HAZARD MITIGATION PLAN

Herkimer County, New York

VOLUME I

2024 (Approved)

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SECTION 1. INTRODUCTION

1.1 BACKGROUND

Communities, residents, and businesses have been faced with continually increasing costs associated with both natural and man-made hazards. Hazard mitigation is the first step in reducing risk and is the most effective way to reduce costs associated with hazards. Herkimer County and 19 participating jurisdictions located therein, have developed this Herkimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP, also referred herein as the "Hazard Mitigation Plan" or the "plan"), which is a multi-jurisdictional, multi-hazard mitigation plan. The HMP includes countywide analysis and assessment of hazards, risk and capabilities and provides an update of the 2017 "Herkimer County Hazard Mitigation Plan. The plan has been prepared following the requirements of the federal Disaster Mitigation Act of 2000 (DMA 2000). DMA 2000 amends the Stafford Act and is designed to improve planning for, response to, and recovery from, disasters by requiring state and local entities to implement pre-disaster mitigation planning and develop HMPs. The Federal Emergency Management Agency (FEMA) has issued guidelines for the development of multi-jurisdictional hazard mitigation plans, and the New York State Division of Homeland Security and Emergency Services (DHSES) also supports plan development for jurisdictions in New York State.

Hazard Mitigation

is any sustained action taken to reduce or eliminate the long term risk and effects that can result from specific hazards.

FEMA defines a Hazard Mitigation Plan (HMP) as the documentation of a state or local government evaluation of natural hazards and the strategies to mitigate such hazards.

Herkimer County has been included in 25 FEMA (major and emergency) declarations since 1974.

Specifically, DMA 2000 requires that states, with support from local governmental agencies, update hazard mitigation plans on a five-year basis to prepare for and reduce the potential impacts of natural hazards. DMA 2000 is intended to facilitate cooperation between state and local authorities, prompting them to work together. This enhanced planning will better enable local and state governments to articulate accurate needs for mitigation, resulting in faster allocation of funding and more effective risk reduction projects.

1.1.1 DMA 2000 Origins -The Robert T. Stafford Disaster Relief and Emergency Assistance Act

In the early 1990s, a new federal policy regarding disasters began to evolve. Rather than simply reacting whenever disasters strike communities, the federal government began encouraging communities to first assess their vulnerability to various disasters and proceed to take actions to

reduce or eliminate potential risks. The logic is simply that a disaster-resistant community can rebound from a natural disaster with less loss of property or human injury, at much lower cost and more quickly. Moreover, other costs associated with disasters, such as the time lost from productive activity by business and industries, are minimized.

DMA 2000 provides an opportunity for states, tribes and local governments to take a new and revitalized approach to mitigation planning. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions (Section 409) and replacing them with a new set of requirements (Section 322). This section sets forth the requirements that communities evaluate natural hazards within their respective jurisdictions and develop an appropriate plan of action to mitigate those hazards, while emphasizing the need for state, tribal and local governments to closely coordinate mitigation planning and implementation efforts.

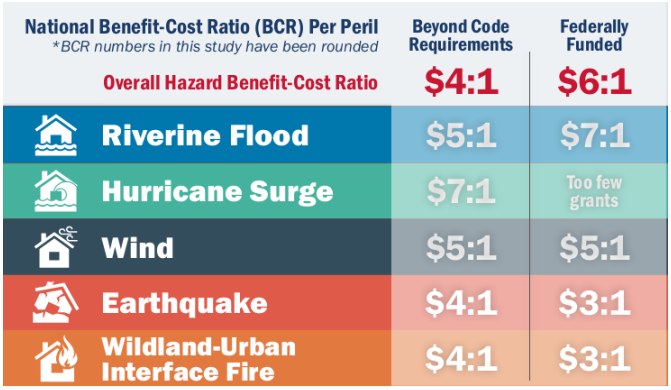
The amended Stafford Act requires that each local jurisdiction identify potential natural hazards to the health, safety and well-being of its residents and identify and prioritize actions that can be taken by the community to mitigate those hazards—before disaster strikes. For communities to remain eligible for hazard mitigation assistance from the federal government, they must first prepare, and then maintain and update an HMP (this plan).

Responsibility for fulfilling the requirements of Section 322 of the Stafford Act and administering the FEMA Hazard Mitigation Program has been delegated to the State of New York, specifically to NYS DHSES. FEMA also provides support through guidance, resources, and plan reviews.

1.1.2 Benefits of Mitigation Planning

Effective mitigation planning will help prepare citizens and government agencies to better prepare for and respond when disasters occur. Also, mitigation planning allows Herkimer County as a whole, including the participating Herkimer County cities, towns, and villages, to remain eligible for mitigation grant funding for mitigation projects that will reduce the impact of future disaster events. The long-term benefits of mitigation planning and implementation include:

- An increased understanding of hazards faced by Herkimer County communities
- A more sustainable and disaster-resistant community
- Financial savings through partnerships that support planning and mitigation efforts
- Focused use of limited resources on hazards that have the biggest impact on the community
- Reduced long-term impacts and damages to human health and structures
- Reduced costs associated with response and recovery efforts, including repairs



Source: FEMA 2018; Federal Insurance Mitigation Administration 2018

1.1.3 Organizations Involved in the Mitigation Planning Effort

Herkimer County and the participating jurisdictions have prepared this hazard mitigation plan with full coordination and participation of county and local government, relevant organizations, and groups, as well as state and federal agencies and the general public. Coordination helps to ensure that stakeholders have established communication channels and relationships necessary to support mitigation planning and mitigation actions included in Section 6 and in the jurisdictional annexes in Section 9. Herkimer County and 19 of the municipal governments in the county have participated in the planning process as indicated in Table 1-1 below. The format of this plan is such that these communities can readily join in the regulatory 5-year plan update process, as identified in Section 7.

Table 1-1. Participating Jurisdictions in Herkimer County

Jurisdictions		
Herkimer County	Village of Herkimer	Town of Ohio*
Village of Cold Brook	Village of Ilion	Village of Poland
Town of Columbia	Town of Litchfield	Town of Russia*
Town of Danube*	City of Little Falls	Town of Salisbury
Village of Dolgeville	Town of Little Falls	Town of Schuyler
Town of Fairfield*	Town of Manheim	Town of Stark
Town of Frankfort	Village of Middleville*	Town of Warren*
Village of Frankfort*	Village of Mohawk*	Town of Webb*
Town of German Flatts	Town of Newport*	Village of West Winfield**
Town of Herkimer	Village of Newport	Town of Winfield*
	Town of Norway	

