



**Greene County Hazard Mitigation and Resilience Plan**  
**Greene County Emergency Services**  
**November 2022**



## **Acknowledgements**

Thank you to the participating jurisdictions for their assistance with providing details of previous hazard events, status of completed and current mitigation activities and proposed actions for the plan update. Thank you as well for reviewing your revised annexes and the final version of the base plan and providing feedback.

A special thank you to County Departments, especially Greene County Soil and Water Conservation District for their continued support and assistance throughout the mitigation planning process. Their contributions to this plan are invaluable.

We would also like to thank Crawford & Associates, LLC for their assistance in coordinating the plan update process, creating a community survey for the public and working with the planning team members to ensure the plan provides the information needed to help the County mitigate the hazards they face and become more resilient.

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The logo for Crawford & Associates, LLC features the company name in a blue, italicized serif font. The text is enclosed within a blue, horizontal oval shape that has a slight gradient and a shadow effect, giving it a three-dimensional appearance.

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## Executive Summary

The *Greene County Hazard Mitigation and Resilience Plan, 2022* is an update to the previous plan, which was approved and adopted in 2017. This plan represents the collaboration of County departments, Town and Village representatives, and other elected and appointed government officials who worked together to develop this framework to protect community assets, preserve the economic viability of the County and jurisdictions within, and save lives.

Greene County residents and infrastructure are at risk each year from various hazards, including severe winter storms, ice storms, flooding, wind events and severe storms. This plan provides a long-term approach to reducing the likelihood that a natural hazard will turn into a disaster. The plan incorporates 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 aimed at breaking the cycle of merely responding to and recovering from hazard events, but rather working to prevent their effects in the first place. With this plan update the County aims to maintain eligibility for federal mitigation project funding such as the Hazard Mitigation Grant Program (HMGP); Building Resilient Infrastructure and Communities (BRIC) Program; Flood Mitigation Assistance (FMA) Program and Repetitive Flood Claims (RFC) Program, in addition to other diverse funding sources that are available. The plan also strives to aid the County in becoming more resilient, which is defined as “the ability of a community to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.”<sup>1</sup>

In addition to working to become more resilient, with this update the County continues to take into consideration the continued impacts of climate change. The previous version introduced the role of global climate change in estimating probability for the identified hazards. This update also takes the role of climate change into consideration for both current and future impacts and any new risks they may bring. A new element added to this update, in accordance with the updated Federal Emergency Management Agency (FEMA) Local Mitigation Planning Policy Guide (2022)<sup>2</sup>, is the inclusion of whole community planning approach. Whole community planning is integral to ensuring *everyone* in the community is safe from the potential impacts of disasters, especially those populations that may be disproportionately impacted and/or are socially vulnerable. Throughout the planning process, from assessing hazards and risks; identifying mitigation actions and conducting public outreach, the planning team worked to ensure equity and inclusion were central to the process.

The hazard mitigation planning process used to create this plan consisted of creating a community survey for residents and businesses to provide input on questions related to preparedness and mitigation. The survey was made available on-line as well as in print format to ensure it was accessible to everyone. In addition, the County posted the 2016 version of the Hazard Mitigation and Resilience Plan and associated Jurisdictional Annexes on the Emergency Services webpage to solicit

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<sup>1</sup> <https://hazards.fema.gov/nri/community-resilience>

<sup>2</sup> Federal Emergency Management Agency. (2022). [Local Mitigation Planning Policy Guide](#) (FP 206-21-0002).





public feedback. There were also regular planning team meetings, both in person and virtual as well as three community engagement meetings to provide residents and businesses with an overview of hazard mitigation, benefits of participating in the process and present mitigation actions that have been implemented in their region. The team also reviewed data publicly available from various sources and utilized Greene County's Geographic Information Systems (GIS) data to identify and map critical infrastructure in hazard-prone areas, such as floodplains and develop jurisdiction specific maps. In addition, cross over planning was conducted with the Comprehensive Emergency Management Plan (CEMP) planning team, which was working on the update to that plan at the same time as this update. The CEMP planning team was incorporating Community Lifelines into their Emergency Support Functions; therefore, it was imperative the two teams collaborate to ensure potential impacts to community lifelines and potential mitigation actions were considered in the updated plan. 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 80 mitigation actions ranging from public education and outreach projects to structural projects, such as relocating critical facilities out of floodplains, increasing culvert sizes, and replacing bridges.

By adopting this updated plan, the County and its participating towns and villages commit to working with each other to make their communities safer, more resilient and include the whole community.



## Section 1 – Introduction

Greene County is located in southeast central New York State, just west of the Hudson River and south of Albany. The northern and eastern regions are mostly low-lying flatlands, and the southern and western areas rise sharply into the Catskill Mountains. Part of the county lies within the Catskill Park and includes some of the tallest peaks south of the Adirondacks such as Hunter Mountain. In addition, there are many waterfalls in the county such as the famed Kaaterskill Falls<sup>3</sup>. Figure 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 2020 Census, the County's population decreased slightly to 48,499<sup>4</sup> residents.

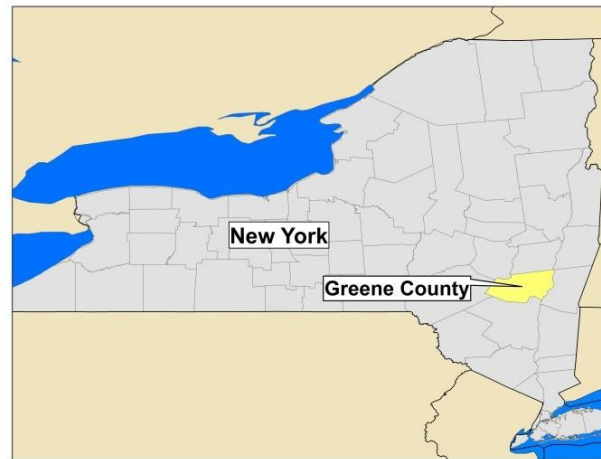


Figure 1: Location of Greene County in New York

### 1.1 Plan Background, Purpose and Authority

The *Greene County Hazard Mitigation and Resilience Plan, 2022* (hereafter referred to as “the plan”) is an update to the previous plan, *The Greene County Hazard Mitigation and Resilience Plan, 2016*, which was approved and adopted for implementation by the County and its 19 Jurisdictions in 2017. The 2016 plan update replaced what was known as the *2009 Greene County Multi-Jurisdictional All-Hazards Mitigation Plan* and introduced the concept of resilience into the plan, based on the impacts of Hurricane Irene, Tropical Storm Lee and Superstorm Sandy.

This plan will help the County to implement mitigation projects aimed at breaking the cycle of merely responding to and recovering from hazard events, but rather working to prevent their effects in the first place.

Greene County residents and infrastructure are at risk each year from various hazards, including flooding, severe winter storms/ice storms, and severe storms/wind events (Section 4 provides specific details on the hazards). This plan provides a long-term approach to reducing the likelihood that a natural hazard will turn into a disaster. The plan incorporates updated data for assessing vulnerabilities and presents updated strategies for making Greene County a safer and more

<sup>3</sup>NY.gov website - <https://www.ny.gov/counties/greene>

<sup>4</sup> 2020 Census Data, Quick Facts Greene County, NY - <https://www.census.gov/quickfacts/greencountynewyork>



sustainable community. In addition, the updated version includes continued consideration for the impacts of climate change and incorporates the whole community approach to planning to ensure equitable outcomes for all mitigation activities.

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 to help mitigate the risk from natural hazards.

Hazard mitigation actions are projects, activities, process, or a specific action taken to reduce or eliminate the long-term risk from hazards and their impacts to people and property in the County. Mitigation actions generally fall into one of the following primary types:

- Local Plans and Regulations
- Structure and Infrastructure Projects
- Natural Systems Protection
- Education and Awareness Programs

The mitigation actions of this plan are linked to other community plans, programs, reports, 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 future land use/zoning policies to acquisition of flood prone properties to public awareness/education campaigns – should consider its effect on reducing risk for the whole community and ensuring equitable outcomes.

Adoption of this plan ensures that Greene County and participating jurisdictions will 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 amended. The Local Mitigation Plan Review Tool (see Appendix I), which is produced by FEMA, was used by the planning team to ensure all requirements have been addressed.

This is a multi-jurisdictional plan that geographically covers the 19 participating jurisdictions within Greene County's boundaries (hereinafter referred to as the Planning Area). All but one of the 19 towns and villages that participated in the 2016 plan update also participated in the development of the 2022 plan update. Table 1 shows the jurisdictions in the planning area, organized by the three geographic regions (mountaintop towns, river towns and valley towns) of the County. All participating jurisdictions in the planning area will adopt this plan and will authorize jurisdictional government staff to implement the proposed mitigation actions. Figure 2 shows the graphic depiction of the regions within the County.





**Table 1: Greene County Jurisdictions, by Geographic Region**

Geographic Region	Jurisdiction
<b>Mountaintop Towns</b>	Town of Ashland Town of Halcott Town of Hunter Village of Hunter Town of Jewett Town of Lexington Town of Prattsville Village of Tannersville Town of Windham
<b>River Towns</b>	Town of Athens Village of Athens Town of Catskill Village of Catskill Town of Coxsackie Village of Coxsackie Town of New Baltimore
<b>Valley Towns</b>	Town of Cairo (did not participate in plan update) Town of Durham Town of Greenville

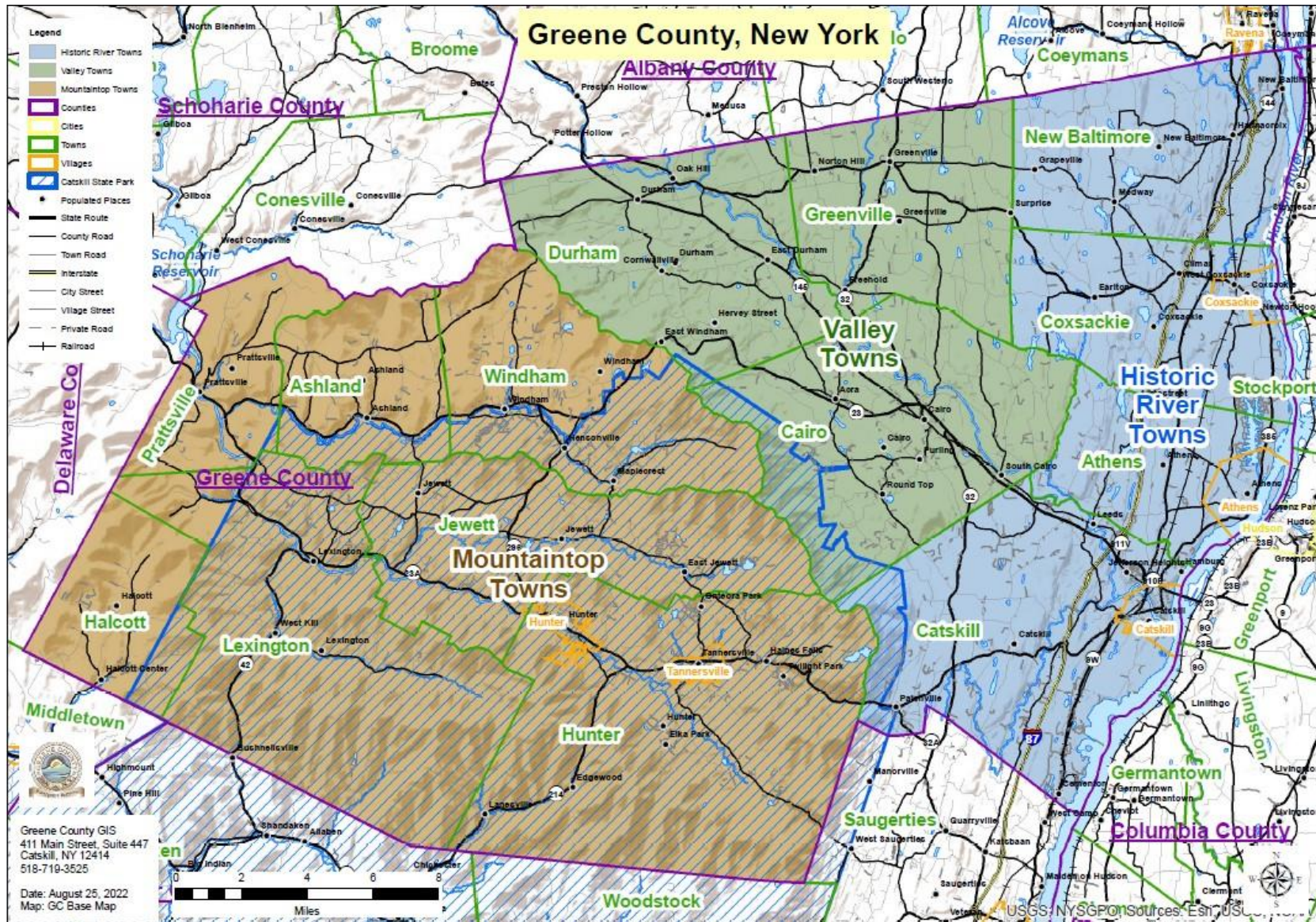


Figure 2: Participating jurisdictions by geographic regions of the County





## 1.2 Organization of the Plan

The Plan consists of the sections, appendices and annexes listed below:

*Table 2: Plan Sections, Appendices and Annexes with descriptions*

Type of Section	Description of the Section
Section 1: Introduction	Explains the purpose and organization of the plan.
Section 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.
Section 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.
Section 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.
Section 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.
Section 6: Implementation and Maintenance	Explains how mitigation actions will be implemented and monitored and how the plan will be evaluated and updated.
Section 7: References and Resources	Provides references for documents cited in the plan as well as resources used.
Appendices	Include documentation of the planning process and community engagement, critical facilities, potential funding sources, supporting plans, proposed mitigation actions and FEMA/NYS Local Mitigation Plan Review Tool.
Jurisdictional Annexes	Provide information on each of the jurisdictions that participated in the plan to include a summary of the hazards, risk and vulnerabilities they face, capabilities within the jurisdiction, mitigation actions, changes in development, etc.



## Section 2 – Planning Process

In June 2022, the planning process for the update to the plan began. Greene County Emergency Services, as the lead agency for the plan update, worked with their contracted vendor to develop a community survey to solicit input on the hazards of concern for the communities and the types of mitigation activities participating jurisdictions should undertake. The survey was distributed widely through pre-existing databases and email distribution lists, social media and at public events (such as the Youth Fair, held at the end of July) and was made available in both online and paper format to ensure it was accessible in multiple formats. Greene County Emergency Services also identified core planning team members from both the County and each of the 19 participating jurisdictions. The planning team met in person, virtually and communicated via email to obtain the information needed. The County also reached out to NY DHSES to engage the mitigation team as part of the planning process. The state mitigation team participated in an initial meeting with Greene County Emergency Services and their contracted vendor to review feedback from the 2016 update and identify any new elements that should be incorporated into the updated version. They also attended the kick-off meeting with the core planning team and provided guidance throughout the planning process, as requested. The remaining piece of the planning process was the inclusion of the public. The 2016 plan and its associated Jurisdictional Annexes were posted to the County website where the public could review them and use the feedback form provided on the site. The planning team conducted three community engagement meetings (one in each of the three regions – mountaintop, valley and river) to provide an overview of the planning process, discuss identified hazards and risks and possible mitigation actions as well as to ask for their input. The public was also afforded the opportunity to review and provide feedback on the draft version of the plan before it went for final review and approval.

In addition, cross over planning was conducted with the Comprehensive Emergency Management Plan (CEMP) planning team, which was working on the update to that plan at the same time as this update. The CEMP planning team was incorporating Community Lifelines into their Emergency Support Functions; therefore, it was imperative the two teams collaborate to ensure potential impacts to community lifelines and potential mitigation actions were considered in the updated plan.

### 2.1 Core Planning Team

The planning process was designed to reach and receive input from not only County officials, but also all participating towns and villages. Therefore, the core planning team was led by Greene County Emergency Services and included representatives from several County Agencies as well as a representative from 18 of the 19 jurisdictions (the Town of Cairo did not participate in the update process). About a quarter of the 2022 planning team also participated in the 2016 update.

Since the plan needs to be adopted and implemented by each participating jurisdiction, multiple attempts were made to obtain participation from each municipality and various opportunities were made available for all stakeholders to genuinely participate.



The planning team’s role was to review the 2016 Plan and provide any recommendations for areas to improve; review current hazards and recommend any new additions; identify new areas or risk/vulnerability; complete status reports on current mitigation actions and identify new actions to be incorporated in the update and support community outreach. In addition, planning team members were responsible for attending scheduled planning meetings, both in person and virtually and for responding to emails or requests for information in a timely manner. Members of the planning team from each jurisdiction were also tasked with supporting the planning process by working with representatives within their jurisdiction to obtain feedback, collect data and gather input on the plan update. The additional jurisdictional representatives that provided input on the plan and associated Jurisdictional Annex are listed within the associated Jurisdictional Annex.

**Table 3: Greene County 2022 Hazard Mitigation Core Planning Team**

Jurisdiction	Name	Position/Title
<b>Ashland</b>	Rich Tompkins	Supervisor
<b>Athens - Town</b>	Michael Pirone	Supervisor
<b>Athens - Village</b>	Amy Serrago	Mayor
<b>Catskill - Town</b>	Patrick McCulloch	Councilman
<b>Catskill - Village</b>	Patrick McCulloch	Councilman
<b>Coxsackie - Town</b>	Rick Hanse	Supervisor
<b>Coxsackie - Village</b>	Mark Evans	Mayor
<b>Durham</b>	Shawn Marriott	Supervisor
<b>Greenville</b>	Paul Macko	Supervisor
<b>Halcott</b>	Innes Kasanof	Supervisor
<b>Hunter - Town</b>	Sean Mahoney	Supervisor
<b>Hunter - Village</b>	Carl Giangrande	Floodplain Administrator/CEO
<b>Jewett</b>	Greg Kroyer	Supervisor
<b>Lexington</b>	Carl Giangrande	Code Enforcement
<b>New Baltimore</b>	Alan VanWormer	Highway Super
<b>Prattsville</b>	Gregg Cross	Supervisor
<b>Tannersville</b>	Carl Giangrande	Code Enforcement
<b>Windham</b>	Tom Hoyt	Supervisor
County Agency	Name	Position/Title
<b>Administration</b>	Shaun Groden	County Administrator
<b>Administration</b>	Warren Hart	Deputy County Administrator
<b>Economic Development</b>	Teri Weiss	Director of Business Marketing
<b>Emergency Services</b>	John Farrell	Director
<b>Emergency Services</b>	Dan King	Emergency Manager
<b>Highway &amp; Solid Waste</b>	Scott Templeton	Superintendent
<b>Soil &amp; Water</b>	Michelle Yost	Watershed Assistance Program Coordinator





## 2.2 Planning Team Activities

Four meetings were held with the Planning Team. Meetings were held in person as well as virtually to seek as much engagement as possible from County staff as well as the participating jurisdictions. In addition to scheduled meetings, email was used to solicit and gather information from planning team members as needed. Table 4 lists milestone planning team activities. Additional planning team documentation, such as meeting invites, agenda, presentations and meeting notes are contained in Annex B.

*Table 4: Planning Activities*

Date	Activity/Meeting	Purpose
July 12, 2020	Planning Team Kick-off Meeting	Introduce the planning team, provide an overview of the update process, roles and expectations of the planning team, public involvement, and project timeline.
Aug. 2, 2022	Planning Team Meeting #2	Review hazards and associated risks, jurisdictional questionnaire, survey data to date and provide information on community outreach meetings.
Nov. 3, 2022	Planning Team Meeting #3	Review of final draft plan and jurisdictional annexes

## 2.3 Community Engagement

At the beginning of the planning process, a Community Survey was developed for residents and businesses as a means for the County to understand what the community believes are the hazards of most concern, what the risks and vulnerabilities are and types of mitigation actions that could be undertaken to reduce damage/disruptions. The survey was distributed widely through pre-existing databases and email distribution lists, social media, newspaper articles and at public events and was made available in both online and paper format to ensure it was accessible in multiple formats. At the Youth Fair, held at the end of July, Greene County Emergency Services had a booth set up and encouraged people to take the survey. There was a poster on display that contained a QR code people could scan to take the survey, Chromebooks were made available for people to take the survey on the spot and hard copies were also available for anyone that wanted them. See Figure 3 below for photos from the event. Local jurisdictions were also asked to promote the survey within their community to ensure there was equal representation across the County. In total, 398 surveys were completed, and the results were used to select hazards and rank their effects within the county as well as to aid in the selection of mitigation actions. In addition to the survey providing an opportunity for the community to give their input on hazard mitigation, it also gave residents a means to provide comments. Some of these comments prompted the County to reach out to the residents to ensure they were okay and that they had access to any services they needed. Without having the survey in place, the County might not have otherwise know these residents were in need, so this was a very positive outcome from the survey that was not initially anticipated when the survey was developed. Additional survey information can be found in Appendix B and the Jurisdictional Annexes.



*Figure 3: Greene County Emergency Services at the County Youth Fair*

The County also posted the 2016 version of the Hazard Mitigation and Resilience Plan and associated Jurisdictional Annexes on the Emergency Services webpage to solicit additional public input for the update. There were also 3 community outreach meetings (one in each of the three regions – Mountaintop [Windham 8/29/22], Valley [Cairo 9/14/22] and River [Catskill 9/13/22]) to provide an overview of the planning process, discuss identified hazards and risks and possible mitigation actions and seek input from the public. Locations for each meeting were identified by taking into consideration the needs of the community to ensure the facility was accessible and conveniently located for all who wanted to attend. For the most part the community meetings were well attended and provided an opportunity to identify additional areas within the County at risk and potential mitigation actions. The public was also afforded the opportunity to review and provide feedback on the draft version of the plan before it went for final review and approval. Input received on the draft was used to refine the final version of the plan and prepare it for submission. Appendix B provides documentation of community engagement efforts and public participation.



