The Town Board sets policy, approves the budget, adopts local laws, implements policies, and administrates local affairs.

Growth and Development Trends: The Town of Windham negotiated with NYCDEP to expand its designated hamlet areas; the agreement went into effect in 2010. The Town has identified the expanded areas as suitable for future growth. The expanded areas include the South Street and Route 23 corridor, portions of County Routes (CR) 40 and 65 in Hensonville, and CR 56 (Maplecrest Hamlet). The Town also conducted a *Generic Environmental Impact Statement* (GEIS) in 2010.

U.S. Census statistics show that the Town grew from 1,660 to 1,703 people between 2000 and 2010 (see Table XIX-1), and the number of housing units increased from 2,002 to 2,457. See Table XIX-1.

Recent Hazard Events

In the last 5 years, there were a few storms that were significant for the Town, in particular Hurricane Irene and a severe snowstorm in 2014.

Hurricane Irene (2011): [add text here to add details regarding damage to the Town and dollar value of repairs]

Snowstorm (2014): [please provide information to add details regarding damage to the Town and dollar value of repairs]

Town Contact Information

PRIMARY POINT OF CONTACT:

Robert J. Pelham, Supervisor
PO Box 96, 371 State Route 296
Hensonville, NY 12436
518.734.4170

Email: windhambette@mhccable.com

ALTERNATIVE POINT OF CONTACT:

Dominick Caropreso, Floodplain
Administrator
PO Box 96, 371 State Route 296
Hensonville, NY 12436
518.734.4170

Table XIX-1: Town of Windham Statistics

2010 Population	Total Land Area	Land/Water Area
1,703	45.34 sq. mi.	45.20/0.14 sq. mi.

Summary of Vulnerabilities

The Town of Windham is one of Greene County's River Towns. Flooding is a concern related to storm water in particular. Table XIX-2 details the number of parcels that are located in or touch the floodway, 100-year floodplain, or 500-year floodplain.

As shown in Figure XIX-1, three critical facilities are located in the floodplain in the Town of Windham, including the Windham Hose Co #1 Fire Station, the Windham-Ashland-Jewett Central School, and the wastewater treatment plant.

Table XIX-2: Number of Parcels in Flood Hazard Areas, Town of Windham

Floodway	100-Year Floodplain	500-Year Floodplain
239	513	548

Source: 2015 FEMA Flood Insurance Rate Map



*Flooding during Hurricane Irene
(Courtesy, Greene County Emergency Services)*



*Flooding [please provide location]
(Courtesy, Greene County Emergency Services)*

The risk analysis described in Chapter 4 of the main plan document notes that the Town of Windham has 2 of the 7 high hazard dams located in the town, and has high landslide susceptibility as well. The town has one of the highest loss estimates in the County for flooding (100-year) and high winds (500-year).

Capability Assessment

Each municipality analyzed four capability assessment areas that are relevant for reducing long-term vulnerabilities through mitigation planning. These four areas include: Planning (legal) and Regulatory, Administrative and Technical, Financial, and Education and Outreach. Changes that have occurred since the 2009 *Greene County Multi-Jurisdictional All-Hazard Mitigation Plan*¹ (HMP) are described below.

Planning (legal) and Regulatory: Since the 2009 HMP, there have been a number of developments: (1) The Town has a *NY Rising Community Reconstruction Plan* from 2014, and (2) An LFA was completed in October 2015 for 8.8 miles of the Batavia Kill to model flood vulnerabilities and potential mitigation solutions. A Flood Advisory Committee was formed to guide

Relevant Documents and Ordinances

- ✓ *Comprehensive Plan* (2002)
- ✓ Building Code [date?]
- ✓ Subdivision Ordinance [date?]
- ✓ *Emergency Response Plan* [date?]
- ✓ *Batavia Kill Stream Management Plan* (2007)
- ✓ NFIP Flood Damage Prevention Ordinance (2008)
- ✓ Generic Environmental Impact Statement (2010)
- ✓ *NY Rising Community Reconstruction Plan* (2014)
- ✓ Local Flood Analysis (2015)

¹ <http://greenegovernment.com/wp-content/uploads/2015/01/HMP.pdf>

the LFA process and long-term flood mitigation projects and initiatives in the Town; recommendations from the LFA are included in Windham’s proposed mitigation actions discussed below.

The Town has a number of relevant documents and ordinances, as listed in the “Relevant Documents and Ordinances” text box.