**Did not participate in the planning process.*

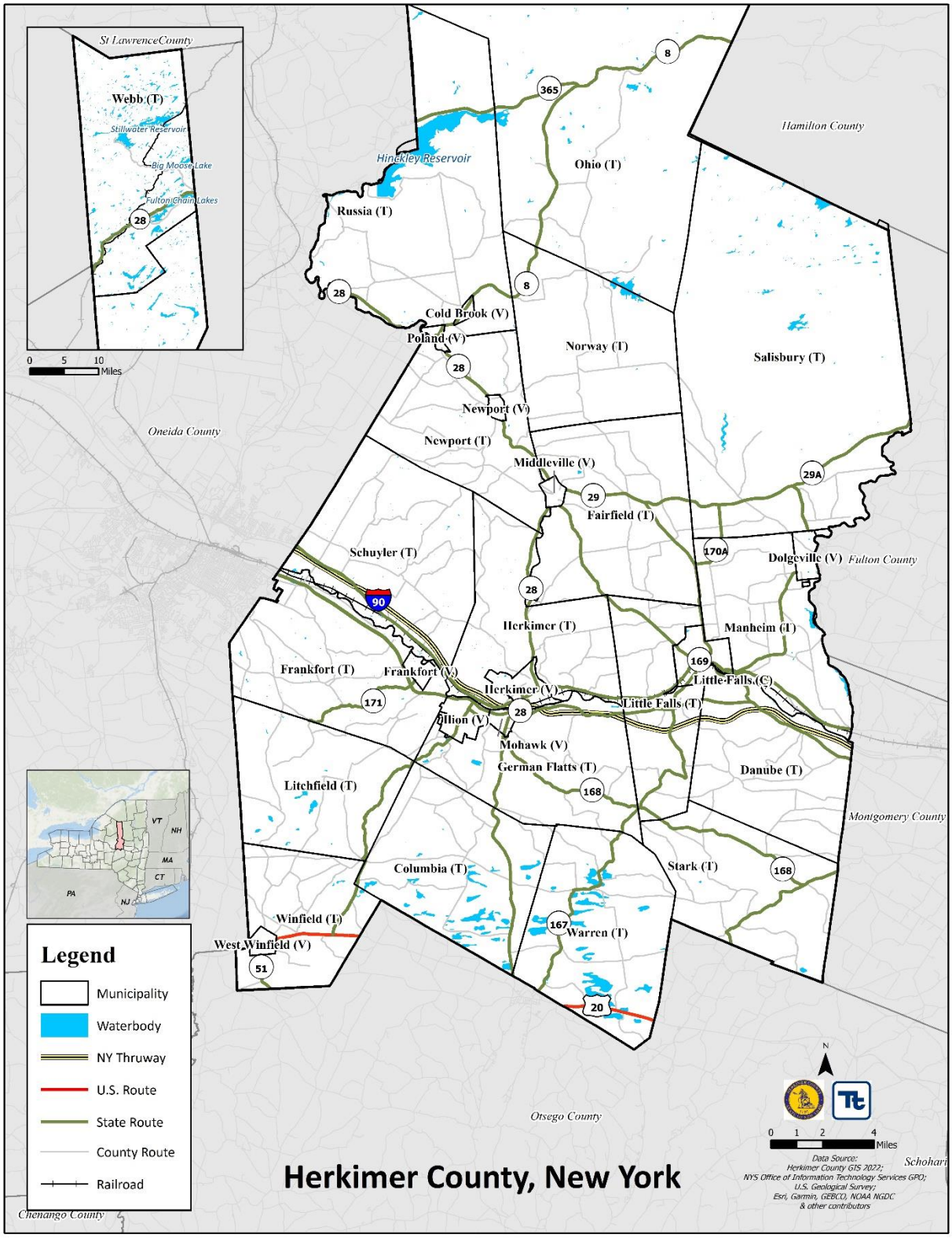
***Participated in the planning process but anticipates submittal for approval at a later date.*

Multiple Agency Support for Hazard Mitigation

Primary responsibility for the development and implementation of mitigation strategies and policies lies with local governments. However, local governments are not alone; various partners and resources at the regional, state, and federal levels are available to assist communities in the development and implementation of mitigation strategies. Within New York State, NYS DHSES is the lead agency providing hazard mitigation planning assistance to local jurisdictions. In addition, FEMA provides grants, tools, guidance, and training to support mitigation planning.

Additional input and support for this planning effort was obtained from a range of agencies and through public involvement (as discussed in Section 3). The project is managed by the Herkimer County Department of Emergency Services, with oversight provided by a Steering Committee consisting of representatives from Herkimer County Highway Department, Herkimer County Public Health, Herkimer County Office of Aging, Herkimer and Oneida Counties Comprehensive Planning Program, the Herkimer County Department of Planning, Herkimer county Industrial Development Agency, Bassett Healthcare, Herkimer ARC, Herkimer-Fulton-Hamilton-Otsego BOECES, Herkimer County Soil & Water Conservation Agency, Catholic Charities of Herkimer County, and three municipalities (Village of Herkimer; Village and Town of Frankfort) to provide both county and local perspectives to guide the planning process. Notably, the 21 participating municipalities provided significant input into the preparation of the plan, in particular the preparation of the annexes included in Section 9 for each municipality. Details regarding the roles and responsibilities of the various committees and other participants are further discussed in Section 3.

Figure 1-1. Herkimer County, New York Mitigation Plan Area



This hazard mitigation plan was prepared in accordance with the following regulations and guidance:

- FEMA *Local Mitigation Planning Handbook*, March 2013.
- FEMA *Integrating Hazard Mitigation into Local Planning*, March 1, 2013.
- FEMA *Plan Integration: Linking Local Planning Efforts*, July 2015.
- Local Mitigation Plan Policy Guide, FP 206-21-0002, effective April 19, 2023.
- *Local Mitigation Plan Review Guide*, October 1, 2011.
- DMA 2000 (Public Law 106-390, October 30, 2000).
- 44 Code of Federal Regulations (CFR) Parts 201 and 206 (including: Feb. 26, 2002, Oct. 1, 2002, Oct. 28, 2003, and Sept. 13, 2004 Interim Final Rules).
- FEMA *How-To Guide for Using HAZUS-MH for Risk Assessment* FEMA Document No. 433, February 2004.
- FEMA *Mitigation Planning How-to Series* (FEMA 386-1 through 4, 2002), available at: http://www.fema.gov/fima/planhowto.shtm.
- FEMA *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*, January 2013.
- NYS DHSES *Hazard Mitigation Planning Standard*, 2023.
- NYS DHSES *Hazard Mitigation Plan*

Table 1-2 summarizes the requirements outlined in the DMA 2000 Interim Final Rule and where each of these requirements is addressed in this hazard mitigation plan.