*Figure 4: Windham Community Engagement Meeting*

## 2.4 Other Agency/Organization Participation

A copy of the draft plan was made available on the County Emergency Services website to solicit input from the public, but also from neighboring counties/jurisdictions; utilities, nonprofit organizations and others as noted in the table below. Individual emails were sent to these stakeholders requesting their input. Appendix B contains copies of the email sent.



**Table 5: Other Agency/Organization Participation**

Organization	Point of Contact	Title
Albany County Emergency Services	Brian Wood	Commander
Columbia County Emergency Services	David Harrison	Emergency Manager
Delaware County Emergency Services	Steven Hood	Emergency Manager
Rensselaer County Emergency Services	Jay Wilson	Director of Public Safety
Schoharie County Emergency Services	Ron Stevens	Sheriff
Ulster County Emergency Services	Michael Madison	Emergency Manager
Catskill Watershed Corporation	Tina Molé	President
Greene County Chamber of Commerce	Pamela Geskie	Director
American Red Cross	John Vale	Executive Dir. Hudson Valley Region

## 2.5 References and Documents

While updating the plan, the planning team used several resource documents, reports and references. Table 6 contains a comprehensive list of those items and how they were incorporated into the plan.

**Table 6: References and Documents Used**

Referenced Document or Technical Source	Resource Type	Description of Reference and its use in the plan
<a href="#">FEMA National Risk Index</a>	Technical Resource	Utilized for assessing hazards and determining risk for the County to include social vulnerability
<a href="#">FEMA Local Mitigation Planning Policy Guide</a>	Technical and Planning Resource	Updated policy guidance that will take effect in early 2023. Utilized to ensure new policy requirements were incorporated into the plan and completed the Plan Review Tool as part of the plan submission
<a href="#">FEMA Local Mitigation Planning Handbook</a>	Technical and Planning Resource	A tool for local planners to use for developing or updating local hazard mitigation plans. Utilized a guidance document to ensure requirements were met and to explore additional approaches to meeting the requirements by reviewing examples and best practices provided.
<a href="#">FEMA Mitigation Ideas - A Resource for Reducing Risk to Natural Hazards</a>	Technical and Planning Resource	This document contains a range of potential mitigation actions communities can take to reduce their risk to a number of natural hazards. This document was used to identify alternative mitigation actions that are available to communities.



<a href="#">New York State, Division of Homeland Security and Emergency Services – Hazard Mitigation</a>	Technical and Planning Resource	Utilized for local hazard mitigation planning guidance to ensure compliance with NYS requirements; reached out for technical support with questions during the plan update process and participated in meetings and calls regarding plan status, assistance needed and questions .
<a href="#">New York State website</a>	Website data	Information on County demographics used in community profile
<a href="#">Local Flood Analysis</a>	Technical and Planning Resource	The Catskills Stream website provides information on the Local Flood Analysis (LFA) that were conducted in 13 communities in Greene County. The LFA were used as part of the hazard identification and risk assessment process as well as when identifying new mitigation actions.
<a href="#">FEMA Community Lifelines</a>	Technical and Planning Resource	Information on the community lifelines was used for critical infrastructure assessment as well as the risk assessment to ensure essential services in the hazard areas are addressed.
<a href="#">National Centers for Environmental Information (NCEI)</a>	Technical Resource	Resource for climate related data and historic event data of the hazards for the risk assessment.
<a href="#">NOAA/NCEI, National Climate Data Center (NCDC)</a>	Technical Resource	Resource for climate related data and historic event data for the hazards that was used for the risk assessment.
<a href="#">National Oceanic and Atmospheric Administration (NOAA)</a>	Technical Resource	Resource for hazard and risk information and graphics for risk assessment
<a href="#">2019 NY State Hazard Mitigation Plan</a>	Technical Resource	Resource for hazard and risk information for risk assessment
<a href="#">Presentation: Economic Impact of Visitors in New York 2020 – Catskills Focus</a>	Technical Resource	Provides data for the impact of tourism on the County. Used information as part of the county profile.
<a href="#">NOAA’s, National Integrated Drought Information System</a>	Technical Resource	Resource for historical information on drought conditions in the US. Information was used as part of the hazard identification process.
<a href="#">NYS Dept. of Environmental Conservation (DEC)</a>	Technical Resource	Provided information on updated NFIP policy numbers, claims and claim amounts.
<a href="#">Fourth National Climate Assessment – US Global Change Research Program (USGCRP)</a>	Technical Resource	This assessment on the effects of global climate change was used to understand the current and future impacts of



		climate change on the identified hazards.
<a href="#">Inventory of Dams – New York State (NYSDEC)</a>	Technical Resource	This document contains the metadata used to update the dataset for dams in the County.
<a href="#">NY GIS Data Clearinghouse</a>	Technical Resource	This site was used by the County to create the updated map of the location of dams in the County
<a href="#">Greene County Real Property Tax Service/Geographic Information Services (GIS)</a>	Technical Resource	This resource was used to create the maps used in the plan and to update loss information provided in Section 4, based on HAZUS data
<a href="#">FEMA HAZUS</a>	Technical Resource	The County utilized the tools and data available in Hazus to aid in estimating risks outlined in Section 4
Community Survey Results	Planning Resource	The survey results were used to validate the Risk Assessment and Mitigation Strategy and inform Mitigation Actions
Jurisdictional Questionnaires	Planning Resource	The questionnaires were used to inform various sections on the plan, such as risk assessment, mitigation strategy and Jurisdictional Annexes

## 2.6 Presentation of Draft Plan

In early November 2022, the planning team held a meeting to do a high-level review of the base plan, annexes, and appendices. Following the meeting, each jurisdiction received a copy of the draft plan for their review and input in terms of modifications for improved accuracy, and missing information for the Jurisdiction Annexes and Mitigation Action Worksheets, particularly regarding priorities for identified action items. Table 7 shows the communities that reviewed the draft plan.

In addition, in late November, the draft plan was posted on the Greene County Emergency Services website for public review and comment and was also sent to adjacent Counties and other stakeholders requesting their review and feedback. The County’s social media outlets were used to inform residents about the public review process and encouraged residents to review the plan and provide feedback.

## 2.7 Summary of Jurisdictional and Stakeholder Participation

As described previously, 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 and County representatives on the Core Planning Team, regional community outreach meetings open to all stakeholders and the public, as well through outreach via





email and phone calls to obtain jurisdictional or County specific information. A summary of jurisdictional and stakeholder participation is shown in Table 7.

**Table 7: Summary of Jurisdiction and Stakeholder Participation**

Jurisdiction/ Stakeholder	Attended Planning Team Meetings	Attended Community Engagement Meetings	Completed Jurisdiction Question- naire	Updated Annex	Provided Input on Mitigation Actions	Reviewed Draft Plan
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	✓		✓	✓	✓	✓
Village of Tannersville	✓		✓	✓	✓	✓
Greene County Administration	✓		n/a	n/a	✓	✓
Greene County Economic Development, Tourism and Planning	✓		n/a	n/a	✓	✓
Greene County Emergency Services	✓	✓	✓	✓	✓	✓
Greene County Highway and Solid Waste	✓		n/a	n/a	✓	
Greene County Soil and Water Conservation District	✓	✓	n/a	n/a	✓	✓



## 2.8 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.



## Section 3 - County Profile

### 3.1 Location

Greene County is located in the mid-eastern part of New York State in the northern end of the Catskill Mountains and is 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.

The varying topography between mountains and water bodies heightens the effects of weather events by increasing the possibility of localized flooding, which is also exacerbated by the high number of creeks. There is one town in the County that can only be accessed from Delaware County (Town of Halcott). There is only one bridge that crosses the Hudson River in Greene County, the Rip Van Winkle Bridge. The County is also along the flight path of Albany Airport.

Greene County includes 19 local jurisdictions: 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). The location of the jurisdictions is shown in Figure 2. The Town of Catskill is the county seat.

According to the 2020 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. Also, according to the Census, Greene County had a population of 48,499 people, a population density per square mile of 74.1, and a housing density per square mile of 44.8.

### 3.2 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 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.

A map of the watersheds in the County can be found in Section 4.3.1, Figure 15.

### 3.3 Climate

The climate in Greene County is typical of the northeast with warm summers, cold winters and mild temperatures in spring and fall. Average temperatures county wide range from single digit lows in the winter to the upper 70’s in the summer, with slight variations at higher elevations. As depicted in Table 8 below, rainfall is fairly consistent regardless of the time of year, with an average of approximately 4.5 inches of rain monthly, with a slight increase in September and October. Snowfall is experienced mostly from November through April, with January and February having the highest amounts. Snow can also fall as late as May and as early as October in any given year.

*Table 8: Average climate data for Greene County, NY*

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
<b>Avg High</b>	30	32	39	52	64	72	76	74	68	56	44	34
<b>Low (F)</b>	8	8	16	27	38	46	51	49	42	32	24	17
<b>Avg Rainfall (Inches)</b>	4.1	3.0	4.3	4.5	4.2	4.8	4.6	4.5	5.2	5.6	4.7	4.3
<b>Avg Snowfall (Inches)</b>	21.4	20.3	17.4	5.0	0.2	0	0	0	0	2.3	5.7	18.4

Source: NOAA



### 3.4 Historical Overview

The first settlement in Greene County was found along the Hudson River: a Native American flint mining site south of present-day Coxsackie. Later the Catskill Indians, a subtribe of the Algonquin Nation, built numerous villages in the Catskill vicinity to take advantage of the natural harbor, flint mine deposits to the north and abundance of fish and game in the surrounding area.

In 1609, Henry Hudson first anchored the Half Moon off the shore of what is at present Catskill Village. He was met by these Native Americans which were described as “a very loving people”. Forty-one years later a permanent dwelling was established at the mouth of Catskill Creek marking the beginning of European settlement in the area.

The Dutch were the first European settlers, arriving in the early part of the 17<sup>th</sup> century. Many were fur traders. Subsequent development took place along the Hudson River where the Dutch built several farmsteads. The land proved to be excellent for farming. Today these early Dutch homes are historic and scenic attractions. The Bronck House is an excellent example and serves as the home of the Greene County Historical Society.

Greene County was formed by an act of the New York State Legislature on March 25, 1800. It included the townships of Catskill, Coxsackie, Freehold and Durham, with a population of about 13,000. By 1852, the present pattern of towns and villages had emerged, following a series of subdivisions and mergers. Today, Greene County consists of 14 towns and 5 villages.

The river towns and villages flourished as boat building, brick making and milling centers, as well as serving as supply points for inland settlers. In the mountains, several communities developed as tanning sites, utilizing the now depleted stock of hemlock forest.

By the mid-nineteenth century Greene County was becoming a fashionable resort area catering to the upper class and was marked by competition between the Catskill Mountain House and Hotel Kaaterskill for the tourist trade. Although these resorts and the Otis Elevated Railway leading to them are no longer in operation, remnants of this era can be viewed in the Town of Hunter.

A booming tourist and sportsmen’s trade in the mountains, farming in the north and east and industry and water sports along the Hudson River has culminated today into a thriving county of over 48,000 people, endowed with a rich historical heritage.<sup>5</sup>

### 3.5 Government

#### County Government

The County Chair of the Legislature serves as the Chief Executive Officer (CEO) of the County and head of the County Legislature made up of a fourteen (14) member, elected council who exercise executive duties. The day-to-day functions of Greene County Government are managed by a contracted County Administrator and county agencies.

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<sup>5</sup> Greene County NY Facts and History - <https://www.greenegovernment.com/our-community/facts-and-history>





The Greene County Sheriff is elected every four years pursuant to Article 13 Section 13 of the New York State Constitution. Other law enforcement support is provided by various Municipal Police Departments.

Fire protection is provided by 5 organized fire districts/battalions, made up of approximately 27 volunteer Fire Departments located throughout the County. There is no statutory authority for fire protection in unincorporated areas of the County beyond those established by fire departments.

Greene County Emergency Management Program activities are headed by the Greene County Department of Emergency Services Director with help from an Assistant Director and Emergency Management Specialist. Daily operations are conducted out of 25 Volunteer Drive, Cairo, New York.

Health responsibilities are provided by the Greene County Public Health, local municipal health officers, and the medical centers located near the County.

### **Local Towns & Villages**

Greene County is made up of fourteen towns and five villages. Each town is governed by an elected Town Board and headed by an elected Town Supervisor.

Each Village is governed by an elected village board and headed by an elected village mayor, except for the village of Catskill, which is headed by a board-appointed Village President.

## **3.6 Economy**

Greene County's economy is comprised of a diversified set of variables that has shown growth in job creation, average wages, home sales, and area median income while maintaining steady tax levies and consistent year-over-year (YoY) increases in sales tax receipts.

Much of the county's economy is reliant on tourism-based activities. Greene County is home to two major resort mountains, spurring ongoing development in the lodging/hospitality, food services, and retail trade industries. In 2021, Greene County realized its twelfth consecutive year of increased sales tax receipts, which has largely helped the County to stabilize its levy base for several years. The County plans to continue this trend for the near future.

As of Q2 2022, Greene County hosts 1,307 total businesses, with retail trade and accommodations and food services business encompassing a combined 367 (28%) total businesses. Together, semiannual countywide sales tax figures are \$17,948,970, outpacing YoY figures by 24%.

The County's total available workforce is approximately 20,300 as of Q2 2022, representing roughly 42% of the population. Total unemployment figures estimate 700 individuals are available to work but remain unemployed. When compared to Q2 2021, Greene County's unemployment rate is 3.6%, a YoY decline of 150 basis-points, and below national unemployment figures.

2022 Greene County employment data suggest leading sectors are Government, Retail Trade, and Accommodation and Food Service workers, together making up roughly 52% of the total workforce. All Greene County employment sectors are as follows:

*Table 9: Employment Sectors in Greene County*

Sector	Jobs	Percent of Workforce
<b>Government</b>	4,088	26%
<b>Retail Trade</b>	2,331	15%
<b>Accommodation and Food Services</b>	1,873	12%
<b>Health Care and Social Assistance</b>	1,081	7%
<b>Manufacturing</b>	1,010	6%
<b>Wholesale Trade</b>	830	5%
<b>Construction</b>	765	5%
<b>Other Services (except Public Administration)</b>	661	4%
<b>Arts, Entertainment, and Recreation</b>	632	4%
<b>Transportation and Warehousing</b>	561	4%
<b>Professional, Scientific, and Technical Services</b>	419	3%
<b>Administrative and Support and Waste Management</b>	401	3%
<b>Finance and Insurance</b>	321	2%
<b>Information</b>	222	1%
<b>Agriculture, Forestry, Fishing, and Hunting</b>	196	1%
<b>Real Estate and Rental and Leasing</b>	185	1%
<b>Educational Services</b>	113	1%
<b>Management of Companies and Enterprises</b>	91	1%
<b>Utilities</b>	90	1%

Average earnings across all listed sectors equated \$68,891 as of July 2022, representing a 24% increase since 2018. The 2022 fiscal year annual median income is \$79,000, 35% higher when compared to 2021 (\$58,500).

Total closed home sales in 2021 rose 0.2% to 893 YoY while the same year's median sales price rose 19.5% to \$287,325, keeping on track for statewide growth in median sales price. The full value tax rate in Greene County dropped from 4.55% in 2020 to 4.31% in 2021, with 2022 decreasing further to 4%.



### 3.7 Population and Demographics

The County has a large aging population (25% of population is over the age of 60) with major populations residing in river towns. The mountain regions house a high percentage of seasonal residents which are difficult to access, in fact, countywide, 35% of housing is second homes. There has been a notable increase in residents moving to the County during the summer months. Some parts of the County have communication issues, including little or no internet connectivity, significant gaps in cellular coverage, and continued use of dial up and satellite connectivity. The County also has a substantial amount of contained communities. Some summer camps and campgrounds welcome large, varying demographic groups such as Boy Scouts, Hasidic Jewish, and special needs populations camps (e.g., Camp Harriman). There is no hospital in the County (no trauma centers, but some immediate care facilities). Two New York State correctional facilities are in the County—Greene and Coxsackie Correctional facilities— and the Census population reported includes the prison population.

Based upon a review of the 2020 U.S. Census, Greene County had a total population of 48,499 people in 2020, which is slightly lower than in 2010. Table 10 shows population statistics for Greene County and the municipalities within it based on the 2010 and 2020 U.S. Census data.

*Table 10: Population Statistics*

Jurisdiction	Census Population	
	2010	2020
<b>Greene County</b>	<b>49,221</b>	<b>48,499</b>
Town of Ashland	784	682
Town of Athens	2,421	2,330
Village of Athens	1,668	1,586
Town of Cairo	6,670	6,644
Town of Catskill	7,694	7,553
Village of Catskill	4,081	3,745
Town of Coxsackie	6,105	5,636
Village of Coxsackie	2,813	2,746
Town of Durham	2,725	2,627
Town of Greenville	3,739	3,741
Town of Halcott	258	249
Town of Hunter	1,691	2,606
Village of Hunter	502	429
Town of Jewett	953	879
Town of Lexington	805	770
Town of New Baltimore	3,370	3,226
Town of Prattsville	700	774



<b>Village of Tannersville</b>	539	568
<b>Town of Windham</b>	1,703	1,708

Source: US Census Bureau and Greene County Economic Development

The U.S. Census identified 17,681 households and 29,746 total housing units in Greene County in 2020. Of the 29,746 total housing units in the County, the 2020 U.S. Census put the number of occupied housing units at 17,681 with 76.6 percent owner-occupied and 23.4 percent renter occupied. The median price of a single-family home in Greene County was estimated at \$185,400 in 2020 (U.S. Census, 2020).

*Table 11: Greene County Demographics*

County Demographics	2020	County Demographics	2020
Population	48,499	Median household income	\$56,681
White	89.5%	In civilian labor force age 16+	53.6%
Black or African American	6.3%	Persons with a disability under 65	9.5%
American Indian and Alaskan Native	0.5%	Persons under 5 years	4.3%
Asian	1.3%	Persons under 18 years	15.9%
Two or more races	2.4%	Persons 65 years and over	23.0%
Hispanic or Latino	6.8%	Persons in poverty	11.2%
White, non-Hispanic or Latino	84.2%	Households with internet	73.8%
Foreign born persons	5.8%		

Source: US Census Bureau

### Socially Vulnerable Populations

Social vulnerability is the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.<sup>6</sup> Some factors used to help determine social vulnerability include socioeconomic status; age, race and ethnicity; renters; home ownership; family structure; education and social dependence to name a few. Understanding the vulnerability and exposure of these populations to natural hazards can aid jurisdictions in implementing mitigation actions to help lessen the impacts prior to an event and to aid in recovery following an event.

As part of FEMA’s National Risk Index, a Social Vulnerability score and rating is assigned to each Census Tract. The score and rating correspond to a community’s relative level of social vulnerability as compared to other communities with similar scores. The Social Vulnerability Score is only one factor that is used to determine a community’s overall Risk Index Score, however, the higher the Social Vulnerability Score will increase the overall Risk Score.

As Figure 5, below, shows, Greene County’s overall Social Vulnerability Score is 35.40, which is relatively low compared to the rest of the United States. Although the score indicates that social groups in the County may not be as susceptible to experiencing adverse impacts from natural

<sup>6</sup> FEMA’s National Risk Index, Social Vulnerability: <https://hazards.fema.gov/nri/social-vulnerability>



hazards, the County is committed to the whole community planning approach to ensure equity and inclusion of all populations. This approach includes ensuring socially vulnerable populations are included in mitigation activities for the County and consideration is given to such groups when developing mitigation actions.

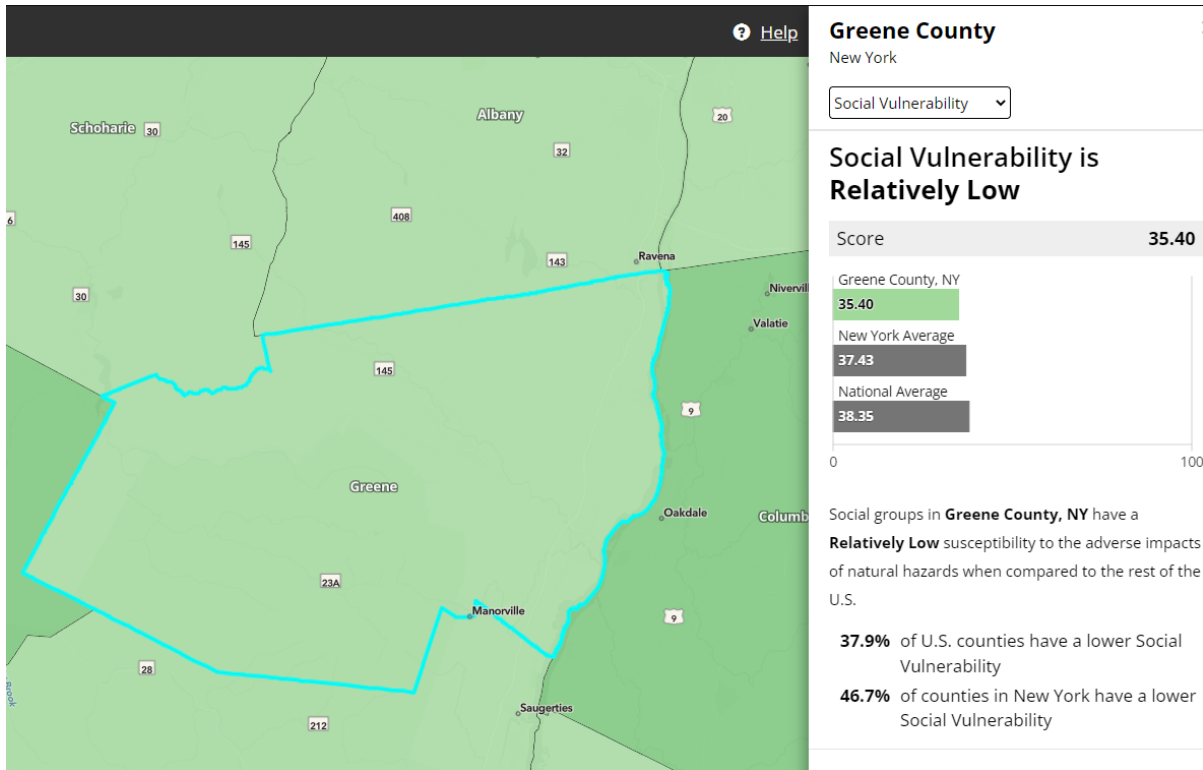


Figure 5: Greene County’s Social Vulnerability Score and Rating (Source: FEMA, NRI)

### 3.8 Transportation

Transportation facilities include the West Shore and New Baltimore Line (carload freight service) of CSX. Highways include the New York State Thruway (with an interchange at Catskill and New Baltimore), State Routes 9W, 23, 23A, 32, 42, 81, 144, 145, 214 and 296 and a network of County and Town roads. The Rip Van Winkle Bridge at Catskill provides access across the Hudson River to the City of Hudson and Dutchess County. Air transportation is available at Albany International Airport and the New York Stewart Airport in Newburgh as well as several smaller airports in the County. Figure 6 below illustrates the geographic and transportation features of the County.