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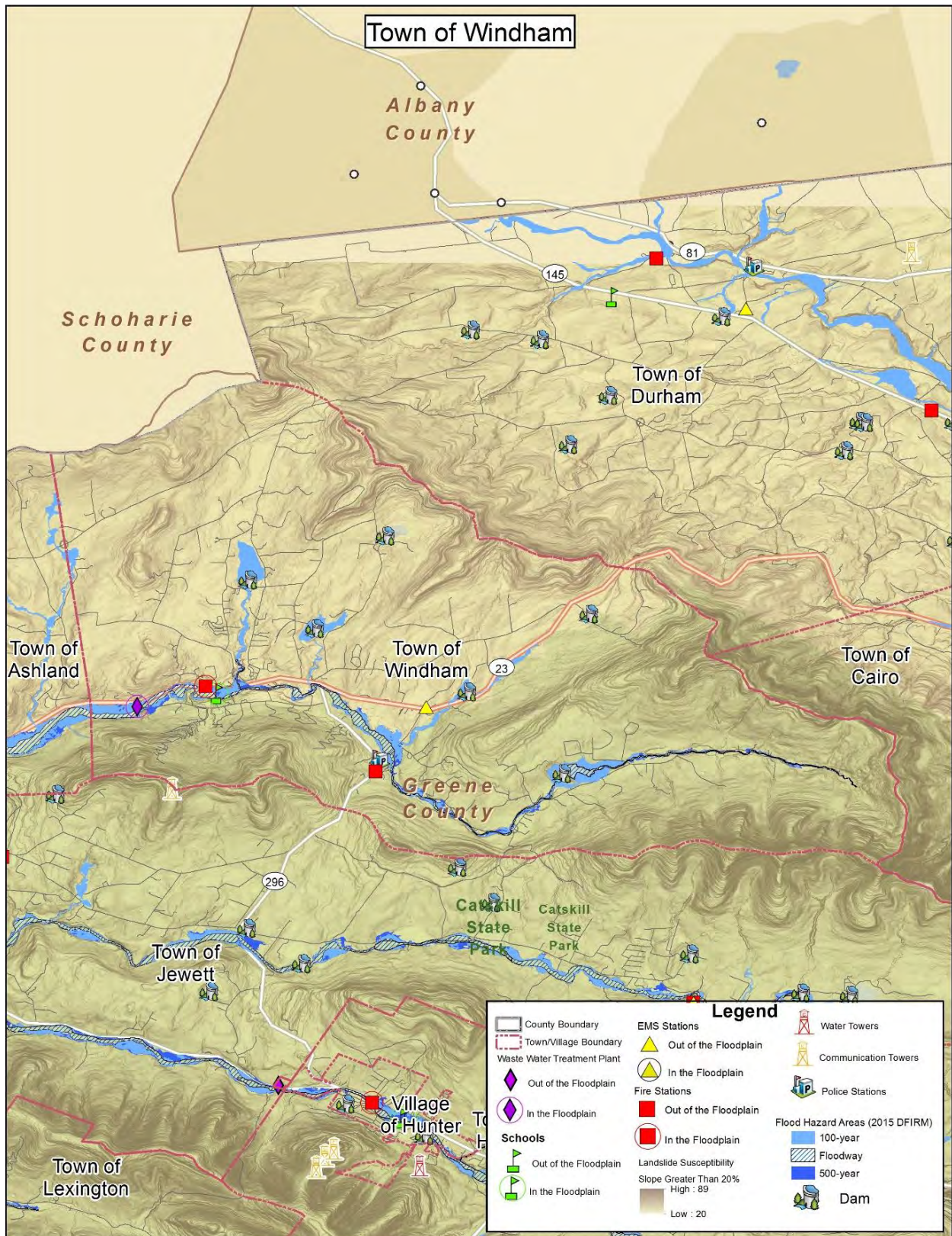


Figure XIX-2: Town of Windham Hazard Area Map

Administrative and Technical: In addition to the Town Board, the Town has a Town Clerk, Assessors Office, Highway Department, Code Enforcement Office, and consulting engineers.

A Memorandum of Understanding was adopted with GCSWCD for implementing the *Batavia Kill Stream Management Plan* (2007).

Financial: While the Town has been very successful in planning for its recovery post-Hurricane Irene, there have not been any identifiable or confirmable changes in locally based financial capabilities for reducing long-term vulnerability since the 2009 HMP. The Town has access to Catskill Watershed Corporation funding, among other grant programs.

Education and Outreach: The Town has conducted and completed outreach and education efforts since Hurricane Irene devastated the community.

Mitigation Strategies

Hazard Mitigation Actions Completed or in Progress: The Town of Windham recently completed two planning efforts in 2014-2015: The *NY Rising Community Reconstruction Plan* and the LFA.

Table XIX-3: Summary of Town of Windham Mitigation Actions Completed or In Progress

Mitigation Action	Project
NY Rising Community Reconstruction Plan	Complete
LFA	Complete

Proposed Hazard Mitigation Actions: In addition to the Greene County actions discussed in this Plan, the Town of Windham has considered its individual needs related to risk and vulnerability and is pursuing or proposing the following hazard mitigation actions:

- (T)WIN-1: Culvert Replacement – Upgrade drainage infrastructure along CR 56 in the area of 97 CR 56 to improve stormwater runoff; install a 6 ft x 6 ft box culvert.
- (T)WIN-2: Back-up Power – Provide for emergency generators at Town of Windham emergency shelters.
- (T)WIN-3: Protect WWTP and Water systems – Consolidation with Ski Windham is complete
- (T)WIN-4: Local Flood Analysis Flood Mitigation Actions – Remove existing structures out of the floodway at #120 CR 65, and at #109 CR 65; replace Main Street (Rt. 23) Bridge and create floodplain bench on Mitchell Hollow Creek by acquiring and relocating three commercial structures. Conduct floodplain enhancement downstream of Church Street; this project would require buying out and relocating GNH Lumber.
- (T)WIN-5: Drainage Study in Hamlet of Hensonville – Perform drainage study in Hamlet of Hensonville on SR 296 and CR 65 to identify remediation of sheet flow flooding.
- (T)WIN-6: Mad (Pratt) Brook Stream Bank Restoration Alternatives – Continue to support the study of stream bank restoration alternatives.
- (T)WIN-7: Road Drainage and Condition Survey – Perform a town-wide survey of road drainage and condition alternatives.

Details about each proposed hazard mitigation action can be found in the individual Action Worksheets.

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