Table 1-2. FEMA Local Mitigation Plan Review Crosswalk

Plan Criteria	Primary Location in Plan
Prerequisites	
Adoption by the Local Governing Body: §201.6(c)(5)	Section 2.0; Appendix A
Planning Process	
Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)	Section 3.0
Documentation of opportunity for involvement of neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies, and other private and non-profit interests (44 CFR §201.6(b)(2))	Section 3.0
Risk Assessment	
Identifying Hazards: §201.6(c)(2)(i)	Sections 5.2
Profiling Hazards: §201.6(c)(2)(i)	Section 5.4
Assessing Vulnerability: Overview: §201.6(c)(2)(ii)	Section 5.4
Assessing Vulnerability: Identifying Structures: §201.6(c)(2)(ii)(A)	Section 4.0 Section 5.4
Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)	Section 5.4
Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)	Section 4.0; Section 9 Annexes

Plan Criteria	Primary Location in Plan
Mitigation Strategy	
Existing authorities, policies, programs, and resources and ability to expand on and improve these existing policies and programs (44 CFR §201.6(c)(3))	Section 6; Section 9 Annexes
Participation in the NFIP and continued compliance with NFIP requirements, as appropriate (44 CFR §201.6(c)(3)(ii))	
Local Hazard Mitigation Goals: §201.6(c)(3)(i)	Section 6.0 Section 9 Annexes
Comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure (44 CFR §201.6(c)(3)(ii))	Section 6.0; Section 9 Annexes
Multi-Jurisdictional Mitigation Actions: : §201.6(c)(3)(iii)	Section 6.0; Section 9 Annexes
Plan Maintenance Process	
Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(i)	Section 7.0
Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)	Section 7.0; Section 9 Annexes
Continued Public Involvement: §201.6(c)(4)(iii)	Section 7.0
Plan Update	
Revised to reflect changes in development? (44 CFR § 201.6(d)(3))	Section 4; Annexes
Revised to reflect changes in priorities and progress in local mitigation efforts? (Requirement 44 CFR § 201.6(d)(3))	Section 6; Annexes

Organization

The Herkimer County Hazard Mitigation Plan has been organized into a two-volume plan to facilitate use of this plan as a resource for each participant. The plan provides a detailed review and analysis of hazards of concern, resources, and relevant statistical information for Herkimer County and participating municipalities.

Volume I is intended for use as a resource for on-going mitigation analysis. It includes a description of the county and local municipalities as well as information on mitigation planning and how the risk assessment and capability analysis was performed. Volume II consists of an annex dedicated to each participating jurisdiction. Each annex summarizes the jurisdiction's legal, regulatory, and fiscal capabilities; evaluates vulnerabilities to natural hazards; describes the status of past mitigation actions; and provides specific mitigation strategies. The annexes are intended to provide an expedient resource for each jurisdiction for implementation of mitigation projects and maximizing future grant opportunities.

Hazard Mitigation Plan Mission Statement, Goals, and Objectives

Mission Statement

In order to provide a guiding principle to describe the overall duty and purpose of the planning process and in accordance with FEMA guidance (386-1), the Herkimer County Hazard Mitigation Plan Steering Committee chose to develop a Mission Statement for this plan. The intent of this statement is to focus the range of goals and objectives identified to support the over-arching purpose of the plan. This is provided as an enhancement to the 2017 plan which did not include a mission statement or guiding principle.

As a result of the committee deliberations, the 2023 Herkimer County Hazard Mitigation Mission Statement is as follows:

The mission of the Herkimer County Hazard Mitigation Plan is to protect and enhance the health, safety, property, and rich history of the communities within Herkimer County and to increase economic prosperity and resilience by partnering and planning to identify and reduce future vulnerability to natural and other emerging hazards in an efficient manner.

Goals and Objectives

According to CFR 201.6(c)(3)(i): "The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards." The mitigation goals have been developed based on the risk assessment results, discussions, research, and input from amongst the committee, existing authorities, polices, programs, resources, stakeholders and the public.

Herkimer County HMP Goals

Goal 1: Protect Life and Property

Goal 2: Increase Public Awareness

Goal 3: Encourage Partnerships

Goal 4: Promote sustainable mitigation actions that preserve or restore the functions of natural systems

Goal 5: Address Long-Term Vulnerabilities from High Hazard Dams

The Herkimer County Hazard Mitigation Plan planning process included a review and update of the prior mitigation goals and the addition of all new objectives as a basis for the planning process and to guide the selection of appropriate mitigation actions addressing all hazards of concern. Further, the goal development process considered the mitigation goals expressed in the New York State HMP, as well as other relevant county and local planning documents, as discussed in Section 6 (Mitigation Strategy).

Hazards of Concern

Herkimer County and participating jurisdictions reviewed the natural hazards that caused measurable impacts based on events, losses and information available since the development of the current Herkimer County HMP (2017). Herkimer County and participating jurisdictions evaluated the risk and vulnerability due to each of the hazards of concern on the assets of each participating jurisdiction. Although the resulting hazard risk rankings varied for each jurisdiction, the summary risk rankings corresponded with that of Herkimer County and are indicated in each jurisdictional annex. The hazard risk ranks were used to focus and prioritize individual jurisdictional mitigation strategies.

Herkimer County HMP Hazards of Concern

Disease Outbreak/Pandemic

Dam Failure

Drought

Extreme Temperature

Flood

Invasive Species

Severe Storm (Hail, Hurricane, Lightening, Tornado)

Severe Winter Storm (Snow,

Wildfire

Plan Integration into Other Planning Mechanisms

Effective mitigation is achieved when hazard awareness and risk management approaches and strategies become an integral part of public activities and decision-making. Within the county there are many existing plans and programs that support hazard risk management, and thus it is critical that this hazard mitigation plan integrate, complement, and reference those plans and programs to the extent practical in order to be a comprehensive resource for hazard mitigation.

The "Capability Assessment" section of Chapter 6 (Mitigation Strategy) provides a summary and description of the existing plans, programs and regulatory mechanisms at all levels of government (Federal, State, County and local) that support hazard mitigation within the county. Within each jurisdictional annex in Chapter 9, the County and each participating jurisdiction have identified how they have integrated hazard risk management into their existing planning, regulatory and operational/administrative framework ("integration capabilities"), and how they intend to continue to promote this integration ("integration actions"). A further summary of these continued efforts to develop and promote a comprehensive and holistic approach to hazard risk management and mitigation is presented in Section 7.

1.1.4 Implementation of Prior and Existing Local Hazard Mitigation Plans

The status of the mitigation projects identified in prior or existing local HMPS are provided in Section 6 (Mitigation Strategy) and Section 9 (Jurisdictional Annexes) of the plan. Numerous projects and programs have been implemented that have reduced hazard vulnerability to assets in the planning area. Those projects not completed have been revaluated, modified as necessary and incorporated into this plan. The County and municipal annexes describe these mitigation activities in more detail,

and plan maintenance procedures (Section 7) have been developed to encourage thorough integration with local decisions and processes and regular review of implementation progress.

1.1.5 Implementation of the Planning Process

To support the planning process in developing this plan, Herkimer County and the participating jurisdictions have accomplished the following:

- Developed a Steering Committee and countywide planning partnership with municipalities and stakeholders,
- Reviewed the 2017 Herkimer County Hazard Mitigation Plan,
- Identified/reviewed hazards that are of greatest concern to the community (hazards of concern) to be included in the update,
- Profiled these hazards,
- Estimated the inventory at risk and potential losses associated with these hazards,
- Developed appropriate hazard mitigation goals,
- Reviewed mitigation strategies identified in prior and existing local HMPS to indicate progress,
- Developed new mitigation actions to address reduction of vulnerability of hazards of concern,
- Involved a wide range of stakeholders and the public in the plan update process,
- Developed mitigation plan maintenance procedures to be executed after obtaining approval of the plan from NYS DHSES and FEMA.