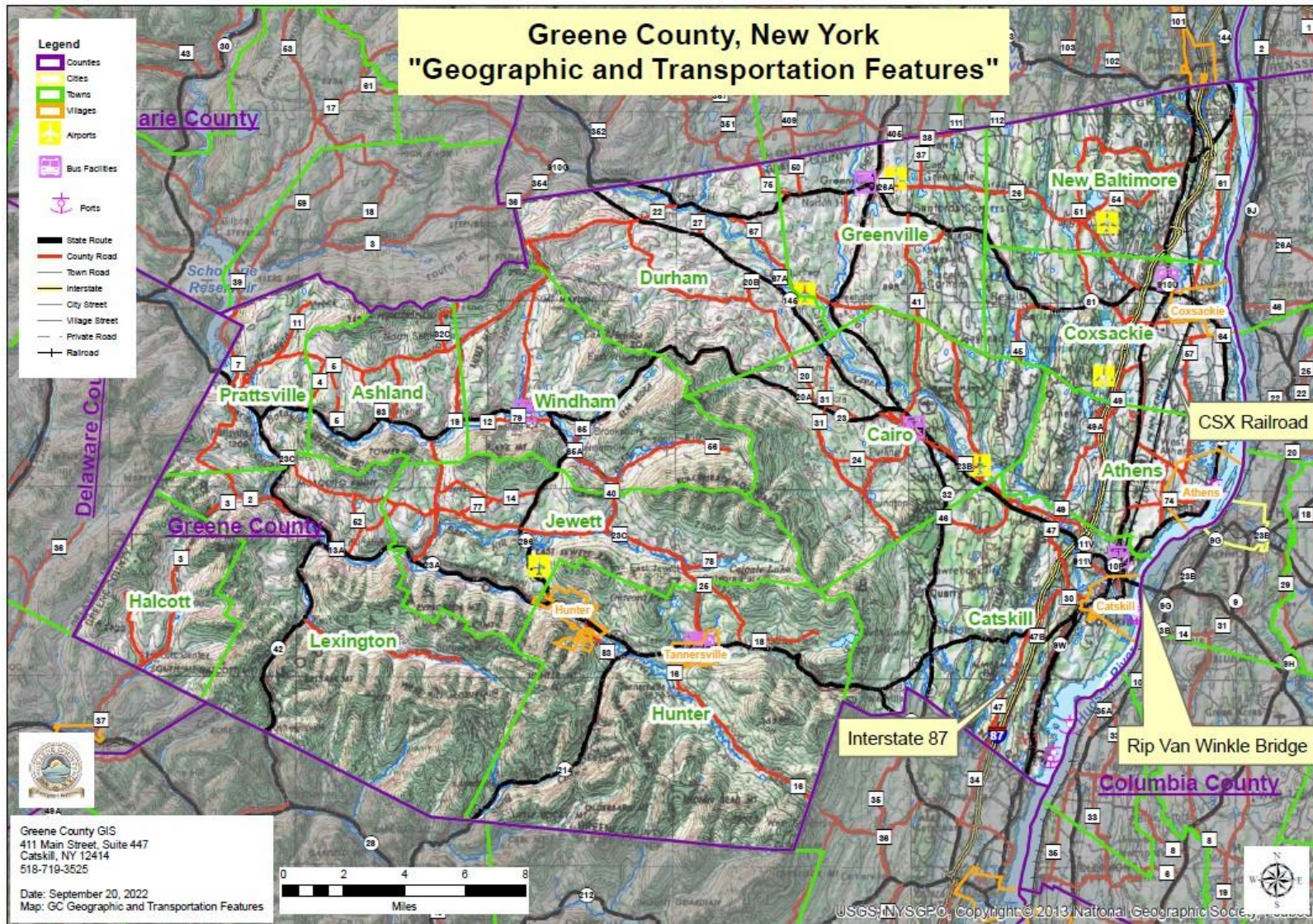


Figure 6: Geographic and Transportation Features in the County



### 3.9 Land Use and Development Trends

#### Land Use

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 12. 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 7 which was created using current GIS data for land use from the County.

*Table 12: Land Use Statistics for Greene County*

Land Use Classification	Acreage
<b>Residential</b>	139,941
<b>Vacant</b>	115,680
<b>Forested, Conservation Lands, and Parks</b>	13,124
<b>Agricultural</b>	16,540
<b>Commercial</b>	9,165
<b>Recreation and Entertainment</b>	7,184
<b>Community Services</b>	5,588
<b>Industrial</b>	4,893
<b>Public Services</b>	2,468
<b>Unknown Land Use</b>	1,321
<b>TOTAL</b>	<b>405,902</b>



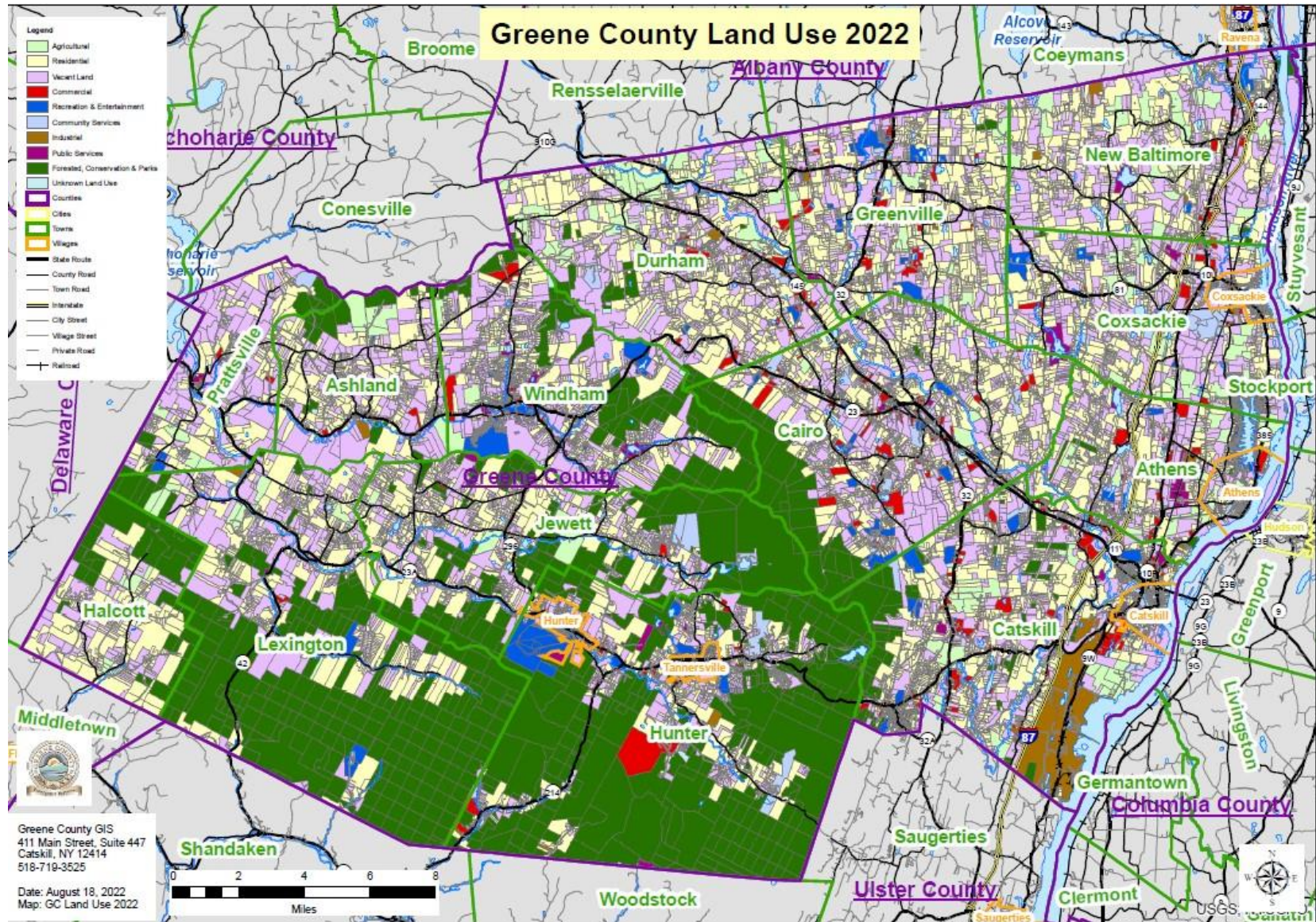


Figure 7: Greene County Land Use Map





## Development Trends

Major development is happening throughout the County, to include new construction within industrial park areas, National Gas expansion to the park, investment in downtown areas such as purchasing and renovating resorts, two new medical facilities and a county health services building. One new development of note is the Windham Mountain Development, which recently completed a project that provides an enhanced storm water collection and conveyance system (due to effects from Hurricane Irene), to protect the resort infrastructure of Windham Mountain and a new lower slope side ski trail with access to the base lodge. This project was part of a larger \$33.5 million tourism destination project at Windham Mountain.

Additional information regarding development was collected from all the towns and villages and is contained in the jurisdictional annexes.

### 3.10 Critical Facilities and Community Lifelines

Critical facilities provide essential services and functions to a community and need to always remain functional and accessible, especially following a natural disaster or event. If these facilities are offline or not operational, the impacts to the community can be devastating. Critical facilities in a community generally consist of police, fire and Emergency Medical Services (EMS); emergency operations centers (EOCs); public and private utility facilities; drinking water and wastewater treatment plants; medical facilities; schools; communication towers and Tier 2 (hazardous materials) facilities. In addition to critical facilities, Greene County also incorporates the recently released concept by FEMA, known as Community Lifelines<sup>7</sup>. Lifelines are the fundamental services that, when stable, allow other facets of communities to function. Lifelines allow critical government and business functions to continue to operate and they are essential to the health and safety of the public. As noted in the Executive Summary, cross over planning was conducted with the CEMP planning team, which was working on the update to that plan at the same time as this update. The CEMP planning team was incorporating Community Lifelines into their Emergency Support Functions; therefore, it was imperative the two teams collaborate to ensure potential impacts to community lifelines and potential mitigation actions were considered in the updated plan. As part of these planning efforts, critical facilities were categorized by their associated Community Lifeline and that is how they are presented in this plan.

There are seven Community Lifelines as defined by FEMA.

- Safety and Security
- Food, Water, Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

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<sup>7</sup> FEMA Community Lifelines: <https://www.fema.gov/emergency-managers/practitioners/lifelines>



As noted above, the critical facilities that were identified by the planning team and other sources, were categorized by their associated Lifeline. Below, those critical facilities are displayed on maps that were created by each of the seven Lifelines, along with a brief description of the types of facilities within each Lifeline. Within each Jurisdictional Annex there is additional information on critical facilities and lifelines in the hazard areas within the jurisdiction. In addition, a full listing of the names and location of the critical facilities is contained in Appendix C, which is not for public disclosure.

**Below is the Critical Facilities Legend for the maps that follow:**

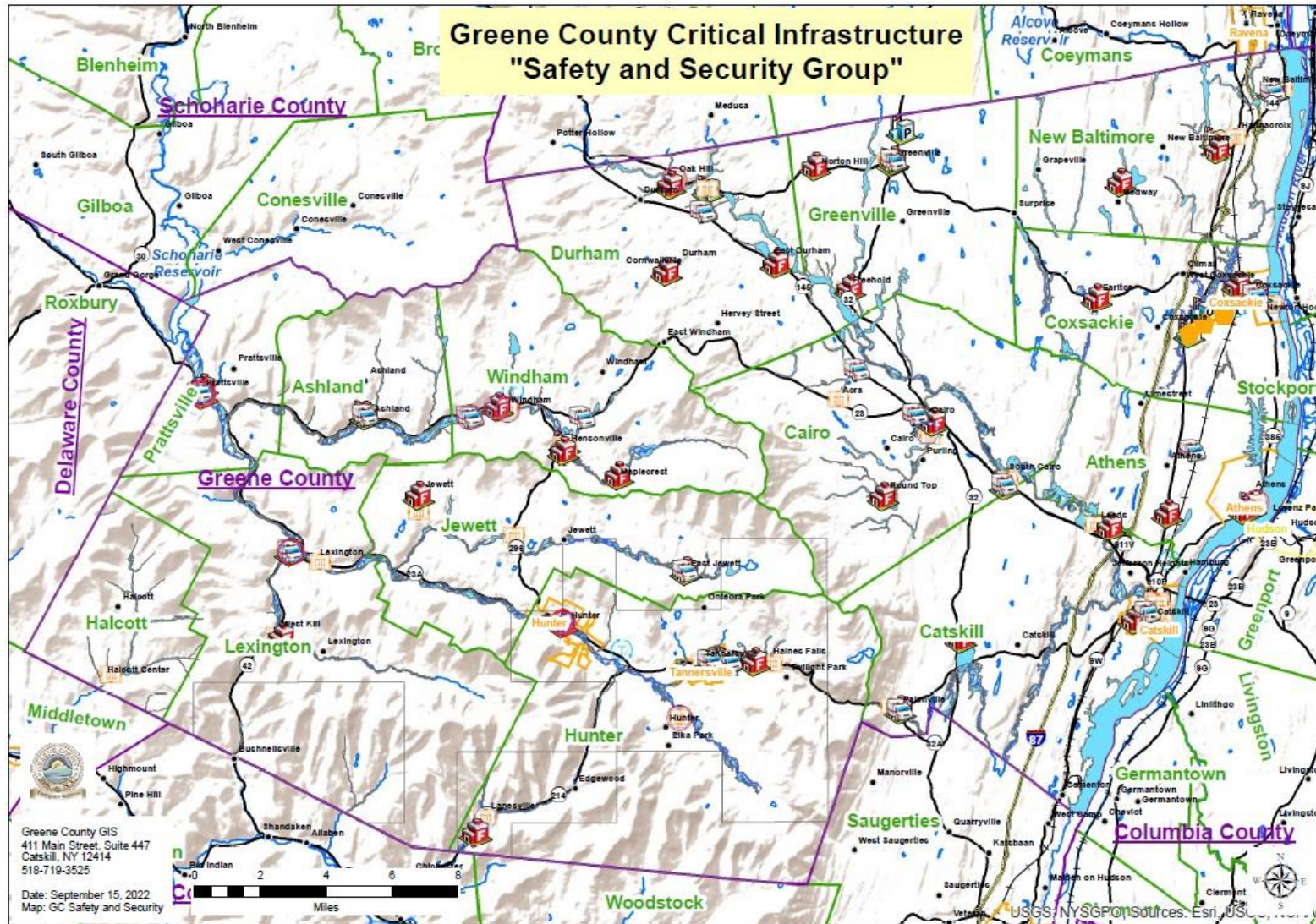
### Critical Infrastructure Legend

- |  |   |                   |  |
|--|---|-------------------|--|
|  | Critical Infrastructure in 100 Year Flood Plain |                   | Tier 2 Facility (Hazardous Materials)            |
|  | Critical Infrastructure in 500 Year Flood Plain |                   | Communication Tower                              |
|  | Airport   |                   | Wastewater Facility                              |
|  | Bus Facility                                    |                   | Water Facility (potable)                         |
|  | Communication Facility                          |                   | Water Tower (potable)                            |
|  | Community Service Facility                      |                   | Populated Places                                 |
|  | Correctional Facility                           | <b>Flood Zone</b> |  |
|  | Dam   |                   | A (100 year)                                     |
|  | Electric Power Generation Facility              |                   | AE (100 year)                                    |
|  | Electric Substation                             |                   | AH (100 year)                                    |
|  | EMS Station                                     |                   | AE, FLOODWAY (100 year)                          |
|  | Fire Station                                    |                   | X, 0.2 PCT ANNUAL CHANCE FLOOD HAZARD (500 year) |
|  | Gas Facility                                    |                   | X, AREA OF MINIMAL FLOOD HAZARD (500 year)       |
|  | Government Facility                             |                   | Counties   |
|  | Highway Facility                                |                   | Cities   |
|  | Medical Facility                                |                   | Towns  |
|  | Police Station                                  |                   | Villages   |
|  | Port  |                   | State Route                                      |
|  | Railroad Bridge                                 |                   | Interstate                                       |
|  | School  |                   | Railroad   |
|  | Senior or Disables Living Facility              |                   |  |
|  | Shelter   |                   |  |
|  | Solid Waste Facility                            |                   |  |





**Figure 8: Safety and Security Map** - This map displays the location of Correctional Facilities; Emergency Operations Center; EMS Facilities; Fire Stations; Government Facilities (including solid waste facilities) and Police Stations.







**Figure 9: Food, Water and Sheltering Map** - This map displays the location of NY City Aqueduct Shaft; Private and Public Water and Waste Water Facilities; Pump Stations; Water Supply Towers; American Red Cross Shelters and Schools.

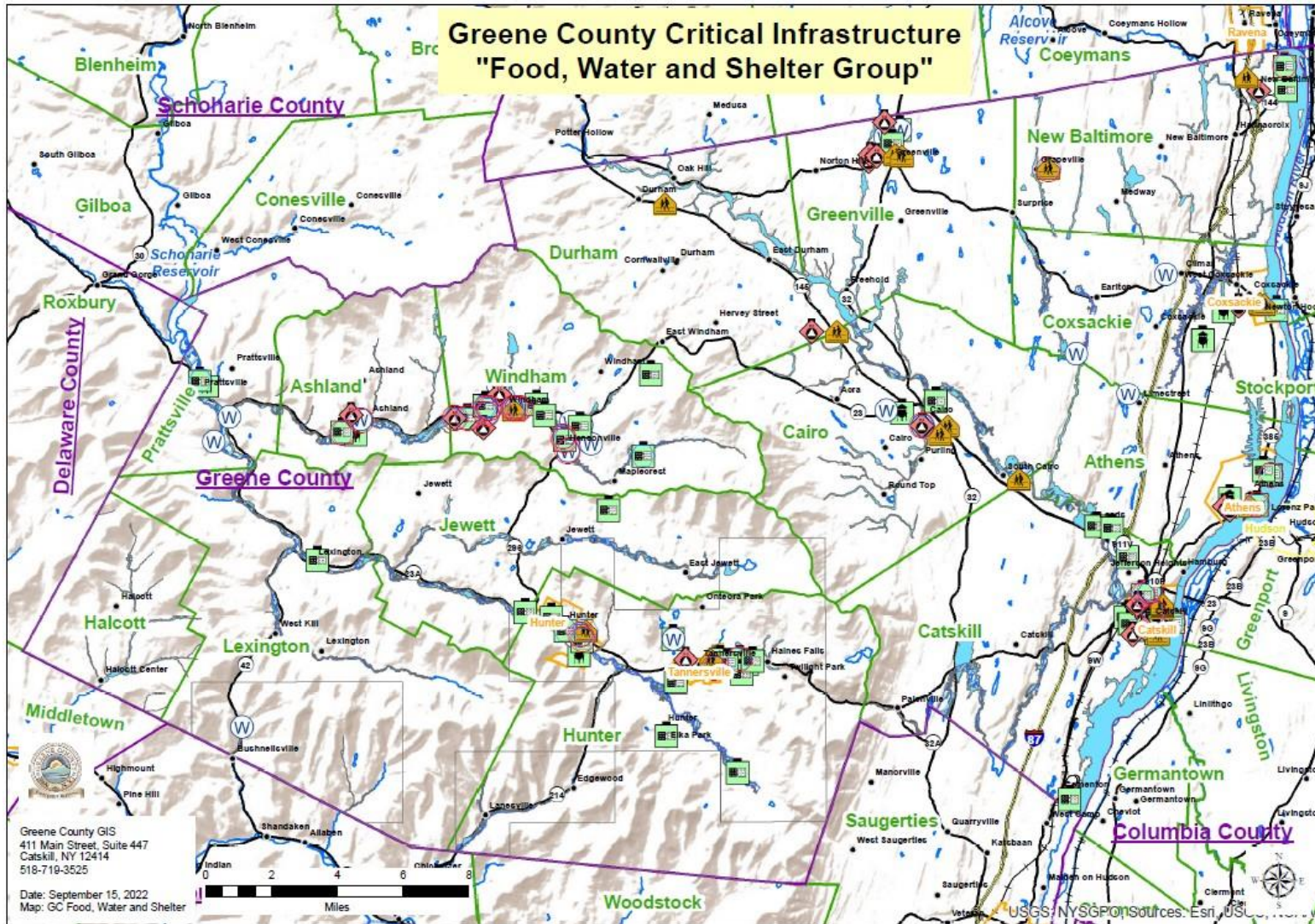
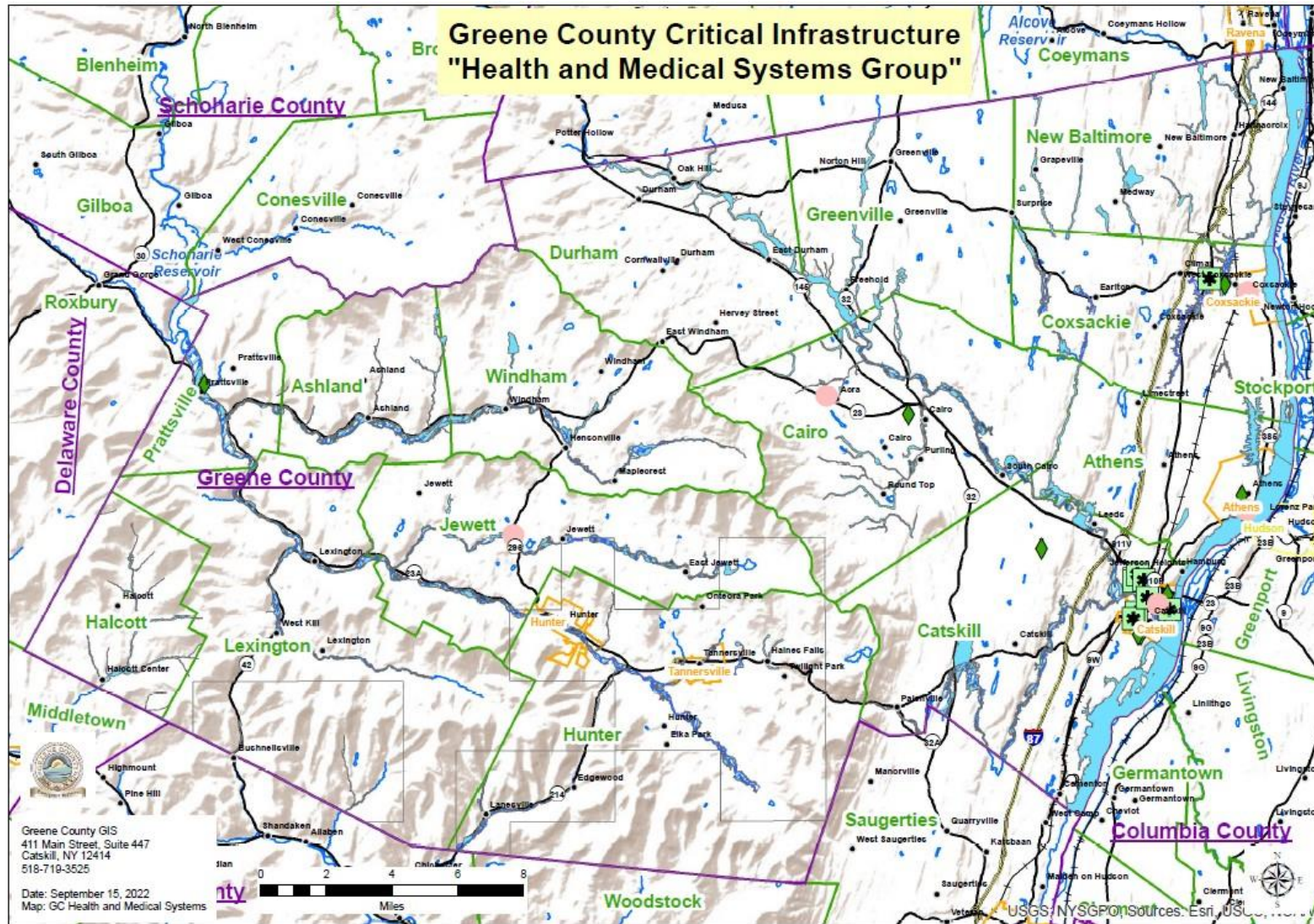