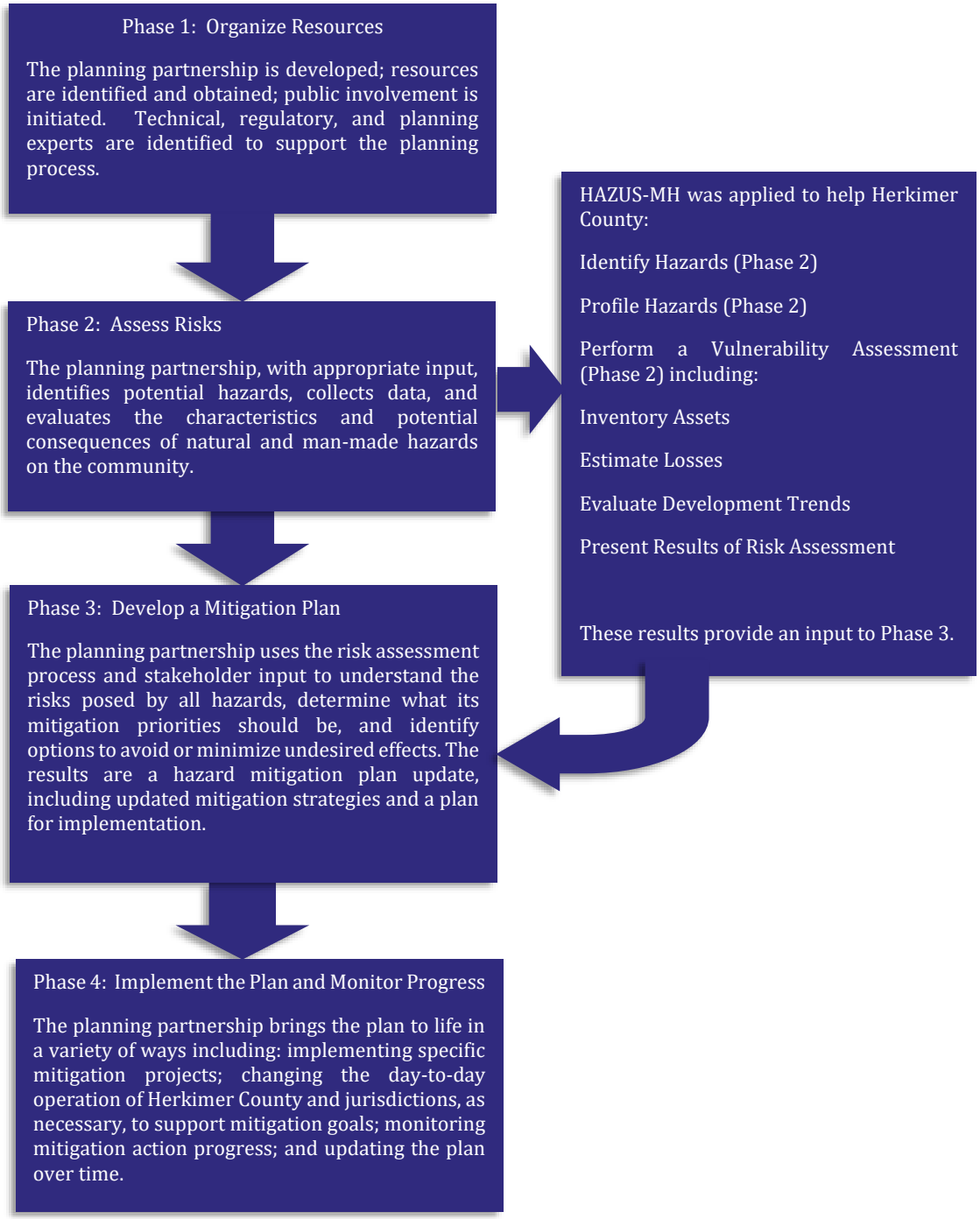
As required by DMA 2000, Herkimer County and participating jurisdictions have informed the public and provided opportunities for public comment and input. In addition, numerous agencies and stakeholders have participated as core or support members, providing input and expertise throughout the planning process.

This Hazard Mitigation Plan documents the process and outcomes of Herkimer County and the jurisdictions' efforts. Additional information on the plan update process is included in Section 3, Planning Process. Documentation that the prerequisites for plan approval have been met is included in Section 2, Plan Adoption.

1.1.6 Organization of This Mitigation Plan

The planning effort followed the four-phase planning process recommended by FEMA and summarized in Figure 1-2.

Figure 1-2. Herkimer County Hazard Mitigation Planning Process



This plan was organized in accordance with FEMA and NYS DHSES guidance, organized into two volumes: Volume I includes all information that applies to the entire planning area (Herkimer County); and Volume II includes specific information for the County as a jurisdiction as well as each participating jurisdiction.

More specifically, Volume I of this plan includes the following sections:

Section 1: Introduction: Overview of participants and planning process

Section 2: Plan Adoption: Information regarding the adoption of the plan by Herkimer County and each participating jurisdiction.

Section 3: Planning Process: A description of the plan methodology and development process, committee and stakeholder roles and activities, and how the plan will be incorporated into existing programs.

Section 4: County Profile: An overview of Herkimer County, including: (1) general information and physical conditions, (2) economy, (3) land use patterns and trends, (4) population and demographics, (5) general building stock inventory and (6) critical facilities.

Section 5: Risk Assessment: Documentation of the hazard identification and hazard risk ranking process, hazard profiles, and findings of the vulnerability assessment (estimates of the impact of hazard events on life, safety and health; general building stock; critical facilities and the economy). Description of the status of local data and planned steps to improve local data to support mitigation planning.

Section 6: Mitigation Strategies: Information regarding the mitigation goals and objectives identified by the Steering Committee in response to priority hazards of concern, and the process by which County and local mitigation strategies have been developed or updated.

Section 7: Plan Maintenance Procedures: A system to continue to monitor, evaluate, maintain and update the plan.

Volume II of this plan includes the following sections:

Section 8: Planning Partnership: Description of the planning partnership and jurisdictional annexes.

Section 9: Jurisdictional Annexes: A jurisdiction-specific annex for Herkimer County and each participating jurisdiction containing their hazards of concern, hazard risk ranking, capability assessments, mitigation actions, action prioritization specific only to Herkimer County or that jurisdiction, progress on prior mitigation activities (as applicable), and a discussion of prior local hazard mitigation plan integration into local planning processes..

Appendices include:

Appendix A: Sample Resolution of Plan Adoption: Documentation that supports the plan approval signatures included in Section 2 of this plan.

Appendix B: Participation Matrix

Appendix C: Meeting Documentation: Agendas, attendance sheets, minutes, and other documentation (as available and applicable) of planning meetings convened during the development of the plan.

Appendix D: Public and Stakeholder Outreach Documentation: Documentation of the public and stakeholder outreach effort including webpages, informational materials, public and stakeholder meetings and presentations, surveys, and other methods used to receive and incorporate public and stakeholder comment and input to the plan update process.

Appendix E: Supplementary Data

Appendix F: Plan Maintenance Tools: Examples of plan review templates available to support annual plan review and example FEMA Guidance Worksheets (FEMA 386-4).

Appendix G: Critical Facility Inventory

Appendix H: NYS DHSES Planning Standards: Includes planning standards and guidelines for hazard mitigation planning.

Appendix I: Linkage Procedures

Appendix J: Dam Failure (Confidential)

Appendix K: Public Comment

1.2 THE PLAN UPDATE – WHAT IS DIFFERENT?

Herkimer County's initial HMP was initially approved by FEMA and adopted by participating jurisdictions in 2017. The 2023 update builds on the 2017 plan and specifically includes the following changes or enhancements. This plan differed from its predecessor for a variety of reasons:

1. This plan was prepared in accordance with the 2023 NYS DHSES guidance which provided a framework for a more concise and focused mitigation plan.
2. Updated data and tools provided for a more detailed and accurate risk assessment. Building footprint data was now available to provide a more accurate flood vulnerability assessment. The risk assessment was prepared to better support future grant applications by providing risk and vulnerability information that would directly support the measurement of "cost-effectiveness" required under FEMA mitigation grant programs.

3. The plan identified implementable actions rather than strategies, with enough information to serve as the basis for policy and funding decisions and represent measurable impacts on resiliency and mitigation progress. Strategies provide direction, but actions are fundable under grant programs.

Table 1-3. Plan Changes Crosswalk

44 CFR Requirement	2017 Plan	2023 Updated Plan
Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: *(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;* *(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and* *(3) Review and incorporation, if appropriate, of existing plans, studies, reports and technical information.*	The 2017 plan followed an outreach strategy utilizing multiple media developed and approved by the Steering Committee.	The plan followed an outreach strategy utilizing multiple media developed and approved by the Steering Committee. This strategy involved the following: • Public participation on an oversight Steering Committee. • Establishment of a plan informational website. • Press releases. • Use of a public information survey. Stakeholders were identified and coordinated with throughout the process. A comprehensive review of relevant plans and programs was performed by the planning team. . The plan included the following enhancements: • Using social media. • Web-deployed survey. • Informational brochure.. • Public website specific to the HMP planning process. The 2023 planning process identified key stakeholders and coordinated with them throughout the process. A comprehensive review of relevant plans and programs was performed by the planning team.
§201.6(c)(2): The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.	The plan includes a risk assessment of hazards of concern. Each jurisdiction in the Planning Area conducted a flood risk analysis to consider location, probability of future occurrences, magnitude/severity, and significance.	The plan includes a comprehensive risk assessment of hazards of concern. Risk was defined as (probability x impact), where impact is the impact on people, property, and economy of the planning area. All planning partners ranked risk as it pertains to their jurisdiction. The potential impacts of climate change are discussed for each hazard.

44 CFR Requirement	2017 Plan	2023 Updated Plan
§201.6(c)(2)(i): [The risk assessment] shall include a] description of the … location and extent of all-natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.	The 2017 plan presented a risk assessment of each hazard of concern.	The 2023 plan presents a risk assessment of each hazard of concern. Each section of the risk assessment includes the following: • Hazard profile, including maps of extent and location, previous occurrences, and probability of future events. • Climate change impacts on future probability using the best available data for New York State. • Vulnerability assessment includes: impact on life, safety, and health, general building stock, critical facilities, and the economy, as well as future changes that could impact vulnerability. • The vulnerability assessment also includes changes in vulnerability since the 2017 plan.
§201.6(c)(2)(ii): [The risk assessment] shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i). This description shall include an overall summary of each hazard and its impact on the community.	Vulnerability was assessed for all hazards of concern.	Vulnerability was assessed for all hazards of concern. The HAZUS-MH computer model was used for the severe storm, earthquake, and flood hazards. These were Level 2 analyses using county data. Site-specific data on county-identified critical facilities were entered into the HAZUS-MH model. HAZUS-MH outputs were generated for other hazards by applying an estimated damage function to an asset inventory extracted from HAZUS-MH-MH.
§201.6(c)(2)(ii): [The risk assessment] must also address National Flood Insurance Program insured structures that have been repetitively damaged floods.	The NFIP Summary in Appendix 3 shows data for each participating jurisdiction: the number of policies, dollar amount of coverage, and number and dollar value of claims for each jurisdiction. This information is also provided in the Jurisdiction Annexes.	A summary of NFIP insured properties using new and updated aggregate data is included in the plan.
Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure and critical facilities located in the identified hazard area.	A complete inventory of the numbers and types of buildings exposed was generated for each hazard of concern. The Steering Committee defined "critical facilities" for the planning area, and	An inventory of the numbers and types of buildings exposed was generated for each hazard of concern. The Steering Committee defined "critical facilities" for the planning area, and these were

44 CFR Requirement	2017 Plan	2023 Updated Plan
	these were inventoried by exposure. Each hazard profile provides a discussion on future development trends.	inventoried by exposure. Each hazard profile provides a discussion on future development trends.
Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) and a description of the methodology used to prepare the estimate.	Qualitative estimates were developed for most of the hazards of concern, utilizing exposure analysis. Quantitative estimates for annual loss estimates for flood were derived by taking the total economic losses attributed to flood divided by the number of years of record to obtain estimated losses per year. Hazus analysis was not employed for the flood, wind or earthquake hazards.	Loss estimates were generated for all hazards of concern. These were generated by HAZUS-MH for the severe storm, earthquake, and flood hazards. For the other hazards, loss estimates were generated by applying a regionally relevant damage function to the exposed inventory. In all cases, a damage function was applied to an asset inventory. The asset inventory was the same for all hazards and was generated in HAZUS-MH.
Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.	There is a summary of anticipated development in the County profile, as well as in each individual annex.	There is a summary of anticipated development in the County profile, as well as in each individual annex.
§201.6(c)(3):[The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.]	The 2017 plan contained 4 goals with associated objectives. Each planning partner identified actions to support the goals and objectives, and that could be implemented within their capabilities.. Each planning partner completed an assessment of its planning, regulatory, technical, and financial capabilities.	The 2023 plan includes a mission statement. Regarding goals, the same methodology for setting goals, objectives, and actions was applied to the 2023 plan update. The Steering Committee reviewed and reconfirmed the mission statement, goals, and objectives for the plan. Each planning partner used the progress reporting from the plan maintenance and evaluated the status of actions identified in the 2017 plan. Actions that were completed or no longer considered to be feasible were removed. The balance of the actions was carried over to the 2023 plan, and new actions were added to the action plan.
Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.	The identified goals, and objectives. These planning components supported the actions identified in the plan.	The Steering Committee identified goals, and objectives targeted specifically for this hazard mitigation plan. These planning components supported the actions identified in the plan. The Steering Committee reviewed and updated