Figure 10: Health and Medical Map - This map displays the location of Community Service Facilities; Homes for Developmentally Disabled Adults; Senior Apartments; Adult Care and Assisted Living and Medical Facilities.







**Figure 11: Energy Map** - This map displays the location of Electric Facilities; Power Plants and Substations; Natural Gas Facilities and Solar Generation Facilities.

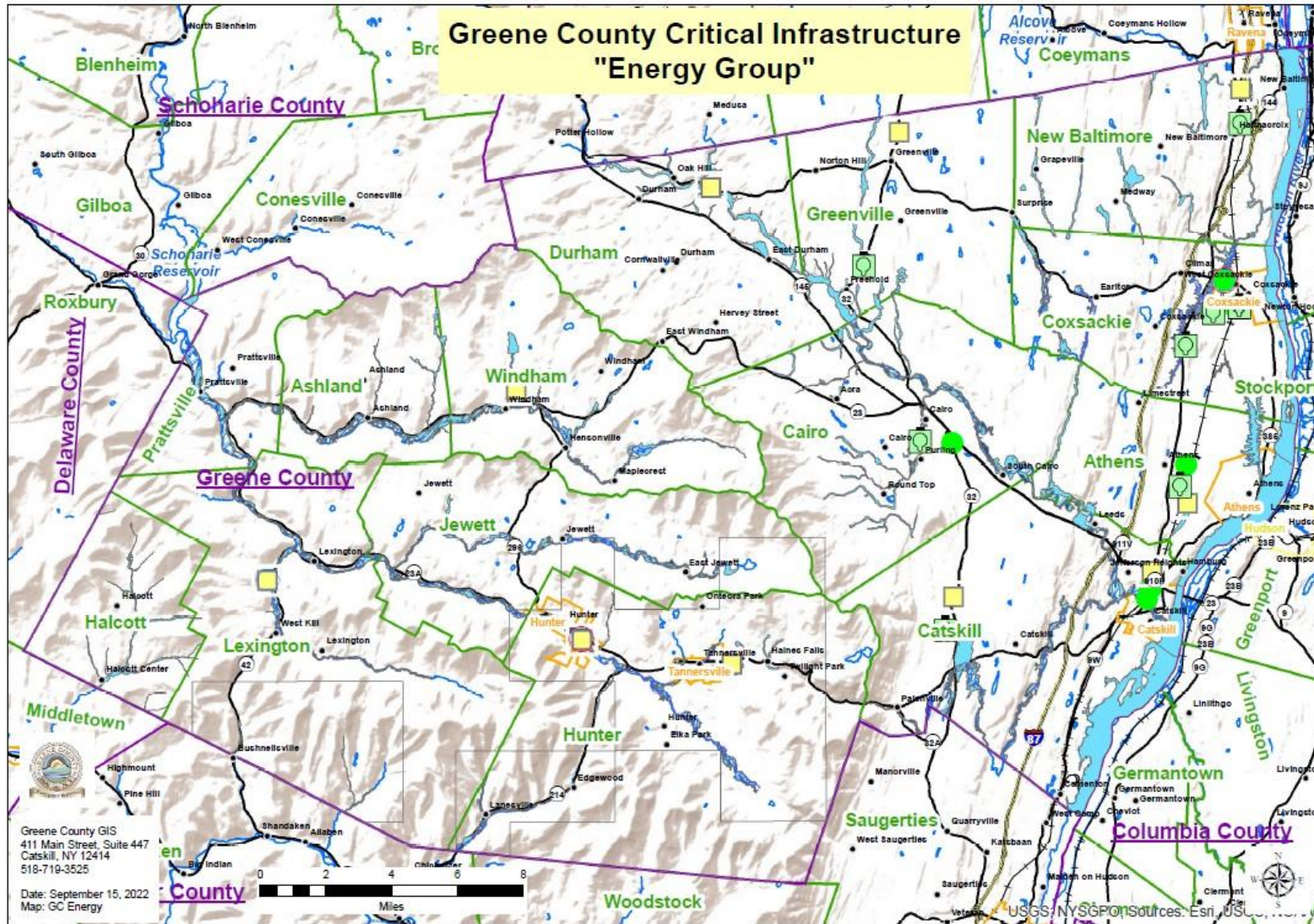






Figure 12: Communications Map- This map displays the location of Aviation Towers; Cablevision Towers; Communication and Public Safety Towers; and Communication Facilities.

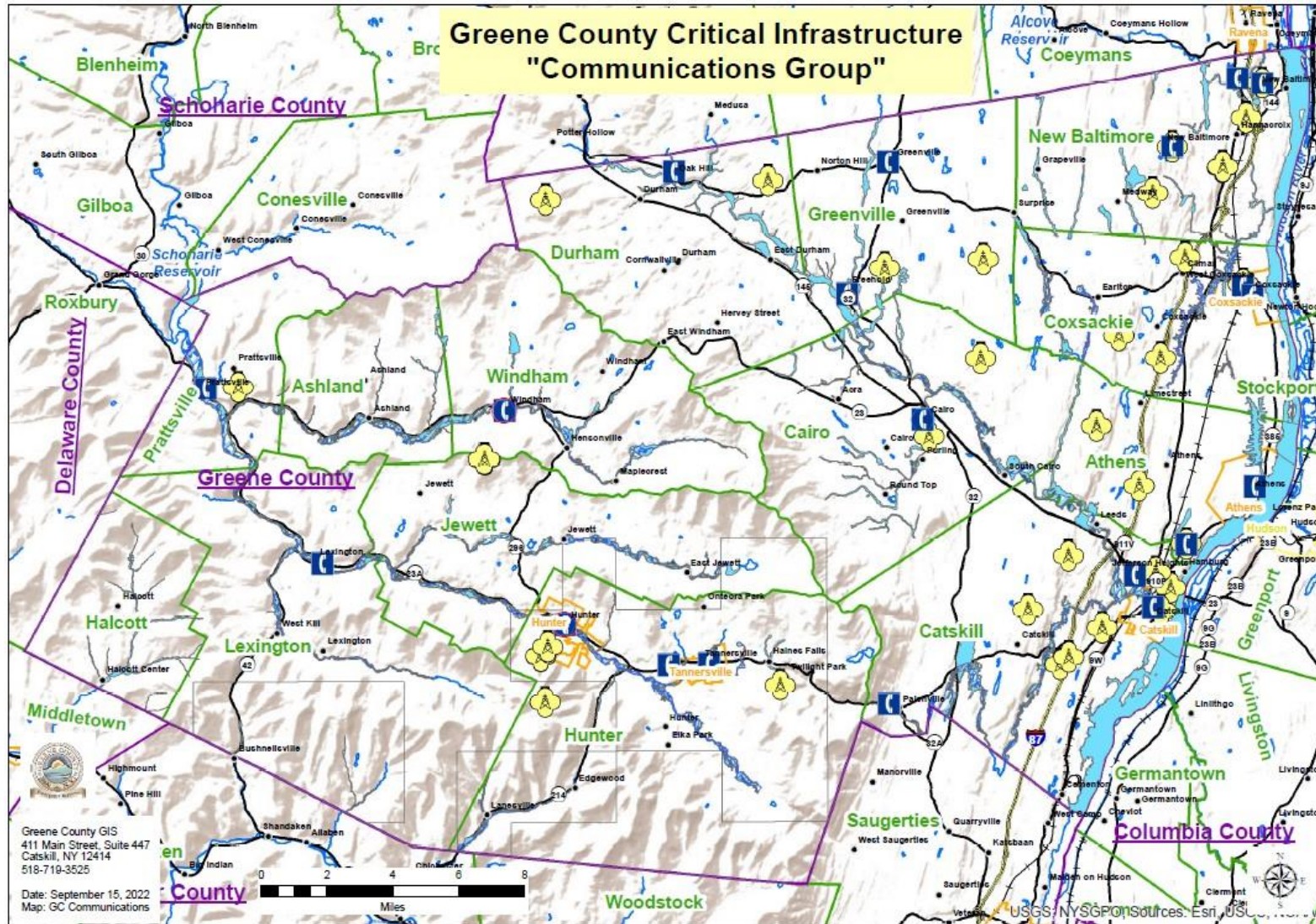






Figure 13: Transportation Map - This map displays the location of Airports; Bus Stations; Highway Facilities; Ports and Railroad Bridges.

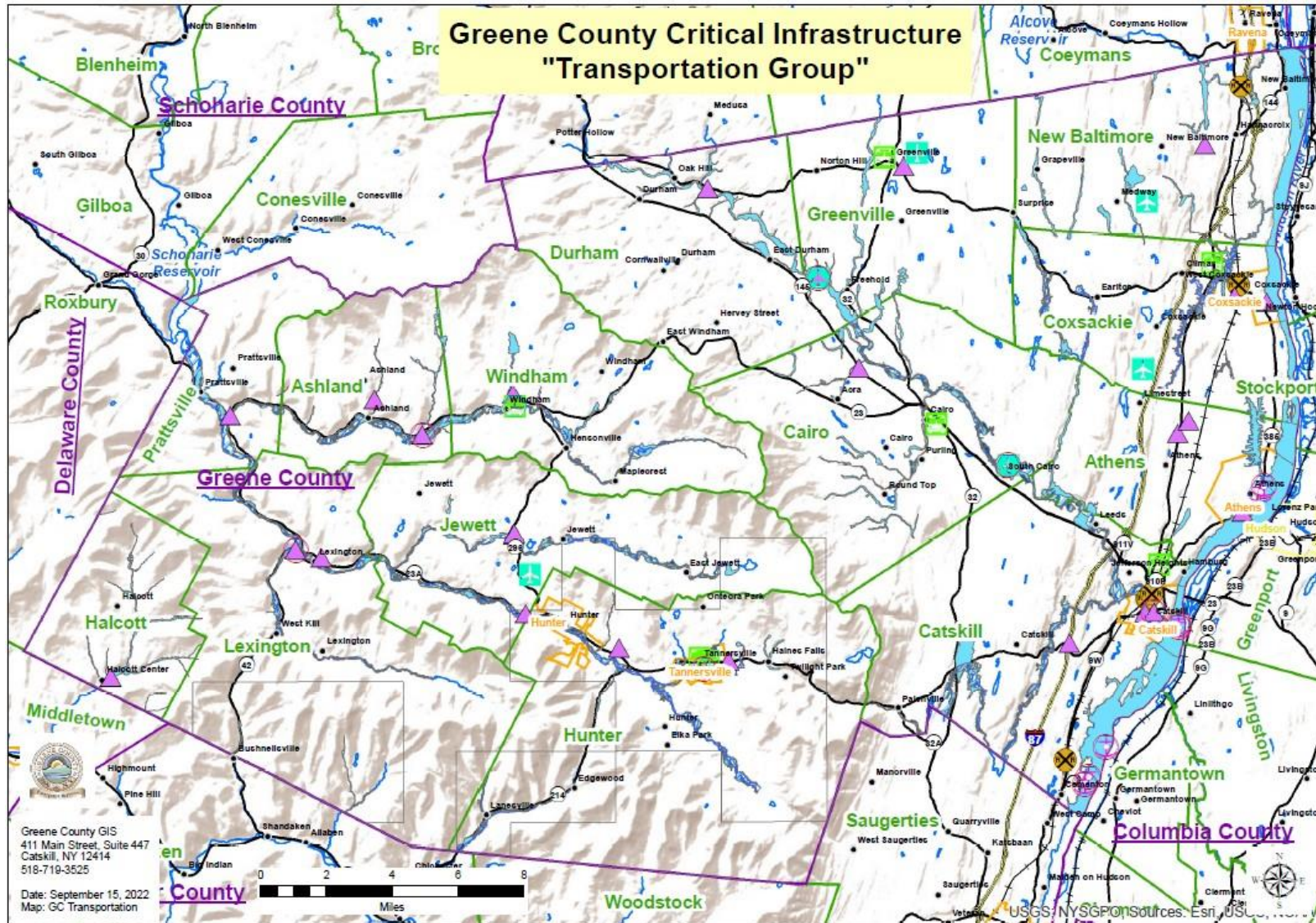
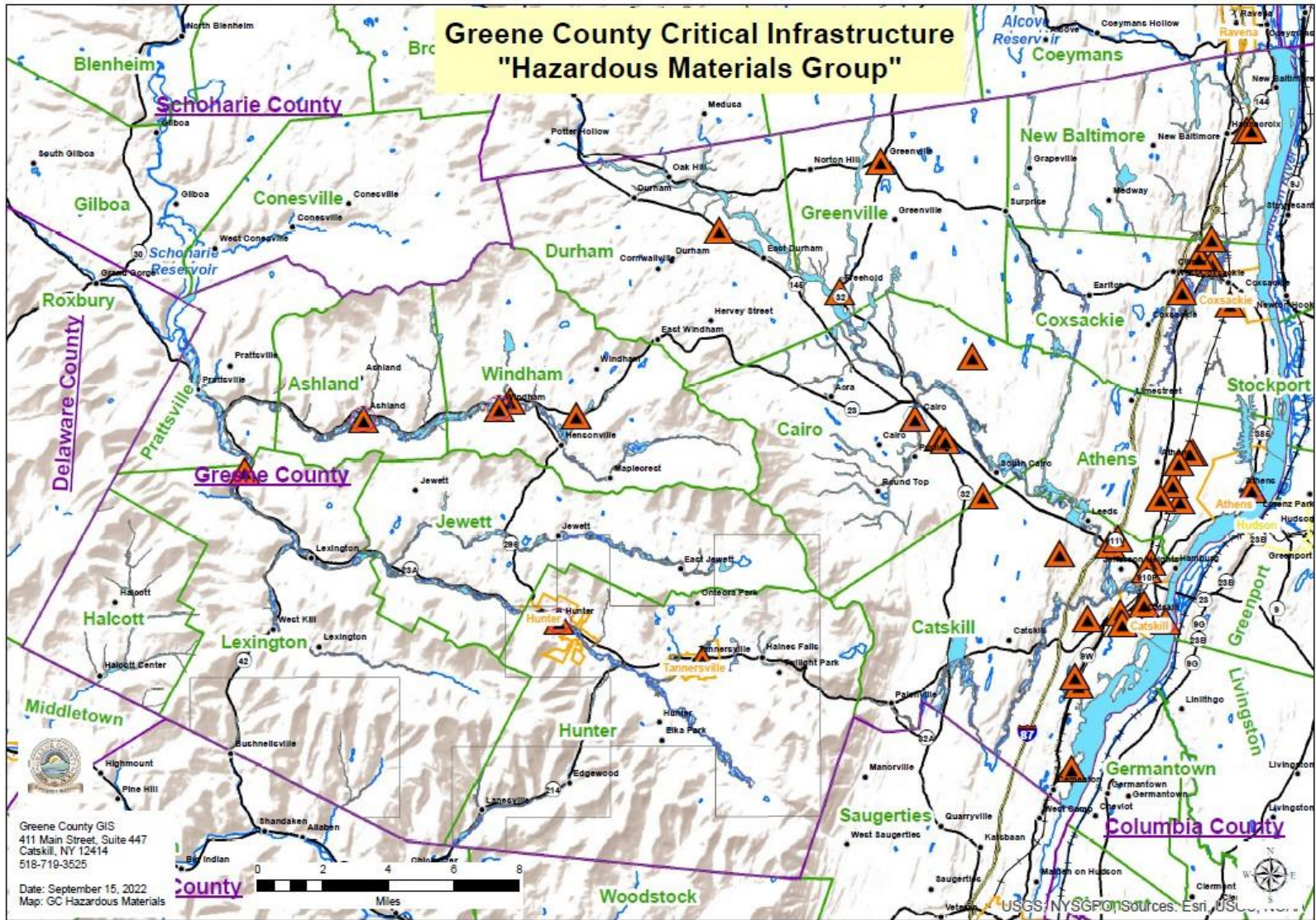






Figure 14: Hazardous Material Map- This map displays the location of Tier 2 Facilities.





## Section 4 - Risk Assessment

The risk assessment process consists of hazard identification, profiling the hazards, identifying community assets at risk; analyze the risk and estimate losses.

The updated risk assessment for the County and participating jurisdictions was conducted using a County and jurisdiction wide approach since most, if not all, of the hazard events are likely to affect numerous jurisdictions within the County and not just a single jurisdiction. The goal of the risk assessment was to review the assessment information in the previous plan and identify if/how the hazards and risks may have changed since the last update.

For the risk assessment, the planning team utilized information contained in the 2022 County Emergency Preparedness Assessment (CEPA) and the results of a Community Survey, which was completed by 398 residents and businesses in the County. The planning team also utilized the three community engagement meetings that were held to obtain additional input from residents and officials regarding hazards and their potential impacts. GIS analysis and FEMA’s Hazus software were also utilized 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 4.3.1 and 4.3.2).

New to the risk assessment process with this update is the inclusion of whole community planning approach. Whole community planning is integral to ensuring *everyone* in the community is safe from the potential impacts of disasters, especially those populations that may be disproportionately impacted and/or are socially vulnerable.

Section 4.1 contains the disaster declaration history; Section 4.2 describes the hazard identification and Section 4.3 profiles the identified hazards and assesses vulnerability.

### 4.1. Presidentially Declared Disasters and Emergency Declarations

As part of the risk assessment, the Planning Team researched the Presidential Declared Disasters (DR) and Emergency Declarations (EM) that have occurred since the last update in 2016. Table 13 below contains the history of the disaster declarations in the County 2016-2022. A listing of Presidentially Declared Disasters and Emergency Declarations prior to 2016 can be found in Appendix A.

*Table 13: Presidentially Declared Disasters in Greene County 2016-2022*

Type of Event	Date of Declaration	Declaration No.	Comments
Blizzard	July 12, 2017 (Incident occurred March 14-15, 2017)	DR-4322	This snowstorm was regarded as the largest snowstorm to impact upstate New York since the Valentine’s Day 2007 Snowstorm/Blizzard. Most areas saw 15-25 inches, with some western parts of the



			area picking up an amazing 30-42 inches of snowfall. The winds brought considerable blowing and drifting of snow along with numerous power outages.
Hurricane Henri	Aug. 22, 2021	EM-3565	Tropical Cyclone Henri spun across eastern New York on Monday, August 23, 2021, producing additional moderate to locally heavy rainfall with Greene County being the hardest hit. Storm total rainfall from Henri spanning August 22nd to 23rd ranged between 4.00 to 7.50 inches across much of Greene County. This additional rainfall on the 23rd led to some incidents of flash flooding across the county.