44 CFR Requirement	2017 Plan	2023 Updated Plan
		the mission statement, goals, and objectives for the plan to include a focus on increased resiliency. This resulted in the finalization of four goals and 20 objectives to frame the plan.
Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.	Mitigation action project types are indicated in the mitigation action plan.	A focused process was used to provide step-wise review of a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard. Each partner was mentored by the contracted planner and the County to review and enhance carry-over actions from the 2017 plan to provide a better foundation for funding and implementation. In addition, projects in all mitigation categories (Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, and Education and Awareness actions were reviewed and considered when addressing problem statements identified by the partners or via public and stakeholder feedback.
Requirement: §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program, and continued compliance with the program's requirements, as appropriate.	Municipal planning partners that participate in the NFIP completed an NFIP assessment worksheet.	Ongoing participation in the NFIP for municipalities was included in ongoing capabilities. All municipal planning partners that participate in the NFIP identified an action to address identified repetitive loss properties.
Requirement: §201.6(c)(3)(iii): [The mitigation strategy shall describe] how the actions identified in section (c)(3)(ii) will be prioritized, implemented and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.	Each recommended action was prioritized using a methodology based on the STAPLEE criteria for the 2017 plan.	Each recommended action was prioritized using a methodology based on the STAPLEE criteria.
Requirement §201.6(c)(4)(i): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.	Appendix 5 of the 2017 plan details steps for monitoring, evaluating, and updating the mitigation plan set forth in *44 CFR § 201.6*.	The 2023 plan details a plan maintenance strategy enhancing that of the initial plan by use of a web-based proprietary progress reporting tool.

44 CFR Requirement	2017 Plan	2023 Updated Plan
Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.	The 2017 plan details recommendations for incorporating the plan into other planning mechanisms.	The 2023 plan details recommendations for incorporating the plan into other planning mechanisms such as the following: • Comprehensive Plan. • Emergency Response Plan. • Capital Improvement Programs. • Municipal Code.
Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.	The 2017 plan details a strategy for continuing public involvement.	The 2017 plan maintenance strategy details a strategy for continuing plan maintenance and public involvement. In addition, the County will use a proprietary online tool to support the annual progress reporting of mitigation actions.
Requirement §201.6(c)(5): [The local hazard mitigation plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).	12 of 31 planning partners sought to adopt the 2017 planning process.	The 2023 plan achieves DMA compliance for Herkimer County and 19 of 30 local planning partners. A list of partners who met the planning criteria for DMA compliance are included in Section 8 (Planning Partnership) of this plan. Resolutions for each partner adopting the plan will be in Appendix A of this volume.

SECTION 2. PLAN ADOPTION

2.1 OVERVIEW

This section contains information regarding adoption of the 2023 Herkimer County Multi-Jurisdictional Hazard Mitigation Plan by Herkimer County and each participating jurisdiction.

2.1.1 Plan Adoption by Local Governing Bodies

Adoption by the local governing bodies demonstrates the commitment of Herkimer County and each participating jurisdiction to fulfill the mitigation goals [and objectives] and mitigation strategies outlined in the Plan. Adoption legitimizes the Plan and authorizes responsible agencies to execute their responsibilities.

The County and all participating jurisdictions will proceed with formal adoption proceedings when FEMA provides conditional approval of this plan. Following adoption or formal action on the plan, the jurisdiction must submit a copy of the resolution or other legal instrument showing formal adoption (acceptance) of the plan to NYS DHSES. This will then be submitted to FEMA with the signed resolution to adopt this Plan. The jurisdictions understand that FEMA will transmit acknowledgement of verification of formal plan adoption and the official approval of the plan to the mitigation plan coordinator.

The resolution issued to support adoption of the plan is included as Appendix A, Resolution of Plan Adoption.

In addition to being required by DMA 2000, adoption of the plan is necessary because:

- It lends authority to the plan to serve as a guiding document for all local and state government officials;
- It gives legal status to the plan in the event it is challenged in court;
- It certifies the program and grant administrators that the plan's recommendations have been properly considered and approved by the governing authority and jurisdictions' citizens; and
- It helps to ensure the continuity of mitigation programs and policies over time because elected officials, staff, and other community decision-makers can refer to the official document when making decisions about the community's future.

Source: FEMA. 2003. "How to Series"-*Bringing the Plan to Life* (FEMA 386-4).

SECTION 3. PLANNING PROCESS

3.1 INTRODUCTION

This section includes a description of the planning process used to update the Herkimer County Hazard Mitigation Plan (HCHMP, also referred herein as the "Hazard Mitigation Plan" or the "plan"), including how it was prepared, who was involved in the process, and how the public was involved.

To ensure that the plan both met the requirements of the DMA 2000, as well as to support the long-term goal of having all jurisdictions in the County covered under a comprehensive and cohesive county-wide DMA 2000 plan, an approach to the planning process and plan documentation was developed to achieve the following:

- The plan will be multi-jurisdictional, with the intention of including all municipalities in the county. Herkimer County invited all jurisdictions in the county to join with them in the planning process. To date, Herkimer County and 19 of the 30 local municipal governments in the county participated in the 2023 plan update process as indicated in Table 3-1 below. The format of this plan is such that these communities can readily join in the regulatory 5-year plan update process, as identified in Section 7.

Table 3-1. Participating Herkimer County Jurisdictions

Jurisdictions		
Herkimer County	Village of Herkimer	Town of Ohio*
Village of Cold Brook	Village of Ilion	Village of Poland
Town of Columbia	Town of Litchfield	Town of Russia*
Town of Danube*	City of Little Falls	Town of Salisbury
Village of Dolgeville	Town of Little Falls	Town of Schuyler
Town of Fairfield*	Town of Manheim	Town of Stark
Town of Frankfort	Village of Middleville*	Town of Warren*
Village of Frankfort*	Village of Mohawk*	Town of Webb*
Town of German Flatts	Town of Newport*	Village of West Winfield**
Town of Herkimer	Village of Newport	Town of Winfield*
	Town of Norway	

**Did not fully participate in planning process*
***Participated in the planning process but anticipates submittal for approval at a later date.*

- The plan considers all-natural hazards facing the area, thereby satisfying the natural hazards mitigation planning requirements specified in DMA 2000.
- The plan was developed following the process outlined by DMA 2000, FEMA regulations, and prevailing FEMA and NYS DHSES guidance. Following this process ensures that all the

requirements are met and support Plan review. In addition, this Plan will meet criteria for the National Flood Insurance Program (NFIP) Community Rating System (CRS) and the Flood Mitigation Assistance (FMA) programs.

The Herkimer County HMP update was written using the best available information obtained from a wide variety of sources. Throughout the HMP update process, a concerted effort was made to gather information from municipal and regional agencies and staff as well as stakeholders, federal and state agencies, and the residents of the county. The HMP Steering Committee solicited information from local agencies and individuals with specific knowledge of certain natural hazards and past historical events. In addition, the committees took into consideration planning and zoning codes, ordinances, and recent land use planning decisions. The hazard mitigation strategies identified in this HMP have been developed through an extensive planning process involving local, county and regional agencies, residents, and stakeholders.

This section of the plan describes the mitigation planning process, including (1) Organization of Planning Process; (2) Planning Activities; (3) Stakeholder Outreach and Involvement; (4) Public Outreach and Involvement; (4) Integration of Existing Data, Plans, and Information; (5) Integration with Existing Planning Mechanisms and Programs; and (6) Continued Public Outreach.

3.2 ORGANIZATION OF PLANNING PROCESS

This section of the plan identifies how the planning process was organized with the many planning partners involved and outlines the major activities that were conducted in the development of this HMP.

3.2.1 Organization of Planning Partnership

Herkimer County applied for and was awarded a multi-jurisdictional planning grant under the Building Resilient Infrastructure and Communities Grant Program (EMN-2020-BR-063-0033), which supported the development of this HMP.

Project management and grant administration has been the responsibility of the Herkimer County Department of Emergency Services. A contract planning consultant (Tetra Tech) was tasked with:

- Assisting with the organization of a Steering Committee and municipal planning partnership;
- Assisting with the development and implementation of a public and stakeholder outreach program;
- Data collection;
- Facilitation and attendance at meetings (Steering Committee, municipal, stakeholder, public and other);
- Review and update of the hazards of concern, and hazard profiling and risk assessment;
- Assistance with the review and update of mitigation planning goals and objectives;
- Assistance with the review of past mitigation strategies progress;

- Assistance with the screening of mitigation actions and the identification of appropriate actions;
- Assistance with the prioritization of mitigation actions; and
- Authoring of the draft and final plan documents.

In August 2022, the County notified all municipalities within the County of the pending planning process and invited them to formally participate. Jurisdictions were asked to formally notify the county of their intent to participate (via a Letter of Intent) and to identify planning points of contact to facilitate municipal participation and represent the interests of their respective communities.

To facilitate plan development, Herkimer County developed a Steering Committee to provide guidance and direction to the HMP update effort, and to ensure the resulting document will be embraced both politically and by the constituency within the planning area. All municipalities participating in the plan update authorized the Steering Committee to perform certain activities on their behalf, via the Letter of Intent to participate (FEMA mitigation planning "combination model"). Specifically, the Steering Committee was charged with:

- Providing guidance and oversight of the planning process on behalf of the general planning partnership;
- Attending and participating in Steering Committee meetings;
- Assisting with the development and completion of certain planning elements, including:
  - Reviewing and updating the hazards of concern,
  - Developing a public and stakeholder outreach program,
  - Assuring that the data and information used in the plan update process is the best available
  - Reviewing and updating the hazard mitigation goals,
  - Identification and screening of appropriate mitigation strategies and activities; and
- Reviewing and commenting on plan documents prior to submission to NYS DHSES and FEMA.

The Steering Committee provided guidance and leadership, oversight of the planning process, and acted as the point of contact for all participating jurisdictions and the various interest groups in the planning area.

All municipalities in the County were invited to participate in the planning process, and received a copy of the Planning Partner Expectations, outlining the responsibilities of the participants and the agreement of the partners to authorize the Steering Committee to represent the jurisdiction in the completion of certain planning elements as noted above. Within this plan, the greater universe of County and local departments, agencies and jurisdictions that formally participated in the planning process are referred to as the "planning partnership", while the municipal government participants are referred to as the "municipal planning partnership".

The municipal planning partnership was charged with the following:

- Represent their jurisdiction throughout the planning process;
- Assure participation of all department and functions within their community that have a stake in mitigation (e.g., planning, engineering, code enforcement, police and emergency services, public works, etc.);
- Assist in gathering information for inclusion in the plan update, including the use of previously developed reports and data;
- Support and promote the public involvement process;
- Report on progress of mitigation actions identified in prior or existing HMPs, as applicable;
- Identify, develop and prioritize appropriate mitigation initiatives;
- Report on progress of integration of prior or existing HMPs into other planning processes and municipal operations;
- Develop and author a jurisdictional annex for their jurisdiction;
- Review, amend, and approve all sections of the plan update; and
- Adopt, implement and maintain the plan update.

Table 3-2 shows the current members of the planning partnership as of the time of publication of this plan update.

Table 3-2. Herkimer County Hazard Mitigation Planning Partnership Members

Organization	Name	Title	Steering Committee Representative	POC	Alternate POC
Herkimer County	John J. Raymond	Herkimer County Emergency Services Director	X	X	
	Robert (Bob) Vandawalker	Herkimer County Emergency Management Coordinator	X		X
	Kelly Wares	Herkimer County Emergency Services Deputy Director	X	X	
	James (Jim) Wallace	Herkimer County Administrator	X	X	
	Stephanie Tyoe	Herkimer County Highway Department Deputy County Highway Superintendent	X	X	
	Diane Ward	Director of Health Services	X	X	
	Kathy Fox	Herkimer County Office of the Aging Director	X	X	
	Richard (Rick) Reichert	GIS Analyst	X	X	
	John Piseck	Chief Executive Officer	X	X	
Town of Columbia	R. Mark Buddle	Highway Superintendent		X	
	George W. Weiss	Town Supervisor			X
Town of Frankfort	Mishele Spaman	Codes Enforcement Officer		X	
	Glenn D. Asnoe	Town Supervisor			X
	Matthew Palumbo	Police Chief		X	

Organization	Name	Title	Steering Committee Representative	POC	Alternate POC
Town of German Flats	L. Peter Rovazzi	Town Supervisor		X	
	Scott Hendrix	Town Councilman			
	Richard Sweeney	Codes Officer			
Town of Herkimer	Kathy Penree	Town Councilwoman		X	
	Dominick Frank	Town Supervisor			X
	Ken Collis	Codes Officer			
Town of Litchfield	Mark O'Sullivan	Town Councilman		X	
	James D. Entwistle	Town Supervisor			X
City of Little Falls	Chester "Chet" Szymanski III, P.E.	Engineer		X	
	Mark Blask	Mayor			X
Town of Little Falls	Daniel Casler	Town Supervisor			
	Donald Cotton	Highway Superintendent		X	
Town of Manheim	John Haughton	Town Supervisor		X	
	Carrie Rockwell	Town Clerk			X
	David Kuehnle	Codes Officer			
Town of Norway	Gary Snyder	Town Councilman		X	
	Judith Gokey	Town Supervisor			X
	Howard Eaton	Highway Superintendent			
Town of Ohio	Karen Mowers	Town Supervisor		X	
	B. Scott Sperry	Highway Superintendent			X
Town of Russia	Frances Donley	Town Supervisor		X	
	Amy Clemons	Town Clerk			X
	Herb Belfiore	Codes Officer			
Town of Salisbury	John Mowers	Town Supervisor		X	
	Lyle Kjenkins	Highway Superintendent			X
	Barry Vickers	Codes Officer			
Town of Schuyler	Anthony J. Lucenti	Town Supervisor		X	
	Ronald Beach	Deputy Supervisor			X
Town of Stark	Richard Bronner	Town Supervisor		X	
	David Hajczewski	Highway Superintendent			X
	Richard Jordan, Chief	Van Hornesville Fire Department			
Town of Warren	John Armstrong	Town Councilman		X	
	Jeffrey Crockett	Town Councilman			X
	Lisa VanWinkler	Town Supervisor			
Town of Winfield	Albert Moxham	Fire Chief		X	
	Charles W. Osborn	Town Supervisor			X
Village of Cold Brook	Marvin Jones	Trustee		X	
	Kathy Potempa	Mayor			X
Village of Dolgeville	Mary Puznowski	Mayor		X	
	David Jaquay	DPW Superintendent			X
	Phillip Green	Codes Officer			
Village of Frankfort	Richard D. Adams Jr	Mayor			X