Source: FEMA (2022) and NOAA/NCEI NCDC

## 4.2 Hazard Identification

For the update to this plan, the planning team collected and analyzed data on the natural hazards that have affected the County since the last update of the plan in 2016 to determine the natural hazards that have affected the area, with the goal of refining the list to reflect only those natural hazards that pose the greatest risk.

The identification of natural hazards involved the following:

- Input from the County
- Input from the jurisdictions participating in the plan
- Input from the Community Survey
- Review of the 2022 CEPA
- Review of the 2019 New York State Hazard Mitigation Plan
- Review of the National Risk Index information for Greene County
- 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 14 below summarizes the process that was used to identify the natural hazards of concern for further evaluation.

Following review of the data, the Planning Team determined that flooding, severe storms, and severe winter storms could lead to a disaster in the County. In fact, based upon recent history and further consideration, as part of the 2022 CEPA update, the County adjusted their Risk Assessment to reflect an increased risk of Flooding, Ice Storms (at least a ½ inch or more) and Severe Wind/Tornado. Below





is an excerpt from the CEPA that shows the Relative Risk Score for the natural hazards that pose the greatest risk to the County.

*Table 14: Excerpt from the 2022 Updated Greene County CEPA Risk Assessment*

Hazard	Likelihood	Consequence	Relative Risk Score
Ice Storms (at least a ½ inch or more)	High	High	16
Hurricanes/Tropical Storm (Wind/Surge and Rainfall)	Medium	High	12
Severe Winter Snowstorms	High	Medium	12
Flooding	High	Medium	12
Severe Wind/Tornado	High	Medium	12

Source: County Emergency Preparedness Assessment (CEPA), Greene County 2022

Based on the data and information contained in the CEPA, the Planning Team grouped the natural hazards by similar impacts, with equal ranking, as follows:

- **Flooding** – Riverine and flash flooding due to rainfall and flooding caused by an ice jam or dam failure.
- **Severe storm/wind event** – 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/ice storm** – Heavy snow, blizzards, sleet, freezing rain, ice storms (at least ½ inch or more), Nor’easters, and extreme cold.

Of note, in the 2016 plan, the Planning Committee had identified two additional hazards: earthquakes and landslides. Upon further consideration by the Planning Team as part of this update, it was decided that these two hazards be removed from consideration in the plan since neither hazard is likely to lead to a disaster in the County and that both therefore present a low risk.

*Table 15: Greene County Hazard Identification*

Hazard	Risk	Determination	Source of Hazard Information
<b>Flooding</b>	High	The Planning Team considers flooding the natural hazard that poses a high risk to the County. Since the last plan update, eight flooding events have occurred in the County.	NOAA/NCEI, NCDC NWS FEMA Greene County Greene County CEPA Planning Team





		<p>Flooding occurs throughout the County with some areas seeing upwards of 4"-6" of rain in recent events.</p>	<p>2019 NYS HMP National Risk Index Community Survey NY GIS Data Clearinghouse</p>
<p><b>Severe Storm/ Wind Event</b></p>	<p>High</p>	<p>The Planning Team considers Severe Storms/Wind Events as posing a high risk to the County.</p> <p>Since the last plan update, 26 Severe Storm events have occurred in the County.</p> <p>Severe storms have occurred throughout the County, and most happen frequently.</p>	<p>NOAA/NCEI, NCDC NWS FEMA Greene County Greene County CEPA Planning Team Community Survey 2019 NYS HMP National Risk Index</p>
<p><b>Severe Winter Storm/ Ice Storm</b></p>	<p>High</p>	<p>The Planning Team considers Severe Winter Storms/Ice Storms as posing a high risk to the County.</p> <p>Since the plan update in, 24 Winter Storm events have occurred in the County.</p> <p>Winter storm events have occurred throughout the County.</p>	<p>NOAA/NCEI, NCDC NWS FEMA Greene County Greene County CEPA Planning Team Community Survey 2019 NYS HMP National Risk Index</p>

Based on the information provided above, the Planning Team determined that the following three hazards would be profiled and assessed for risk for this plan:

- Flooding
- Severe storm/Wind Event
- Severe winter storm/Ice Storm

Other hazards the Planning Team considered but decided not to address in this plan are noted below. The Planning Team will continue to monitor these events and will reassess their risk as part of the next update. The team will also monitor any potential impacts of these hazards due to climate change, which is expected to increase the occurrence of the hazards over time.

- a. Forest fires were considered because two forest fires occurred in the County, but none since the last update in 2016. Since both previous fires were minor and quickly controlled, and neither one was started by natural causes, the Planning Team determined that forest fires would not be profiled for this plan but would continue to be monitored for occurrences. Of note, the 2019 New York State Hazard Mitigation Plan lists Greene County as a High-Risk County for Wildfire.
- b. Drought was considered because the County has experienced moderate drought conditions periodically since the last update, according to NOAA's, National Integrated Drought



Information System. The most significant occurrence was from April 2016 through May 2017 when the county was classified as being in “moderate drought” and “severe drought” for an extended period. However, Greene County has never been included in a declared disaster for drought. As such, the Planning Team decided not to include drought in a plan since the focus is on mitigation and not drought management strategies that focus on preparedness or response.

- c. Extreme heat was considered since there have been 3 occurrences of excessive heat since the last update. There were no injuries or fatalities, but on two occasions the hot air mass provided fuel for thunderstorms that resulted in minor wind damage and some scattered power outages. However, Greene County Emergency Services prepares for and responds to this hazard in the same manner as extreme cold, i.e., there are procedures in place for elderly residents to call-in and/or receive messages about assistance and cooling shelters before, during and after an event, therefore, the Planning Team decided not to consider this hazard for the plan update but will continue to monitor future occurrences.

The participating jurisdictions were asked to review and update their individual annexes, which included ranking the hazards based on the impacts to their jurisdiction and identifying any other hazards that may impact the jurisdiction. No other hazards, other than those noted above, were identified by the jurisdictions. The ranking of the hazards can be found in the Table below, as well as in the Jurisdictional Annexes. Ranking used a scale of 1 to 3, with 1 being the highest risk.

**Table 16: Hazard ranking by Jurisdiction**

Jurisdiction	Flooding	Severe Storm/Wind Event	Severe Winter Storm/ Ice Storm
Ashland	1	2	3
Athens – Town	2	1	3
Athens – Village	1	2	3
Cairo			
Catskill – Town	1	1	1
Catskill – Village	1	1	1
Coxsackie – Town	2	1	3
Coxsackie – Village	1	2	3
Durham	2	3	1
Greenville	2	3	1
Halcott	2	3	1
Hunter – Town	2	3	1
Hunter – Village	1	2	3
Jewett	1	2	3
Lexington	1	3	2
New Baltimore	1	3	2
Prattsville	1	2	3
Tannersville	1	2	1
Windham	2	3	1



## 4.3 Hazard Profiles and Vulnerability Assessment

This section contains the profiles of the three hazards that the Planning Team selected for profiling: flooding, severe storm/wind event, and severe winter storm/ice storm. 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 Repetitive Loss Properties in the County.

### 4.3.1 Flooding

Flooding in Greene County can occur at any time of the year, 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.

#### 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. See Figure 15 below for the watersheds in Greene County.



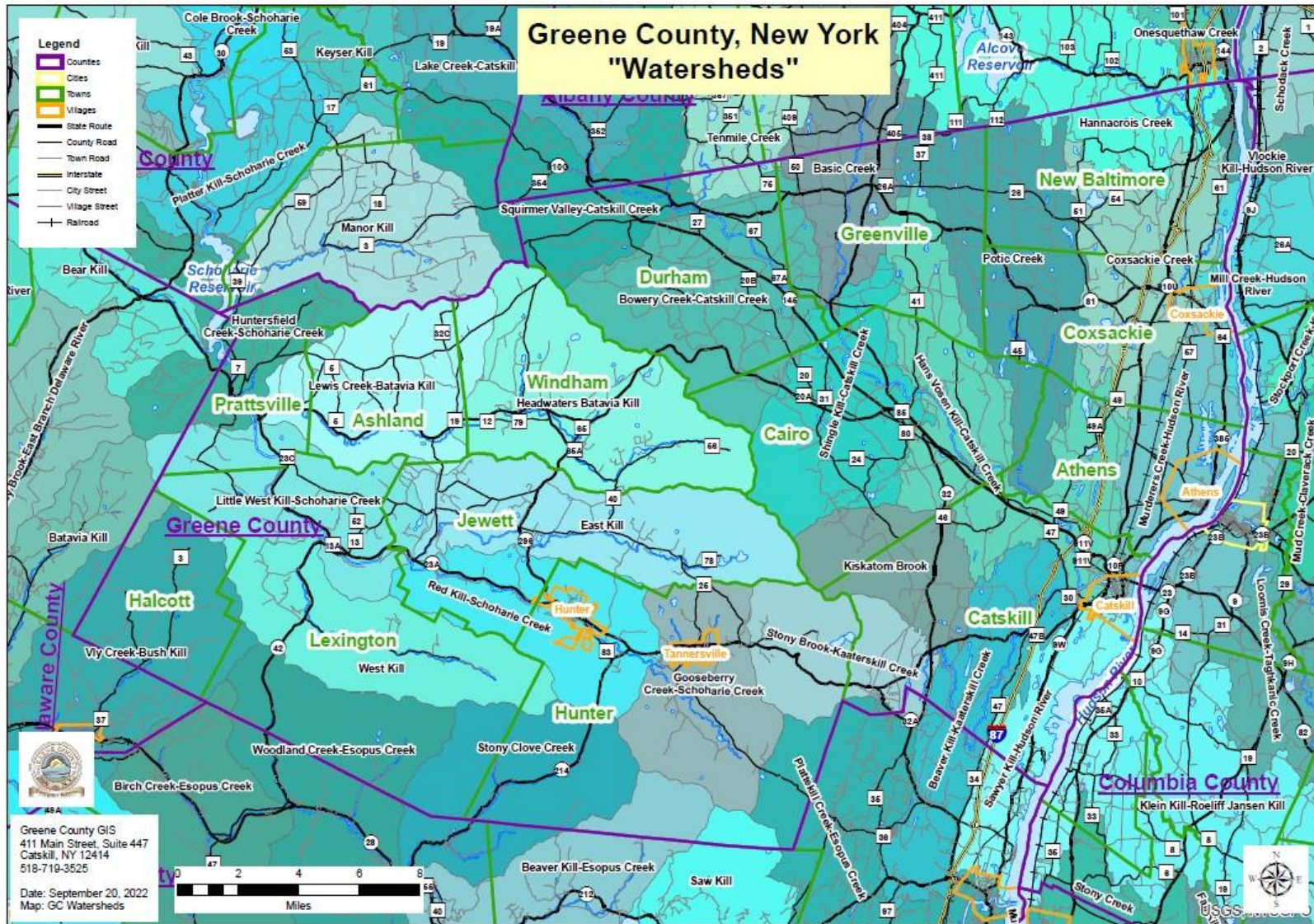


Figure 15: Watersheds in Greene County





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.

Figure 16 below illustrates the regulatory 100-year and 500-year floodplains in the County.

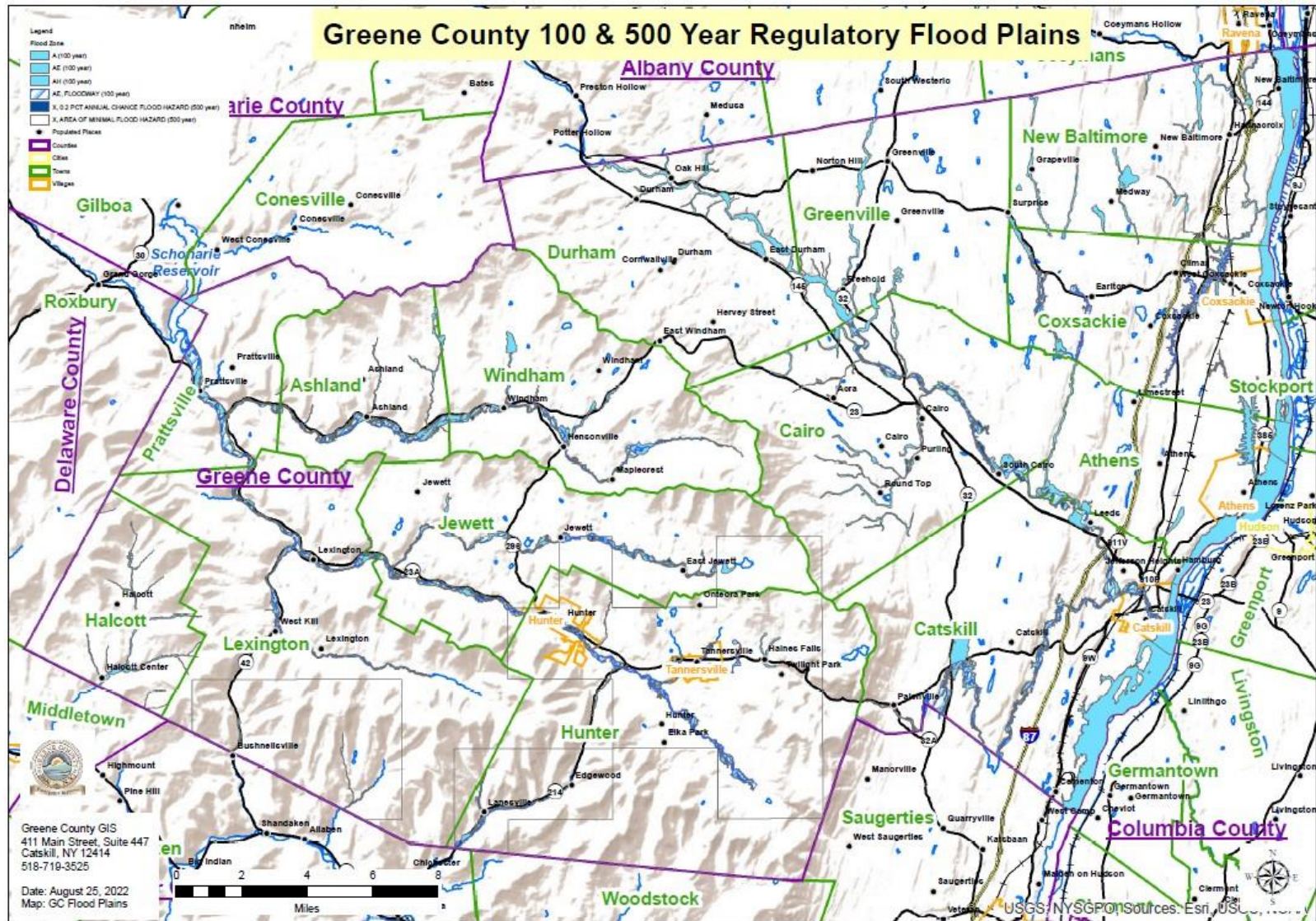


Figure 16: Greene County 100- and 500-year regulatory flood plains



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 90 dams (NYSDEC, NPDP, 2022). See Appendix A for a list of the dams and their hazard classification, location, type, owner, and purpose. The hazard classifications of the 90 dams are Low (62), Intermediate (7), High (7), and No Hazard (14). Figure 17 shows the locations of the dams.



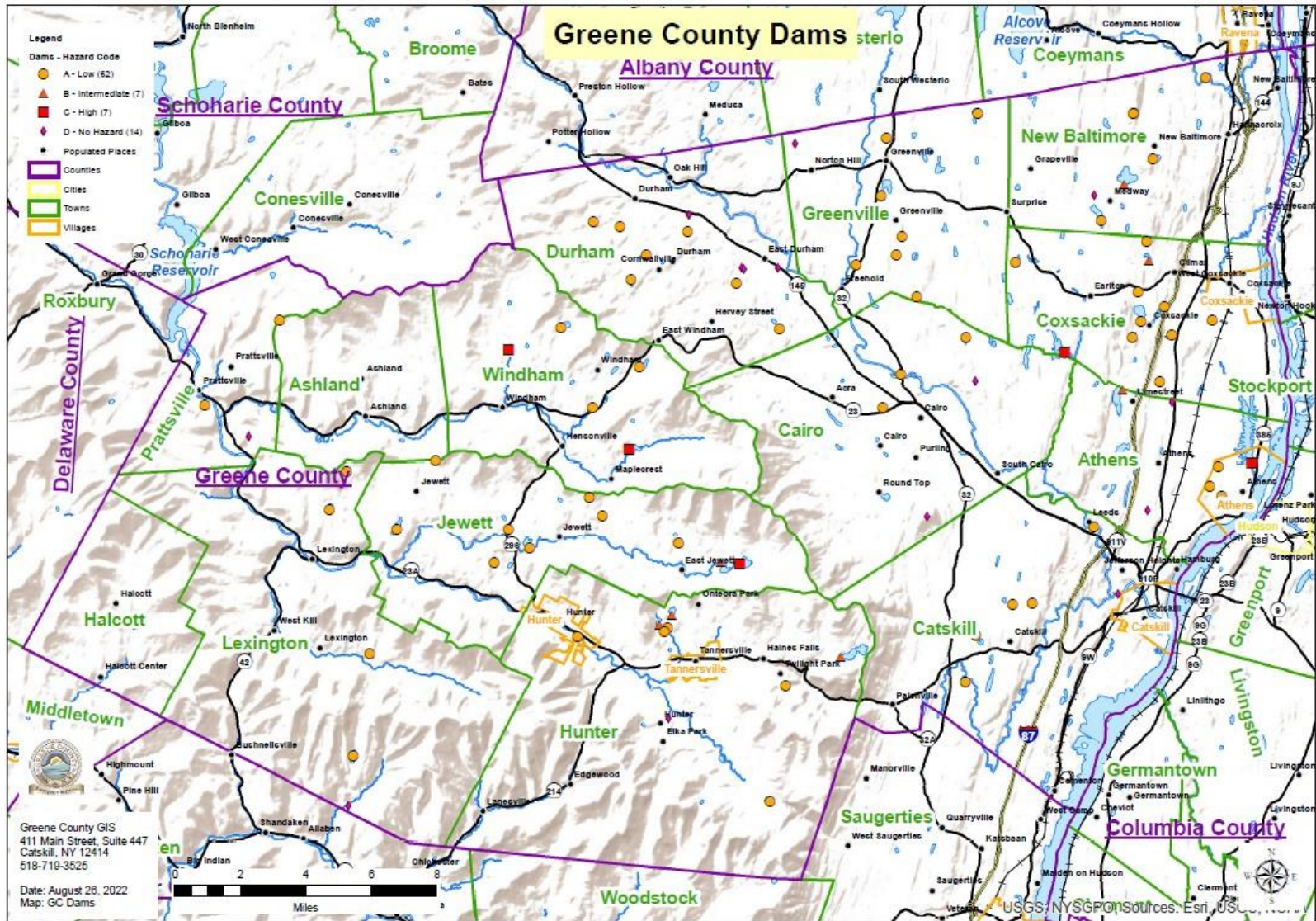


Figure 17: Locations of the 90 dams in Greene County



### 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 earth-fill 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.

### Previous Occurrences

Between 1953 and 2022, Greene County had 103 flooding events (NCDC), leading to approximately \$15 million in property damage. Since the last plan update in 2015, there have been 8 flooding events in the County. Table 17 summarizes the flooding events in the County between the last plan update in 2016 and 2022.

There was one EM declared for flooding since the last plan update. Tropical Cyclone Henri spun across eastern New York on Monday, August 23, 2021, producing additional moderate to locally heavy rainfall with Greene County being the hardest hit. Storm total rainfall from Henri spanning August 22nd to 23rd ranged between 4.00 to 7.50 inches across much of Greene County. This additional rainfall on the 23rd led to some incidents of flash flooding across the county.



**Table 17: Flooding Events in Greene County, 2016-2022**

Date	Affected Location	Type	Deaths	Injuries	Reported Property Damage	Reported Crop Damage
8/3/18	Catskill	Flash Flood	0	0	\$1,000	0
	West Coxsackie	Flash Flood	0	0	0	0
12/25/20	Jewett	Flood	0	0	\$85,000	0
	Spruceton	Flood	0	0	0	0
	Lanesville	Flood	0	0	0	0
	Palenville	Flood	0	0	\$75,000	0
	Prattsville	Flood	0	0	0	0
	Leeds	Flood	0	0	0	0
	Catskill	Flood	0	0	0	0
	West Kill	Flood	0	0	0	0
7/18/21	Prattsville	Flash Flood	0	0	0	0
8/23/21	Kiskatom	Flash Flood	0	0	0	0
	Cairo	Flash Flood	0	0	0	0
	West Coxsackie	Flood	0	0	0	0
9/8/21	West Coxsackie	Flash Flood	0	0	0	0
10/26/21	Hensonville	Flood	0	0	0	0
	Durham	Flood	0	0	0	0
	Cornwallville	Flood	0	0	0	0
	Jefferson Hgts	Flood	0	0	0	0
11/12/21	West Coxsackie	Flood	0	0	0	0
4/7/22	Climax	Flood	0	0	\$20,000	0
	Acra	Flood	0	0	\$20,000	0
	Palenville	Flood	0	0	0	0

Source: NOAA/NCEI, NCDC (2022)

Selected events that have occurred since the plan was updated in 2016 are described below. See Appendix A for descriptions of significant flooding events that affected Greene County before 2016.

**December 25, 2020** - An area of low-pressure tracking from the Great Lakes to Hudson Bay advected in an unseasonably warm air mass into the region from Thursday, December 24 to Friday, December 25, 2020. Rain gradually overspread the region from west to east during the day on December 24 with the steadiest, heaviest rainfall during the overnight hours and early morning hours of December 25. Rain showers continued through the day on December 25 and changed to snow showers during the evening and overnight hours of December 25-26 as colder air returned.





The region still dealt with nearly the entire snowpack from the blockbuster winter storm from December 16-17. While the snow compacted over time, very little water was lost from the snow. Observations concluded that between 1.50 to 3.00 inches of water was in the snowpack prior to this event, most, if not all of which, melted during this event.

Rainfall totals across eastern New York were generally between 1 to 3 inches; however, the eastern Catskills received 4 to 6 inches of rain. These amounts do not include the additional 1.50 to 3.00 inches of water that melted from the snowpack. The combination of warm air, rainfall, and melting snowpack led to aerial and river flooding across the region. There were numerous reports of roads being closed due to the flooding. Local emergency managers had to evacuate a few communities due to the rising waters. Some roads across Greene and Ulster counties were washed out and had to be rebuilt. Two area rivers reached or exceeded moderate flood stage, Esopus Creek and Schoharie Creek.

**August 23, 2021** - The broad circulation of what was once Tropical Cyclone Henri spun across eastern New York on Monday, August 23, 2021, producing additional moderate to locally heavy rainfall with Greene County being the hardest hit. Storm total rainfall from Henri spanning August 22nd to 23rd ranged between 4.00 to 7.50 inches across much of Greene County. This additional rainfall on the 23rd led to some incidents of flash flooding across the county. Greene County was one of the several counties that Governor Andrew Cuomo declared a State of Emergency prior to Henri's arrival. President Joe Biden later approved a pre-landfall disaster declaration.

**October 26, 2021** - A coastal storm brought a prolonged period of moderate rainfall across portions of eastern New York, mainly on Tuesday, October 26, 2021. While the rain was not falling particularly heavily, persistent rainfall rates of 0.25 to 0.50 of an inch an hour occurred for several hours across portions of Ulster, Greene, Schoharie and Schenectady counties. This resulted in rainfall amounts of 2 to 5 inches across the region. Minor flooding began as early as the late morning hours on October 26, but the greatest coverage of flooding occurred during the afternoon and evening hours as roads began to close. Rivers, creeks and streams also began overflowing their banks leading to additional flooding. Rain ended during the overnight hours, slowly allowing water to recede. However, roads damaged by the flooding remained closed into the daytime hours of October 27. Gusty winds between 30 and 40 mph also accompanied the storm which resulted in a few downed trees and some power outages.

New York Governor Kathy Hochul declared a State of Emergency for selected counties across New York State including Greene, Montgomery, Schenectady, Schoharie and Ulster.

**April 7, 2022** - A slow moving frontal system produced widespread heavy rainfall and flooding across eastern New York from April 7-8, 2022. Rainfall amounts between 1.50 and 3.00 inches were common, though a few localized areas received upwards of 4.50 inches. Periods of light to moderate rainfall began during the daytime hours on April 7 with the steadiest and heaviest rainfall arriving during the evening hours on April 7 into the overnight hours on April 8 before ending. This heavy rainfall led to over a dozen rivers to exceed minor flood stage with a few rivers reaching moderate flood stage. For some, it took days after the event for waters to recede.



### Repetitive Loss Properties

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, which is the best available data at the time of the plan update, Greene County has 52 RL properties, mostly in the Towns of Lexington (9), Catskill (7), Prattsville (6), and Hunter (6), and the Village of Catskill (5). Of the 52 properties, 37 are single-family homes, 6 are other residences, which include 2- to 4-family residences and condos, and 9 are non-residential. Table 18 provides a summary of RL properties in Greene County. The number of RL properties in each town or village is included in the Jurisdictional Annexes and Appendix G. Mitigation of repetitive loss properties is very cost-effective and is therefore possible to fund through federal mitigation grant funding. Mitigating repetitive loss properties is a win-win as it reduces the financial burden on the NFIP and prevents repeated suffering for residents.

**Table 18: Repetitive Loss Properties in Greene County as of October 2015**

Type of Property	Number
Residential	37
Other residential*	6
Non-residential	9
<b>Total properties</b>	<b>52</b>
<b>Total claims payouts</b>	<b>\$6,598,703</b>

Source: FEMA Region II  
\*2- 4-family residence or condo

### Probability and Climate Change

Based on historic and recent flood events, the probability of future occurrences in Greene County is high. With 54 flooding events in the last 22 years, the probability of future events is 2.5 floods per year, or greater than a 100 percent chance of flooding in any given year. According to the Fourth National Climate Assessment Report<sup>8</sup> the Northeast has been experiencing increases in rainfall

<sup>8</sup> Fourth National Climate Assessment – US Global Change Research Program (USGCRP): <https://nca2018.globalchange.gov/>



intensity, which has exceeded those in other regions in the United States. This trend is expected to continue, with increases expected in both winter and spring.

This is supported by the 2019 NY SHMP which notes that the increase in historic occurrences, climate change and the rise in sea levels, increases the probability of more frequent flood hazard events. In addition, more frequent and intense flash flooding may occur as a result of climate change.

### **Vulnerability and Impacts**

Flooding is a significant concern for Greene County. There are several components involved in assessing Greene County's vulnerability to the flood hazard – which critical facilities are vulnerable, which areas would suffer the greatest losses (so they can be prioritized for mitigation), and repetitive loss properties that were discussed previously. Potential losses in the county were calculated for riverine flooding for 100-year and 500-year 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. As such, many of the carry over and new mitigation actions contained in the Jurisdictional Annexes will help eliminate or alleviate future flooding impacts due to climate change.

### **Estimated Potential Loss from Flooding**

To estimate potential residential loss from a flood hazard, a Hazus analysis was conducted for riverine and coastal flooding. Table 19 shows the estimated residential building losses in 100- and 500-year flooding event scenarios.

Although it doesn't impact the results, it is worth noting that while Greene County staff were working on this flood analysis, they noticed some issues with it so reached out to the HAZUS team with FEMA. Due to the problems they were having, FEMA uncovered an issue with the program that some census blocks are included in the analysis for the 100-year flood, but then those blocks aren't also included in the analysis for the 500-year flood (when they should be included in both the 100-year and 500-year). This issue is easy to see when you look at the table below for Ashland, Athens Village, and Hunter Village as the 500-year residential losses are less than the 100-year residential losses. According to FEMA, this is something that will likely take them months to remedy in the program, so the information below contains the HAZUS data as-is for now. FEMA did confirm with us that the analysis results are still within the range of uncertainties for the HAZUS analysis, regardless of that issue with some census blocks.





**Table 19: Estimated Potential Residential Building Loss from Flooding**

Jurisdiction		Residential Building Exposure	100-Year Flood Residential Building Losses	500-Year Flood Residential Building Losses
<b>Town</b>	Ashland	\$115,197,000	\$2,471,000	\$2,413,000
	Athens	\$247,071,000	\$164,000	\$364,000
	Cairo	\$723,889,000	\$7,082,000	\$8,961,000
	Catskill	\$827,054,000	\$7,072,000	\$12,135,000
	Coxsackie	\$369,872,000	\$1,191,000	\$1,456,000
	Durham	\$369,189,000	\$2,509,000	\$3,170,000
	Greenville	\$355,893,000	\$611,000	\$1,029,000
	Halcott	\$53,676,000	\$666,000	\$779,000
	Hunter	\$334,192,000	\$7,170,000	\$11,905,000
	Jewett	\$247,708,000	\$5,883,000	\$6,246,000
	Lexington	\$154,949,000	\$6,156,000	\$8,730,000
	New Baltimore	\$322,415,000	\$120,000	\$131,000
	Prattsville	\$84,474,000	\$11,867,000	\$14,158,000
	Windham	\$605,561,000	\$29,519,000	\$32,252,000
<b>Village</b>	Athens	\$217,830,000	\$560,000	\$512,000
	Catskill	\$380,258,000	\$17,955,000	\$22,569,000
	Coxsackie	\$317,114,000	\$2,335,000	\$3,130,000
	Hunter	\$115,800,000	\$8,385,000	\$5,776,000
	Tannersville	\$102,710,000	\$0	\$0
<b>Total</b>		<b>\$5,944,852,000</b>	<b>\$111,716,000</b>	<b>\$135,716,000</b>

Figure 18 below illustrates the 100-year flood residential building loss.

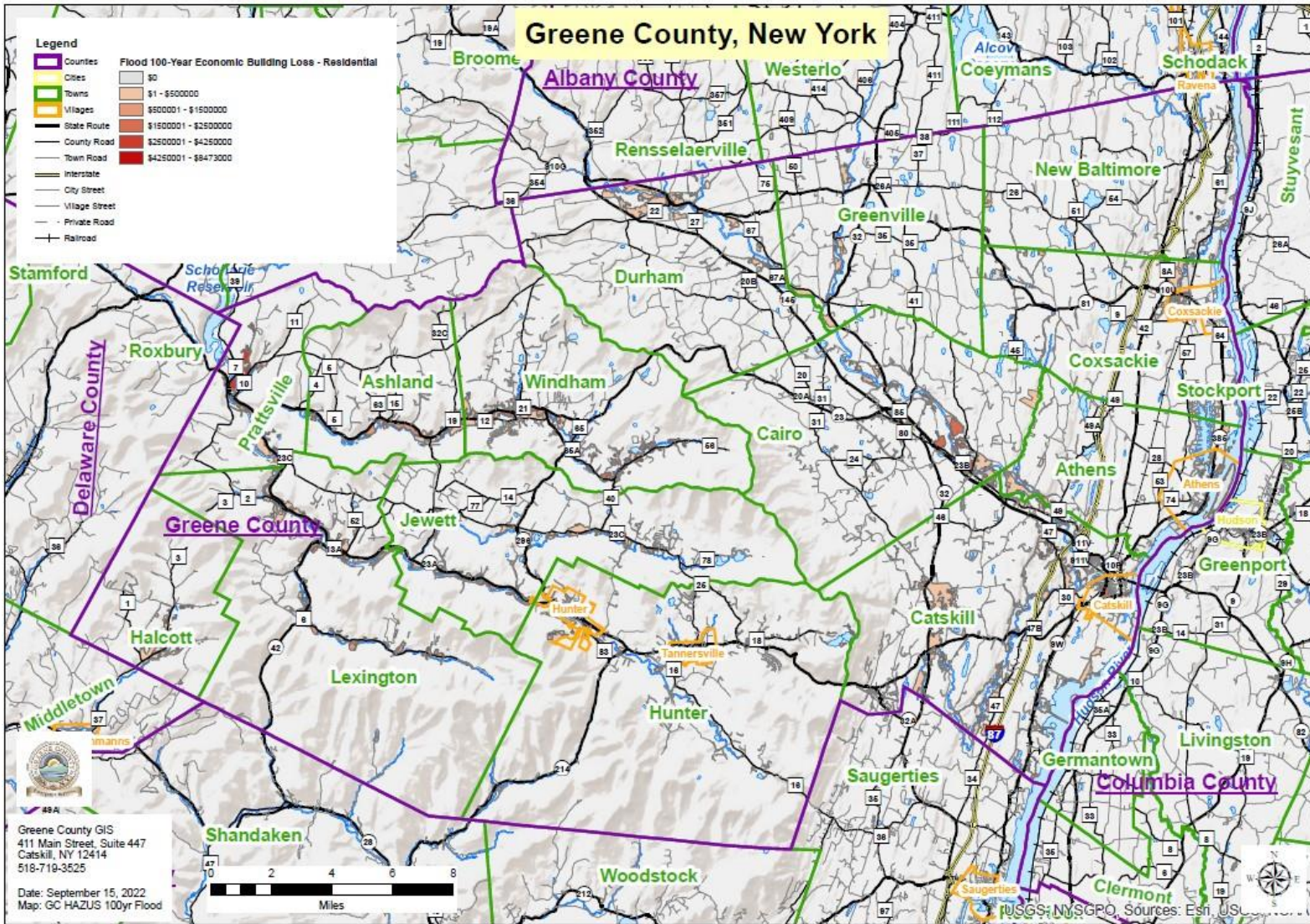


Figure 18: 100-Year Flood Residential Building Loss



### Critical Facilities and Lifelines

A Greene County GIS analysis shows that several critical facilities and lifelines in the County are exposed to the 1-percent-annual-chance (100-year) flood and 0.2-percent-annual-chance (500-year) flood. The table below provides lists the total number of each type of critical facilities and lifelines in the flood hazard areas. More information specific to each jurisdiction can be found in the Jurisdictional Annexes.

*Table 20: Types of Critical Facilities and Lifelines exposed to a 100- and 500- year flood.*

Facility Type	Lifeline Classification	Total Count of Facility Type	# in 100 yr. Flood	# in 500 yr. Flood
Airport	Transportation	6	2	2
Bus Facility	Transportation	7	0	1
Communication Facilities	Communications	20	2	3
Electric Substations	Energy	11	1	2
EMS Stations	Safety and Security	19	3	3
Fire Stations	Safety and Security	34	3	3
Natural Gas Facilities	Energy	7	1	1
Government Facilities	Safety and Security	54	9	13
Highway Facilities	Transportation	26	5	4
Police Stations	Safety and Security	16	1	1
Ports	Transportation	7	6	7
Schools	Food, Water, Shelter	21	1	3
Shelters	Food, Water, Shelter	22	1	1
Tier 2 Facilities	Hazardous Materials	45	4	6
Waste Water Facilities	Food, Water, Shelter	46	11	17
Water Facilities	Food, Water, Shelter	35	13	13
	<b>Totals:</b>	<b>376</b>	<b>63</b>	<b>80</b>

### 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 to 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. Being cut off from such critical services can negatively impact vulnerable populations within the county and put them at higher risk of negative outcomes. Therefore, jurisdictions will work to consciously identify and implement mitigation actions that can alleviate or eliminate the impact to these populations and the community as a whole. For example, critical facilities located in the floodplain and repetitive loss properties are perfect candidates for mitigation to maximize benefits and save lives.





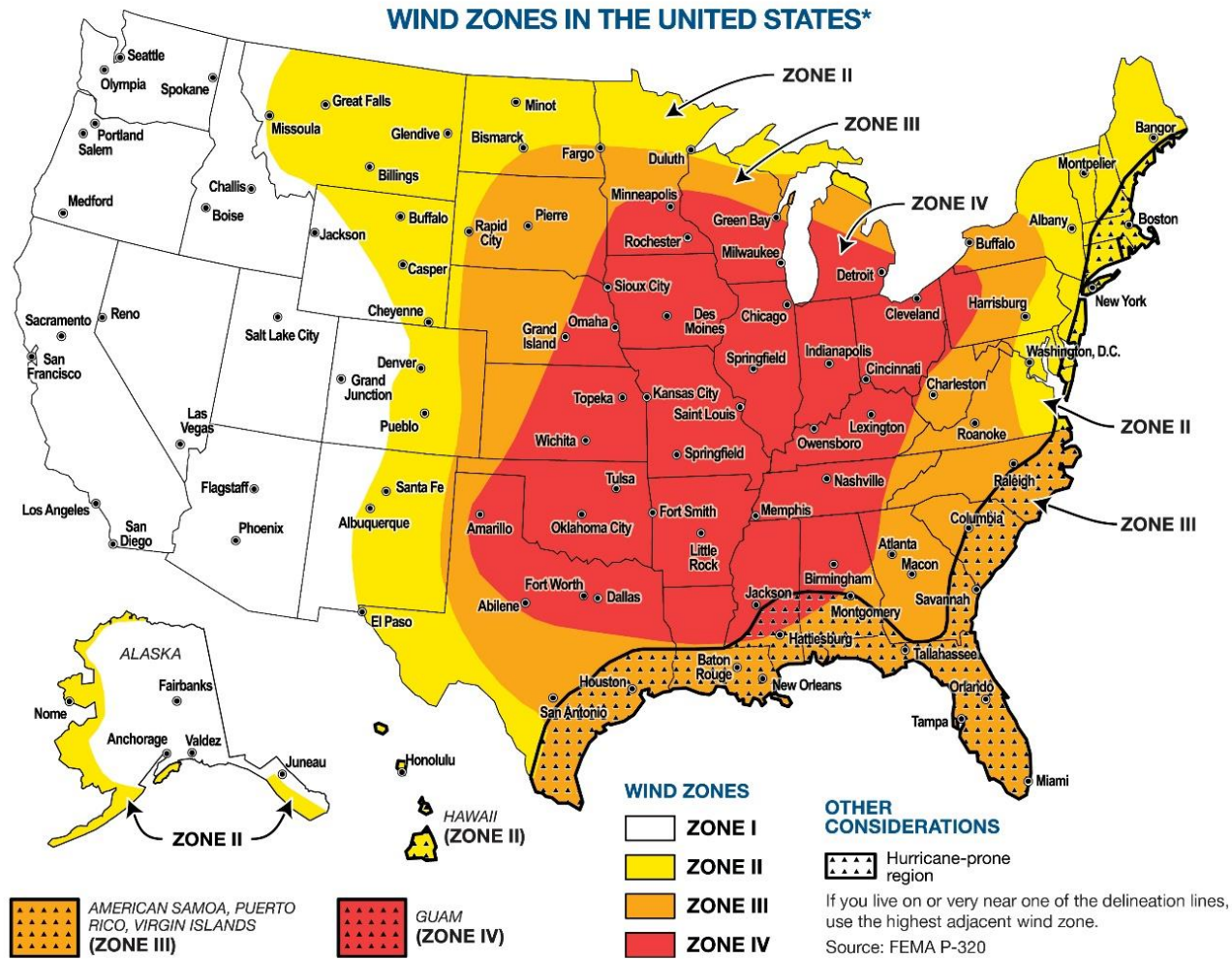
### 4.3.2 Severe Storm/Wind Event

As noted in Section 4.2, Severe storm/wind event includes 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.

#### 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, State Hazard Mitigation Plan, 2019).
- **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 19). Figure 19 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 20 shows the annual mean thunderstorm days each year in the continental United States and shows that Greene County has an average of 18 to 27 thunderstorm days per year.
- **Tornado** – An average of over 1200 tornadoes affect the United States every year. Tornadoes result in an average of 80 deaths and over 1,500 injuries annually. Figure 21 shows tornado activity in the United States between 1995 and 2014, which show New York State experiences between 0 and 9 tornadoes annually. Appendix A describes previous events in detail including Figure A-1 shows the path and damage from the 2003 tornado in Greene County.
- **Hurricanes/Tropical Storms** – Greene County has experienced the indirect landward effects of hurricanes and tropical storms including high winds, heavy rains, and major flooding

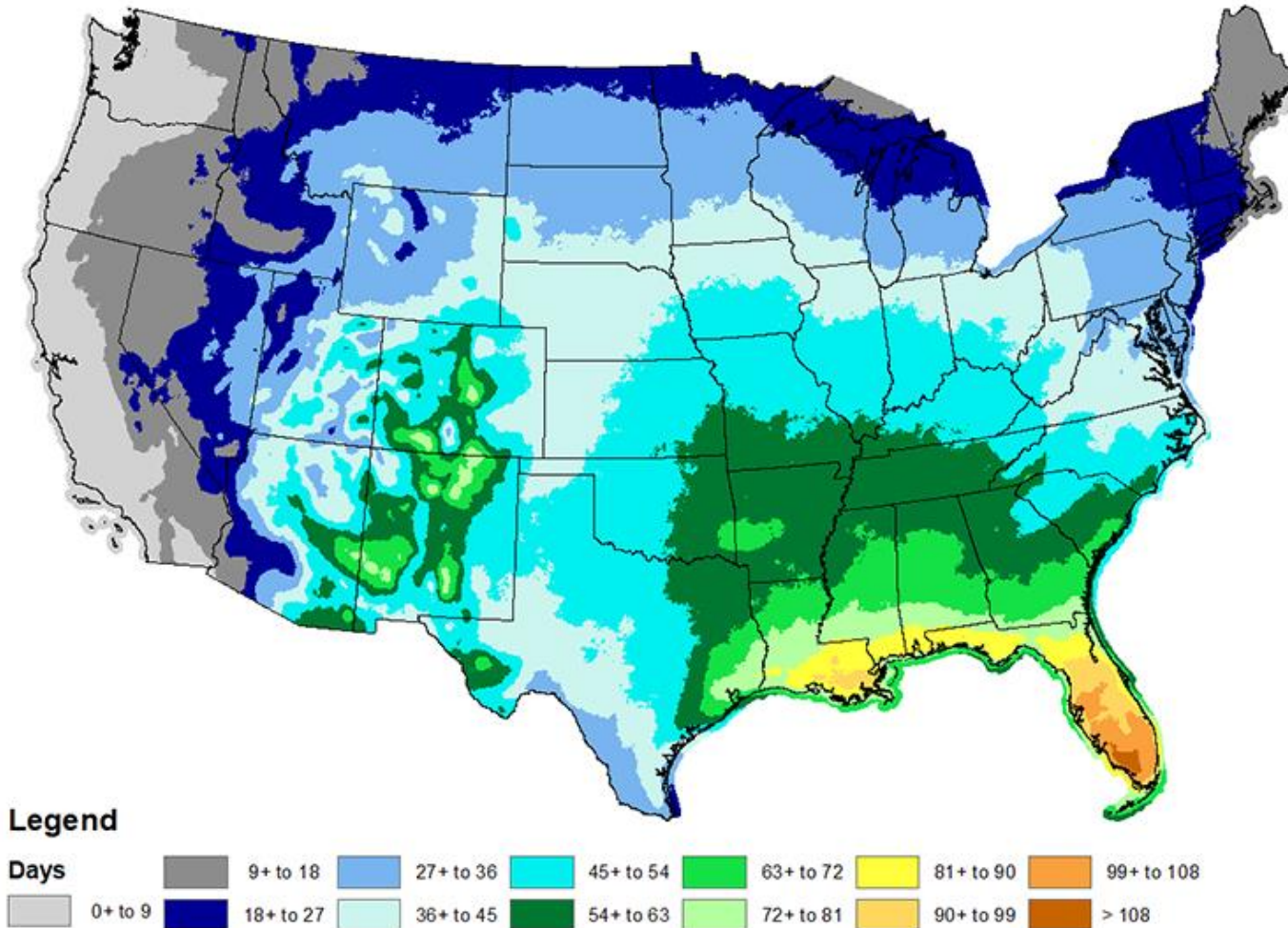


Source: FEMA

Figure 19: Wind Zones in the United States



## Annual Mean Thunderstorm Days (1993-2018)



Source: NOAA

Figure 20: Annual Mean Thunderstorm Days in the US (1993-2018)







### 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 explained in Figure 22.

EF Rating	Wind Speeds	Expected Damage
EF-0	65-85 mph	<p>'Minor' damage: shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled.</p> 
EF-1	86-110 mph	<p>'Moderate' damage: more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged.</p> 
EF-2	111-135 mph	<p>'Considerable' damage: roofs torn off well constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed.</p> 
EF-3	136-165 mph	<p>'Severe' damage: entire stories of well constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark.</p> 
EF-4	166-200 mph	<p>'Extreme' damage: Well constructed homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse.</p> 
EF-5	> 200 mph	<p>'Massive/incredible' damage: Well constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain severe structural damage, trees are usually completely debarked, stripped of branches and snapped.</p> 

Source: NOAA

*Figure 22: Explanation of EF-Scale Ratings*



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 explained in Figure 23 below.

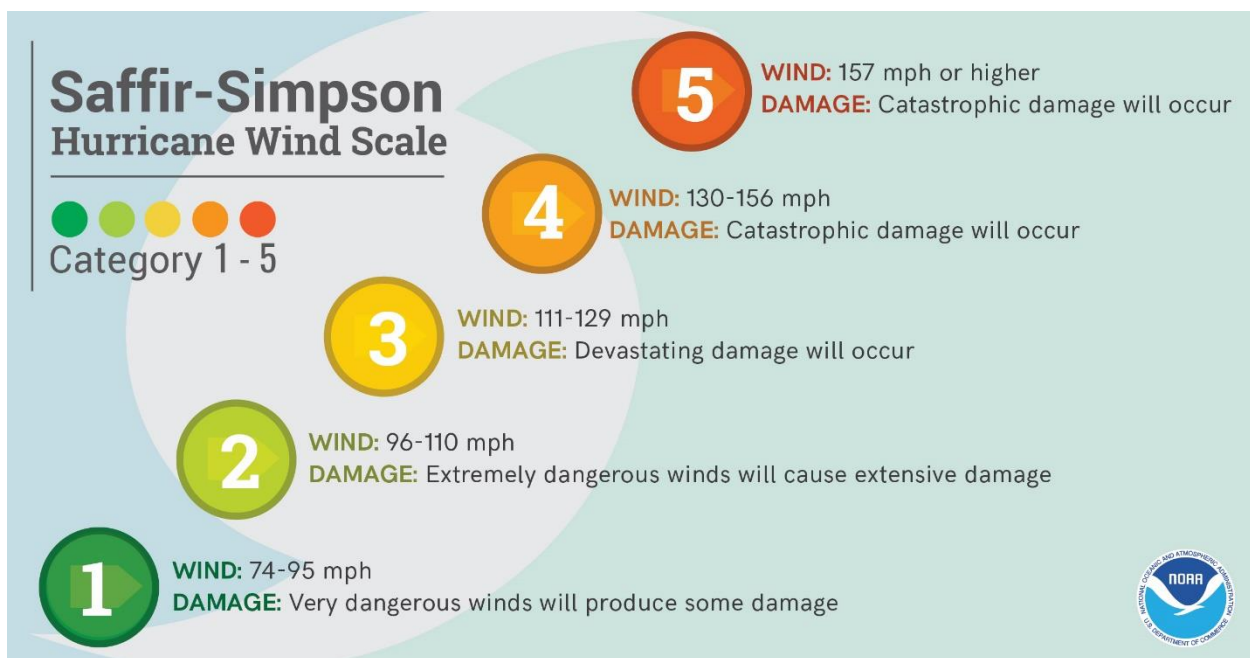


Figure 23: Saffir-Simpson Hurricane Wind Scale used to categorize hurricanes.

### Previous Occurrences

Between 1962 and 2022, New York experienced 60 severe storm-related disasters classified as one or a combination of the following disaster types: severe storm, thunderstorm, hurricane, coastal storms, flooding, high tides, and heavy rain. Greene County was declared a disaster area in 10 of the severe storm-related disasters.

Between 2009 and 2015 there were 27 severe storm events in the County and between 2016 and 2022 there were 26 severe storm events in the County (see Table 21). Five of these events caused





property damage, for a total of \$18,000 in damage; one storm caused \$1,000 in crop damage and one storm resulted in 2 injuries.

**Table 21: Severe Storms in Greene County, 2016-2022**

Date	Affected Location	Type	Deaths	Injuries	Reported Property Damage	Reported Crop Damage
3/16/16	Palenville	Lightning	0	2	0	0
8/13/16	West Cossackie	Thunderstorm Wind	0	0	0	0
	Climax	Thunderstorm Wind	0	0	0	0
2/25/17	Jefferson Heights	Thunderstorm Wind	0	0	0	0
5/31/17	Place Corners	Hail	0	0	0	0
6/30/17	Surprise	Thunderstorm Wind	0	0	0	0
7/12/17	New Baltimore	Lightning	0	0	\$1,000	0
5/4/18	Catskill	Thunderstorm Wind	0	0	0	0
7/27/18	Cossackie	Thunderstorm Wind	0	0	0	0
8/3/18	Halcott Center	Tornado (EF0)	0	0	0	0
6/30/19	Cornwallville	Thunderstorm Wind	0	0	0	0
7/6/19	Catskill	Thunderstorm Wind	0	0	0	0
7/30/19	Catskill	Thunderstorm Wind	0	0	0	0
8/3/19	Purling	Thunderstorm Wind	0	0	0	0
	Catskill	Thunderstorm Wind	0	0	0	0
	Alsen	Thunderstorm Wind	0	0	0	0
8/8/19	Cairo	Thunderstorm Wind	0	0	0	0
	Athens	Thunderstorm Wind	0	0	0	0
10/31/19	Cairo	Thunderstorm Wind	0	0	0	0
4/13/20	Freehold	Thunderstorm Wind	0	0	\$1,000	0



5/15/20	Durham	Thunderstorm Wind	0	0	0	0
	Greenville RNBOW ARP	Thunderstorm Wind	0	0	0	0
	New Baltimore	Thunderstorm Wind	0	0	0	0
	West Coxsackie	Thunderstorm Wind	0	0	0	0
7/27/20	East Durham	Thunderstorm Wind	0	0	0	0
8/23/20	South Cairo	Thunderstorm Wind	0	0	0	0
8/27/20	Halcott Center	Tornado (EF1)	0	0	0	0
8/29/20	Spruceton	Thunderstorm Wind	0	0	0	0
10/7/20	West Coxsackie	Thunderstorm Wind	0	0	0	\$1,000
	Catskill	Thunderstorm Wind	0	0	\$10,000	0
6/21/21	West Kill	Thunderstorm Wind	0	0	0	0
7/7/21	Roberts Hill	Thunderstorm Wind	0	0	0	0
	Coxsackie	Thunderstorm Wind-Straight Line Wind	0	0	0	0
7/27/21	West Coxsackie	Thunderstorm Wind	0	0	\$3,000	0
	Athens	Thunderstorm Wind	0	0	\$3,000	0
9/8/21	Kiskatom	Thunderstorm Wind	0	0	0	0
3/7/22	Cairo	Thunderstorm Wind	0	0	0	0

Source: NOAA/NCEI, NCDC (2022)

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 2016.

**March 16, 2016** - Two campers were injured by a lightning strike near North-South Lake near Kaaterskill Falls in Greene County on Wednesday, March 16th around 6 pm. The two campers, a man and a woman, were camping off a trail in a hemlock grove, when lightning struck a tree about 5 to 10 feet away. The lightning traveled down the tree and towards the camper's tent. The woman lost consciousness and the man may have as well. The woman received superficial burns, but the man received more severe burns, as well as other injuries, and needed to be hospitalized.



**August 3, 2018** - A tornado touched down over southwest Greene County and continued 1.9 miles on the ground towards the northeast for 8 minutes. This weak tornado was approximately 200 feet wide and contained estimated maximum winds of 75 mph. The tornado was rated EF-0. Many trees were snapped and uprooted along the path of this tornado, but there was no observed structural damage associated with this tornado.

**August 27, 2020** - Severe thunderstorms developed along a warm front during the afternoon and two of the storms became quite intense as they tracked from the northern Catskills through the Mid-Hudson Valley and into the Taconics. These storms spawned a brief tornado in a forested area in Greene County, which The National Weather Service confirmed as an EF1. An eyewitness reported about 15 trees with their tops torn off in a forested area on a hilltop at about 2400 feet elevation, which aligned with strong rotation evident on Doppler radar imagery. The maximum estimated winds were 90 miles per hour.

**July 7, 2021** - Strong to severe thunderstorms developed during the afternoon hours. Several reports of downed trees and wires resulted from the severe storms. A microburst was confirmed in Greene County where an estimated 70 to 90 mph winds caused significant damage in the town of Coxsackie. A state of emergency was declared in the town of Coxsackie as a result of the damage.

### Probability and Climate Change

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.

Based on historic and recent severe storm events, the probability of future occurrences in Greene County is high. With 53 severe storm events in the last 13 years, the probability of future events is 4.0 severe storms per year, or greater than a 100 percent chance of severe storms in any given year.

The changing climate is likely to increase the number and intensity of severe storms, including thunderstorms and hurricanes and their associated winds. According to the 2019 NY SHMP, global warming will cause sea level rise and the intensifying of storms, such as hurricanes. However, it's unclear if climate change will have the same influence on the severity and/or frequency of tornado occurrences in NY. Therefore, the overall impacts of climate change on severe storms are difficult to assess given the current understanding and should continue to be monitored.

### 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 and the Jurisdictional Annexes, 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. Flooding can also occur as a result of severe storms and as such, many of the carryover and new mitigation actions contained in the Jurisdictional Annexes will help eliminate or alleviate future flooding impacts due to climate change.

### 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 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. Table 22 shows estimated potential losses for the 100- and 500-year hurricane wind event scenarios by jurisdiction.

*Table 22: Estimated Potential Residential Loss from Hurricanes*

	Jurisdiction	Residential Building Exposure	100-Year Hurricane Residential Building Losses	500-Year Hurricane Residential Building Losses
<b>Town</b>	Ashland	\$115,197,000	\$0	\$411,740
	Athens	\$247,071,000	\$108,490	\$276,890
	Cairo	\$723,889,000	\$122,332	\$980,218
	Catskill	\$827,054,000	\$180,350	\$828,845
	Coxsackie	\$369,872,000	\$133,861	\$362,145
	Durham	\$369,189,000	\$30,180	\$799,430
	Greenville	\$355,893,000	\$54,718	\$752,254
	Halcott	\$53,676,000	\$0	\$92,650
	Hunter	\$334,192,000	\$50,721	\$699,067
	Jewett	\$247,708,000	\$0	\$716,494
	Lexington	\$154,949,000	\$0	\$468,344
	New Baltimore	\$322,415,000	\$152,891	\$431,810
	Prattsville	\$84,474,000	\$0	\$339,754
	Windham	\$605,561,000	\$0	\$1,824,797
<b>Village</b>	Athens	\$217,830,000	\$59,079	\$173,216
	Catskill	\$380,258,000	\$69,006	\$217,563
	Coxsackie	\$317,114,000	\$53,950	\$155,256
	Hunter	\$115,800,000	\$1,493	\$125,933
	Tannersville	\$102,710,000	\$9,269	\$232,504
	<b>Total</b>	<b>\$5,944,852,000</b>	<b>\$1,026,340</b>	<b>\$9,888,910</b>



Figures 24 and 25 illustrate locations that may experience losses due to hurricane wind. Darker colored areas would experience greater wind damage.

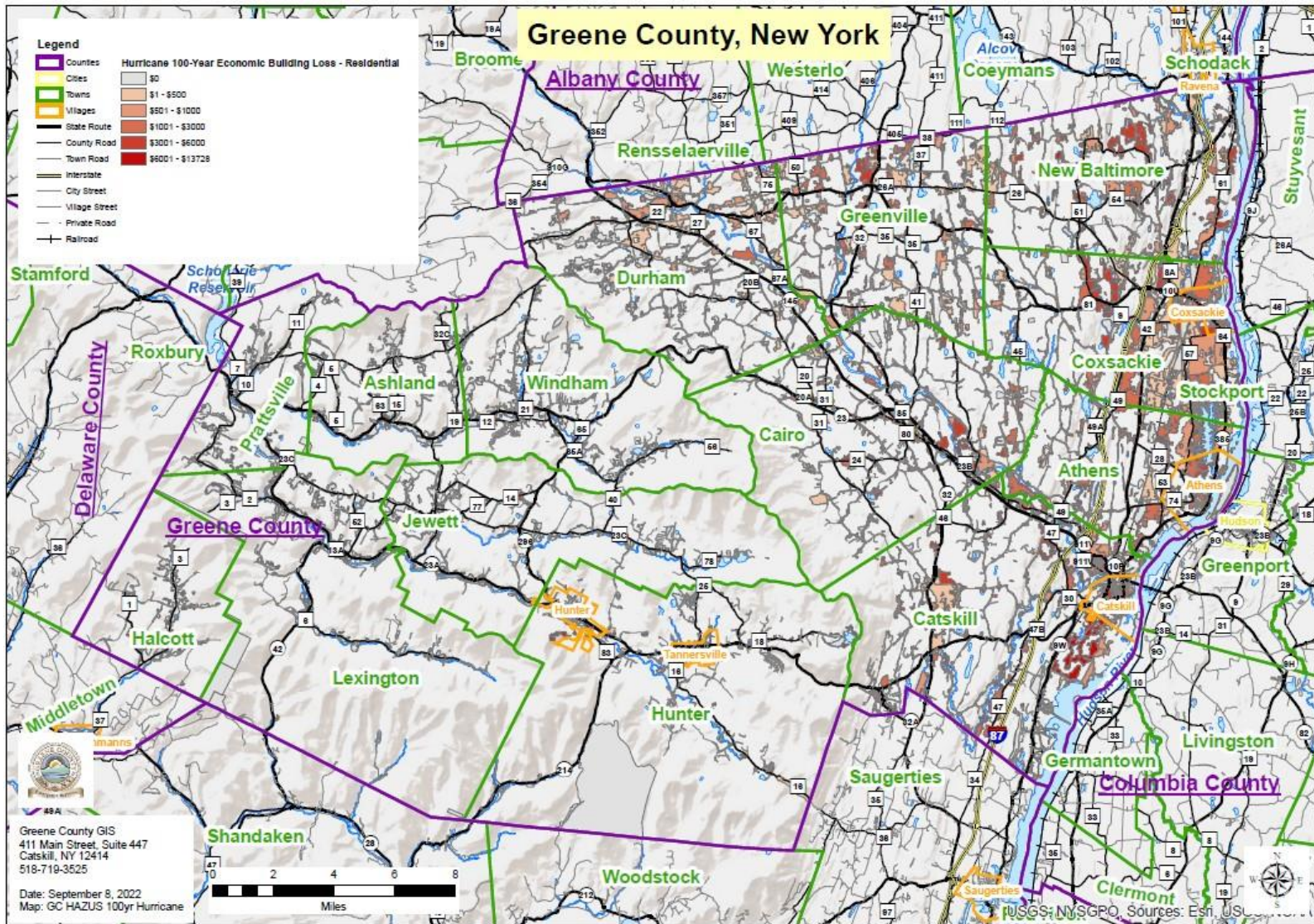


Figure 24: Potential residential building losses in Greene County from a 100-year hurricane



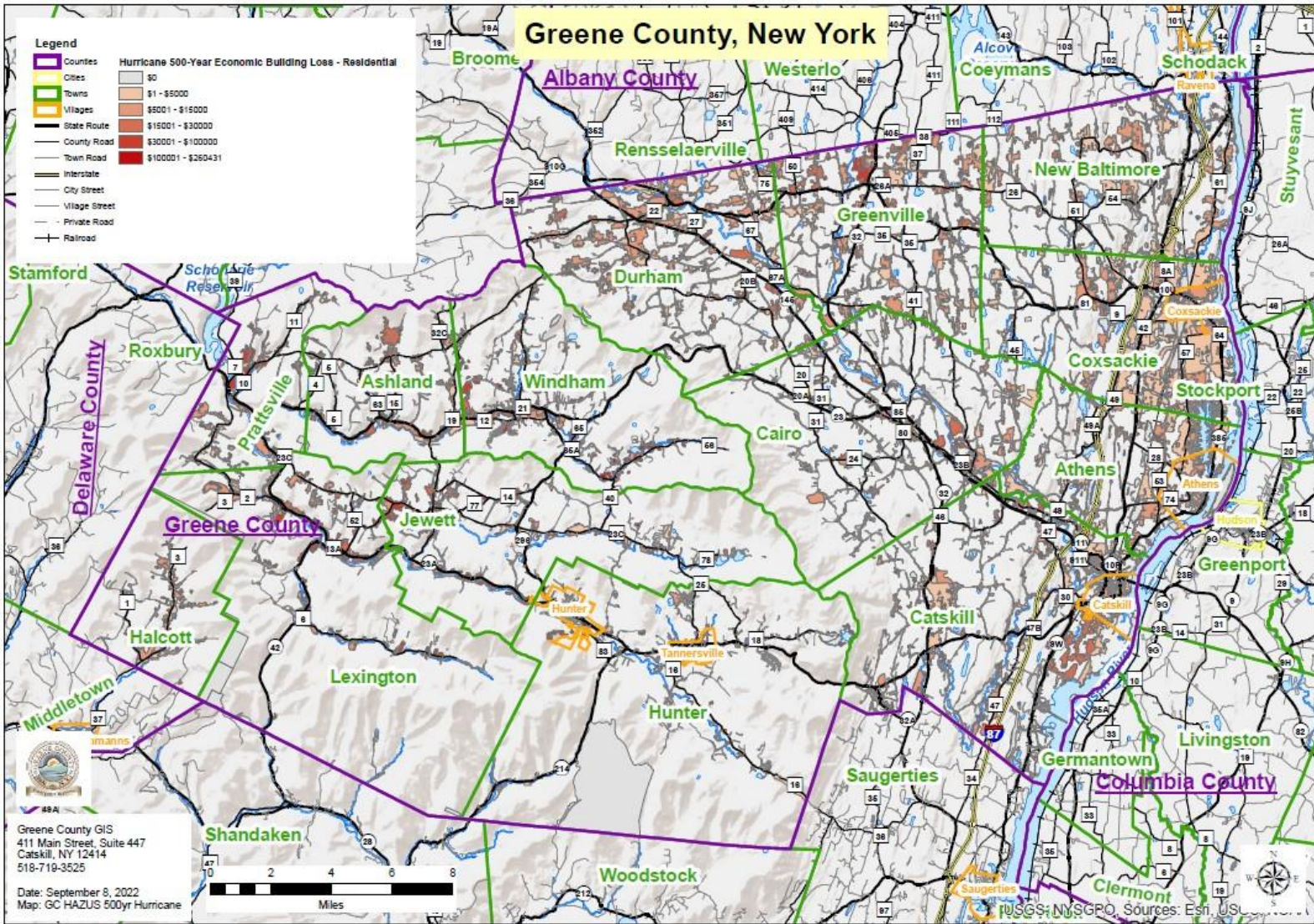


Figure 25: Potential residential building losses in Greene County from a 500-year hurricane



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.

### **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. Straight line winds that are associated with thunderstorms have toppled trees that damaged homes and brought down power lines. The impacts to homes and businesses from severe storms can be felt by everyone, but particularly vulnerable populations and those disproportionately impacted by these types of events. Jurisdictions will continue to work to identify and implement mitigation actions that can alleviate or eliminate the impact of this hazard.

#### **4.3.3 Severe Winter Storm/Ice Storm**

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

##### **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.

##### **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). To aid in determining the impacts of winter storms, the National Weather Service Weather (NWS) recently developed the Winter Storm Severity Index (WSSI) Scale. see Figures 26 and 27 below for the WSSI Scale as well as how it is used. This index is used by the NWS to convey what the impacts may be from a winter storm and how significant they may be. The index accounts for temperature, snowfall, wind, ice, population and location. Including these factors aids in overcoming the misconception that snow totals alone determine a storm's severity. This index should not be used as the sole source of information for winter storms and is not intended to replace other forecast products.

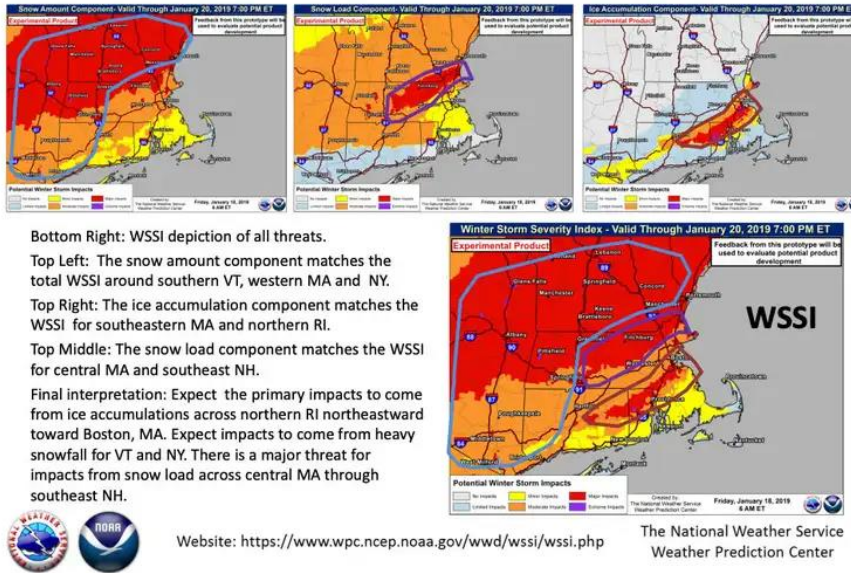


WSSI Descriptor	General Description of Expected Storm Severity and Impacts
None	No snow or ice forecast and no potential Ground Blizzard conditions
Limited	Small accumulations of snow or ice forecast. Minimal impacts, if any, expected. In general, society goes about their normal routine.
Minor	Roughly equates to NWS Advisory Level criteria. Minor disruptions, primarily to those who were not prepared. None to minimal recovery time needed.
Moderate	Roughly equates to NWS Warning Level criteria. Definite impacts to those with little preparation. Perhaps a day or two of recovery time for snow and/or ice accumulation events.
Major	Significant impacts, even with preparation. Several days recovery time for snow and/or ice accumulation events.
Extreme	Historic. Widespread severe impacts. Many days to at least a week of recovery needed for snow and/or ice accumulation events.

Source: NOAA/National Weather Service

Figure 26: Winter Storm Severity Index (WSSI) scale descriptions

### WSSI – How to Interpret (Example)



Source: NOAA/National Weather Service

Figure 27: Example of how to interpret the WSSI





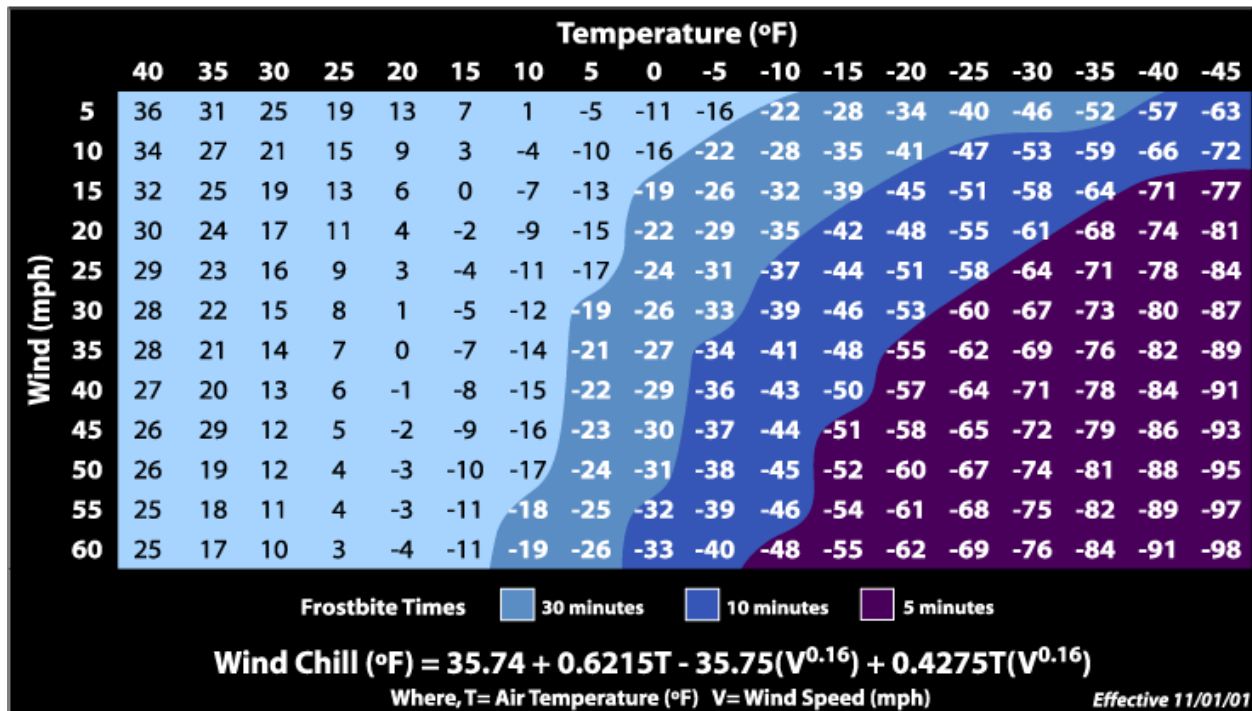
Winter weather can affect New York State as early as October and is usually in full force by late November. Average winter temperatures are between 20 and 40°F and are usually below 0°F more than once each winter.

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 28 below, shows the difference between actual air temperature and perceived temperature and amount of time until frostbite occurs.



### Wind Chill Chart



Source: NWS

Figure 28: Wind Chill Chart



**Previous Occurrences**

Since the 2016 plan update, there have been 24 severe winter storm events in the County (see Table 23). No deaths, injuries, property damage or crop damage were reported for any events.

**Table 23: Severe Winter Storm Events, 2016 - 2022**

Date	Affected Location	Type
2/13/16	Western and Eastern Greene County	Extreme Cold/ Wind Chill
11/20/16	Eastern Greene County	Heavy Snow
2/9/17	Western and Eastern Greene County	Heavy Snow
2/12/17	Western and Eastern Greene County	Winter Storm
3/14/17	Western and Eastern Greene County	Blizzard
1/1/18	Western Greene County	Extreme Cold/ Wind Chill
1/5/18	Western and Eastern Greene County	Extreme Cold/ Wind Chill
3/2/18	Western and Eastern Greene County	Winter Storm
3/7/18	Western and Eastern Greene County	Winter Storm
11/15/18	Western and Eastern Greene County	Winter Storm
1/19/19	Western and Eastern Greene County	Winter Storm
1/20/19	Western Greene County	Extreme Cold/ Wind Chill
1/29/19	Western and Eastern Greene County	Winter Storm
1/30/19	Western Greene County	Extreme Cold/ Wind Chill



2/1/19	Western Greene County	Extreme Cold/ Wind Chill
2/12/19	Western and Eastern Greene County	Winter Storm
12/1/19	Western and Eastern Greene County	Heavy Snow
12/16/20	Western and Eastern Greene County	Heavy Snow
2/1/21	Western and Eastern Greene County	Winter Storm
1/14/22	Western Greene County	Extreme Cold/ Wind Chill
1/16/22	Western and Eastern Greene County	Winter Storm
2/25/22	Western and Eastern Greene County	Winter Storm
3/12/22	Western Greene County	Winter Storm
4/18/22	Western Greene County	Winter Storm

Source: NOAA/NCEI, NCDC (2022)

Selected recent events since the plan was updated in 2016 are described below. Significant severe winter events that impacted Greene County before 2009 are described in Appendix A.

**March 14, 2017** - A very significant coastal snowstorm impacted the region March 14 through 16, featuring extremely heavy snowfall and blizzard conditions. The bulk of the snowstorm occurred during the day on Tuesday, March 14th. This snowstorm was regarded as the largest snowstorm to impact upstate New York since the Valentine’s Day 2007 Snowstorm/Blizzard. Most areas saw 15-25 inches, with some western parts of the area picking up an amazing 30-42 inches of snowfall. The snow fell at 1 to 4 inches per hour for much of the day. There was a widespread extreme public impact, with many roads severely impacted and schools closed for two days. A state of emergency was issued for all New York Counties, and tractor-trailers were banned on most area interstates. Numerous counties issued travel bans on county roads. Much of the train service across the region was cancelled, and all flights were grounded at Albany International Airport. According to media reports, total statewide government costs for response and recovery from the storm were \$31.4 million, allowing the state to qualify for a federal disaster declaration. In addition to the snowfall, gusty winds up to 45 mph resulted in near-zero visibility and blizzard conditions across the Mid-Hudson Valley, Catskills, Capital District, Taconics, and Lake George-Saratoga Region. The winds brought considerable blowing and drifting of snow along with numerous power outages. Although the most severe impacts from





the storm occurred on March 14, periods of light snow and blowing snow continued to affect the region through the early morning hours of March 16.

**January 5, 2018** - A deep upper-level trough swept across the southern US and turned northeastward offshore of the east coast from the morning of January 3 through the morning of January 4, 2018. As the system pulled away, brutally cold Arctic air rushed southward into New York, resulting in an extended period of extremely cold conditions from January 5 through January 7. The coldest wind chills occurred during the mornings of January 6 and 7, when frigid air combined with westerly winds gusting to 30-40 mph resulted in widespread wind chills as low as 20 to 40 degrees below zero. High temperatures on January 6 were mainly in the single digits above and below zero. Many warming shelters were opened across the state.

**February 1, 2019** - An arctic airmass that had infiltrated the region during the last two days of January persisted into the morning of February 1st. Wind chills fell to 15 to 35 degrees below zero. The wind chills prompted many schools to close or delay opening.

**February 25, 2022** - An area of low pressure pushed across the region during the morning and early afternoon hours on Friday, February 25, 2022, producing a period of snow, heavy at times, with sleet and freezing rain mixing in at times for portions of the eastern Catskills and mid-Hudson Valley. Snowfall amounts ranged from as low as 2 to 4 inches (common in parts of the mid-Hudson Valley) to as much as 6 to 9 inches elsewhere. The heaviest snow fell at the time of the morning rush hour with snowfall rates in excess of 1 inch per hour at that time, resulting in significant impacts including several vehicle accidents with some minor injuries reported.

The New York State Thruway reduced its speed limit to 45 mph during the early morning hours due to the difficult travel conditions. Many area colleges and universities cancelled or delayed classes. Dozens of outgoing and incoming flights were cancelled at Albany International Airport.

The snowstorm led to the issuance of snow emergencies for some municipalities including Kingston, Catskill, Athens, Greenport, Cairo and Chatham.

Key impacts: travel delays, vehicle accidents, flight cancellations, school closures.

### **Probability and Climate Change**

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 76 events in 13 years, the probability of future events is approximately 5 to 6 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 snowstorm 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.



According to the 2019 NY SHMP, it is difficult to determine the impact of climate change on severe winter storms, ice storms and extreme cold. The data that is currently available is either limited or inconclusive for these types of events, therefore, these types of events should continue to be monitored.

### **Vulnerability and Impacts**

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, as described in Section 3 and the Jurisdictional Annexes, are vulnerable. The elderly population is most vulnerable and therefore Greene County Emergency Services has a process to both proactively call the elderly and monitor their condition, and for the vulnerable population to call for support. Other preparedness procedures include closing down senior centers and distributing food packages. Power outage at critical facilities hampers the ability to respond; therefore, backup power at fire stations and police stations is critical.

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 community 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. 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.

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. As such, some of the carry over and new mitigation actions contained in the Jurisdictional Annexes will help eliminate or alleviate future impacts due to climate change.

### **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. Severe winter storms can also cause property damage due to toppled trees or roof collapse. Impacts to critical infrastructure, including utilities, can cause school and business closures, as well as life safety issues. The most vulnerable population in severe winter storms are the elderly and homeless. As such, jurisdictions have preparedness processes in place to provide support to these populations.



## Section 5 - Capability Assessment

The capability assessment looks to identify polices, programs, authorities, staff and funding resources available to help determine the ability of a jurisdiction to implement a mitigation strategy. The actions taken to develop a capability assessment help 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 to carry out the prioritized mitigation actions.

As part of the plan update process, jurisdictions were asked to update their capabilities in Planning and Regulatory; Administrative and Technical; Financial and Education Outreach. Specifics on the capabilities of the County and each municipality are provided in the Jurisdictional Annexes.

### 5.1 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.

All of the towns and villages in Greene County participate in the NFIP. Based on information received from the NYSDEC, between the last plan and August 9, 2022, Greene County filed 21 flood-related claims, and the payouts to the County totaled over \$370 thousand. In addition, the number of policies in the County decreased by 194. The drop in policy numbers was seen in most communities and neither DEC nor the County can provide an explanation for what drove the decrease in policies. However, one theory is that a portion of real estate transactions in the past few years, driven in large part by the pandemic, were cash deals and therefore since there was no mortgage people may have not taken out a policy.

Table 24 provides the number of current policies, total claims made and the total claims payouts as of August 9, 2022, in Greene County by jurisdiction.

*Table 24: NFIP Policy and Claim Information for Greene County by Jurisdiction*

	Jurisdiction	Number of Policies	Number of Claims	Total Claims Payouts
<b>Town</b>	Ashland	11	13	\$353,473.85
	Athens	1	5	\$154,647.84
	Cairo	28	44	\$562,020.70





	Catskill	47	132	\$4,734,536.79
	Coxsackie	3	3	\$11,398.88
	Durham	13	14	\$222,436.08
	Greenville	5	2	\$67,611.00
	Halcott	3	2	\$18,826.39
	Hunter	14	28	\$308,311.38
	Jewett	18	26	\$356,958.29
	Lexington	28	52	\$1,180,727.63
	New Baltimore	13	6	\$32,422.06
	Prattsville	35	98	\$4,341,211.67
	Windham	68	49	\$2,746,214.75
<b>Village</b>	Athens	9	23	\$725,254.35
	Catskill	51	40	\$2,423,114.66
	Coxsackie	15	15	\$251,480.03
	Hunter	18	26	\$225,872.27
	Tannersville	13	27	\$233,346.40
	<b>Total</b>	<b>393</b>	<b>605</b>	<b>\$18,949,856.02</b>

Source: DEC (2022)

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*).

## 5.2 Evacuation Routes and Emergency Shelters

The County does not currently have a county-wide evacuation plan except for dam specific routes detailed in the evacuation plan for each dam. Evacuation and emergency sheltering are addressed in the Comprehensive Emergency Management Plan, especially in the Sheltering Plan (included in Appendix E). Greene County has 20 formally identified shelter locations. All but two locations are operated by the American Red Cross. In addition, Greene County has a pet sheltering plan with pre-identified potential pet shelter locations.

## 5.3 Displaced Residents Plan

The County has identified potential locations to be used as Intermediate Term temporary housing locations, where mobile homes could be placed for a period while long-term housing solutions are developed for displaced residents. Not all communities have an identified location, which is due to available land and/or geography. All identified locations are above the flood plain for the given area and have access to electricity, water, and sewer services.



As each situation is unique, the best housing solution may lie outside of the resident's home jurisdiction. Recovery staff should consider all factors affecting the population before deciding on a location. Specifically, the following items should be evaluated.

1. Access to recovery services for the residents.
2. School district- attempt to keep children in their same school district
3. Ease of utility connections
4. Public Transportation Routes- If affected population usually utilize public transportation, attempt to keep the temporary housing location along public transportation routes.
5. If affected population is comprised of specific Cultural or religious or ethnic groups, attempts should be made to ensure those groups remain together in the temporary housing solution.

Appendix F contains the full list of locations that have been identified by the County.

#### **5.4 List of Potential Funding Sources for Mitigation**

The Federal government offers a wide range of funding and technical assistance programs that communities can access. 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. In addition to federal funding sources, there are also state and local funding sources that are available to communities to aid them in their mitigation efforts. A full list of resources can be found in Appendix D.



## Section 6 - Mitigation Strategy

The Greene County updated mitigation strategy emerged as a result of the discussions held during Core Planning Team meetings, results of the Community Survey, a review of the previously proposed mitigation actions, and a review of existing resources and capabilities. In addition, members of the planning team worked closely with jurisdictions to assist them in updating their annexes, which included updating their mitigation strategies.

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. Mountaintop communities were especially affected in Irene and have conducted Local Flood Analyses to define and address the flooding problem.

Each jurisdiction's individual Annex contains the status of mitigation actions from the 2016 plan; previous mitigation actions that were completed; all proposed mitigation actions (both carried forward and new) as well as a minimum of two Action Worksheet for proposed mitigation activities in accordance with NYS Hazard Mitigation Planning Standards. The full list of Mitigation Actions from 2016 and for 2022 can be found in Appendix H.

### 6.1 Mitigation Goals

The Planning Team reviewed the 2016 goals and decided to keep them, with a slight modification, since they are still relevant for this update. 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, infrastructure and lifelines 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.

### 6.2 Mitigation Alternatives Considered

A wide range of potential mitigation actions were considered for each of the identified hazards by the County and each Town/Village. Mitigation alternatives for forest fires are included for general awareness since that hazard was considered during hazard identification.





The list below is developed by simplifying and adapting what's in the 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.

**All-Hazards** (floods, severe storms/wind events, severe winter storms/ice storms)

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.

## **Floods**

Note about all flood mitigation projects: The NYS DHSES Hazard Mitigation Planning Standards emphasize that flood mitigation projects protect critical facilities to a 500-year flood event or the actual worst-damage scenario, whichever is greater, in addition to conforming to other applicable State and local regulations.

*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.

*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 in previous sub-section.

*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.

### **Severe Storms/Wind Events**

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

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

### **Severe Winter Storms/Ice Storms**

Mitigation of damages from winter storms also comprises of adopting and enforcing building codes, so that future development is safe (which is being practiced by most Towns and Villages), and retrofitting existing buildings and infrastructure, focusing on critical facilities.

For existing buildings, especially older ones, mitigation may mean improving insulation, relocating water lines from outside walls to interior spaces, and insulating water lines in crawlspaces and under elevated buildings.

Burying utility lines is a retrofitting measure that addresses the ice that accompanies winter storms. Installing or incorporating backup power supplies minimizes the effects of power losses caused by downed lines.

### **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 like Town of Jewett are encouraging and enforcing building code, development code, stormwater management regulations and floodplain regulations that support reducing flooding risk.

*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.





### 6.3 Selection and Prioritization of Mitigation Actions

This section summarizes the types of mitigation actions proposed for implementation 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.

Overall, the County is still working towards the goal of disaster resilience, which was started with the 2016 planning process. The plan update makes attempts to maintain connection with the previous plan and describes the status of previous actions for each participating municipality in the Jurisdictional Annexes, many of which have been continued in the plan update.

The relatively large number of flood mitigation actions proposed in the Greene County mitigation strategy reflects the recommendations that were made as part of the Local Flood Analysis that were conducted for many communities. Actions determined to be appropriate for the plan were discussed during planning 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 discussed during meetings relative to their potential benefit of effectiveness in saving lives, protecting the natural environment, and reducing disruption and damage.

The above-mentioned prioritization criteria were applied subjectively by the town or village, or County department who assigned relative priorities (high, medium, low) to the actions that they're responsible for.

The mitigation strategy proposes actions reflecting the commitment of the County and all participating jurisdictions to comply 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
- Acquiring and demolishing residential and commercial properties at risk of flooding

Carry-over action 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.



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. Actions related to the hazards determined to be much less likely than flooding to occur and/or to lead to considerably less damage than flooding were identified as being low priority actions.

## **6.4 Mitigation Actions for the County and Jurisdictions**

As previously noted, as part of the planning process each jurisdiction was asked to review their jurisdictional annex as well as their mitigation actions that were part of the 2016 plan. Participating jurisdictions, and the County, reported on the status of those mitigation actions and identified if they were Complete; In Progress/Ongoing; Delayed/No Progress or No Longer Relevant. The jurisdictions also identified whether they wanted to include the action in this update. A table containing the updated status of each of the 2016 mitigation actions is contained in each of the jurisdictional annexes.

The actions that were identified to be included as part of the update formed the basis for the 2022 Mitigation Action Plan for the County and its jurisdictions. In addition to the carry over actions, many jurisdictions also identified new mitigation actions to be implemented over the next few years. The combination of these actions makes up the 2022 Mitigation Action Plan. The actions for each jurisdiction are contained in their jurisdictional annexes along with a minimum of two mitigation action worksheets in accordance with NYS Hazard Mitigation Planning Standards.



## Section 7 - Plan 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 section also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

Given that this is multi-jurisdictional plan, Greene County Emergency Services will lead the implementation efforts at the County level and will work the Planning Team and municipalities on the various strategies noted in this section

### 7.1 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 jurisdiction's goal to assimilate mitigation strategies into the day-to-day functions and priorities.

At the County level, integration is envisioned through the following actions:

- 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
- 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 emergency preparedness and response actions (e.g., purchase of generators or a new radio system) into Greene County Comprehensive Emergency Management Plan

At the municipal level, individual towns and villages will continue to incorporate hazard mitigation principles (e.g., stormwater runoff reduction) and enforce building code, development code and floodplain regulations, as noted in the Jurisdictional Annexes.





## 7.2 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.

### Monitoring

Greene County Planning Team, led by Greene County Emergency Services, is 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 barriers experienced and how implementation strategy can be adjusted.

### Evaluation

The Greene County Planning Team will complete a Hazard Mitigation Progress Report to evaluate the status and accuracy of the plan and record the Team's review process. Greene County Emergency Services will maintain a copy of these records.

One month after conducting the annual monitoring of mitigation actions, the Greene County Emergency Services will schedule an annual meeting of the Planning Team 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 the 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?

Greene 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 3 weeks. Documentation of the annual evaluation meeting will be maintained by Emergency Services. 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.

### **Update**

This Plan must be updated within 5 years and again adopted by the County and participating jurisdictions 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.

### **Continued Public Involvement**

Greene County Emergency Services will provide printed copies of the plan to key Greene County departments as 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. The County will also consider conducting an annual survey, that would help evaluate if/how the public's responses change over time.

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



## Acronyms

BFE	Base Flood Elevation
BRIC	Building Resilient Infrastructure and Communities
CEMP	Comprehensive Emergency Management Plan
CEPA	County Emergency Preparedness Assessment
CRF	Code of Federal Regulations
CRS	Community Rating System
DEC	Department of Environmental Conservation
DHSES	Department of Homeland Security and Emergency Services
DR	Declared Disaster
EF	Enhanced Fujita (Scale)
EM	Emergency Declaration
EMS	Emergency Medical Services
EOC	Emergency Operations Center
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
NCDC	National Climate Data Center
NCEI	National Centers for Environmental Information
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NPDP	National Performance of Dams Project
NWS	National Weather Service
NYS	New York State
RFC	Repetitive Flood Claims
SFHA	Special Flood Hazard Area
SHMP	State Hazard Mitigation Plan





WCT	Wind Chill Temperature
WSSI	Winter Storm Severity Index
YoY	Year over year