Organization	Name	Title	Steering Committee Representative	POC	Alternate POC
	Michael Irons	DPW Superintendent			
	Matthew Palumbo	Police Chief		X	
	Kenneth Collis	Codes Officer		X	
	Karlee Tamburro	Village Clerk		X	
Village of Herkimer	Mike Jory	Chief		X	
	Justin Cristman	DPW Superintendent			X
	Steve Gay	Codes Officer			
	Michael Moody	Fire Chief	X		
	Michael Jory	Police Chief			X
	Dana Sheery	Mayor			
Village of Ilion	John Stephens	Mayor		X	
	Kari Allen	Deputy Mayor			X
	James Maxwell	Code Officer		X	
Village of Mohawk	James M. Baron	Mayor		X	
	Michael Shedd	DPW Superintendent			X
	Robert Phillips	Codes Officer			
Village of Newport	Marc Butler	Mayor		X	
	Thomas Roberts	Trustee			X
Village of Poland	Brian Dutcher	Mayor		X	
	Brianne Miller	Village Clerk			X
	Scot Burritt	Water Superintendent			
Village of West Winfield	Albert Moxham	Fire Chief			
	James Murphy	Trustee			
	Michael Connors	Codes Officer			
	Andrew Bryce	Mayor		X	

Notes: DPW = Department of Public Works, POC = Point of Contact; OEM = Office of Emergency Management

It is noted that the jurisdictional Letter of Intent to Participate identifies the above "Planning Partner Expectations" as serving to identify those activities comprising overall participation by jurisdictions throughout the planning process. The various jurisdictions in Herkimer County have differing levels of capabilities and resources available to apply to the plan update process, and further, have differing exposure and vulnerability to the natural hazard risks being considered in this plan. It was Herkimer County's intent to encourage participation by all-inclusive jurisdictions, and to accommodate their specific needs and limitations while still meeting the intents and purpose of plan update participation. Such accommodations have included the establishment of a Steering Committee, engaging a contract consultant to assume certain elements of the plan update process on behalf of the jurisdictions, and the provision of additional and alternative mechanisms to meet the purposes and intent of mitigation planning.

Ultimately, jurisdictional participation is evidenced by a completed annex of the HMP wherein jurisdictions have individually identified their planning points of contact, evaluated their risk to the

hazards of concern, identified their capabilities to effect mitigation in their community, and identified and prioritized an appropriate suite of mitigation initiatives, actions, and projects to mitigate their hazard risk; and eventually, by the adoption of the updated plan via resolution. Refer to Section 9 of this HMP.

Appendix D identifies those individuals who represented the municipalities during this planning effort and indicates how they contributed to the planning process.

All Floodplain Administrators (FPAs). All FPAs have been informed of the planning process, reviewed the plan documents, and provided direct input to the plan update. Local FPAs are identified in the "Administrative and Technical" portion of the local Capability Assessments presented within the jurisdictional annexes in Section 9, as well as in Appendix D.

3.2.2 Planning Activities

Members of the planning partnership (individually and as a whole), as well as key stakeholders, convened and/or communicated on an as-needed basis to share information and participate in workshops to identify hazards; assess risks; review existing inventories of and identify new critical facilities; assist in updating and developing new mitigation goals and strategies; and provide continuity through the process to ensure that natural hazards vulnerability information and appropriate mitigation strategies were incorporated. All members of the planning partnership had the opportunity to review the draft plan and supported interaction with other stakeholders, and assisted with public involvement efforts.

A summary of planning partnership activities, including meetings held during the development of the plan, is included in Table 3-3. This summary table identifies only the formal meetings and milestone events held during the plan update process and does not reflect the larger universe of planning activities conducted by individuals and groups throughout the planning process. In addition to these meetings, there was a great deal of communication between planning partnership members and the consultant through individual local meetings, phone and email.

After completion of the plan, implementation and ongoing maintenance will become a function of the planning partnership as described in Section 7. The planning partnership is responsible for reviewing the draft plan and soliciting public comment as part of an annual review and as part of the five-year mitigation plan updates.

Table 3-3 presents a summary of planning activities and general project planning efforts conducted during the plan development process. It also identifies which DMA 2000 requirements the activities satisfy. Documentation of meetings (agendas, sign-in sheets, minutes, etc.) may be found in Appendix C.

Table 3-3. Summary of Mitigation Planning Activities / Efforts

Date	*DMA 2000 Requirement*	*Description of Activity*	*Participants*
-	1b, 2	County approves resolution to apply for FEMA mitigation planning grant	-
-	1b, 2	County conducts procurement process for contract planning support	-
6/8/2022	2	Project Start Up Meeting: Discuss proposed planning process and scope of work including documenting participation, schedule, and public and stakeholder outreach and involvement.	See Appendix D
8/2022	2	All municipalities invited to participate in the planning process.	-
	2, 3c	GIS data collection meeting	See Appendix D
Weekly	-	Weekly project status meeting to discuss action items in support of the expedited planning process	See Appendix D
8/2022	1c, 2	Interested jurisdictions submit Letters of Intent to Participate in this planning process, acknowledging municipal participation requirements and identifying planning point(s) of contact.	See Appendix D
8/9/2022	1b, 2, 3a, 3b, 3c, 4a, 5c	SC Meeting #1: Review project schedule; review municipal participation, discuss municipal Kick Off meeting and local data collection; review and discuss sources and availability of county and regional data; discuss public and stakeholder outreach efforts.	See Appendix D
8/25/2022	1b, 2, 3a, 3b, 3c, 4a	Town Supervisors Kick-Off Meeting: Complete overview of planning process, plan participant expectations, review of hazards and hazards of concern identification, discussion of data needs and data collection process explaining all provided worksheets and including discussion of public and stakeholder outreach efforts	County and municipal representatives and stakeholders. See Appendix D
11/29/2022	2	Media Release	Public and Stakeholders
12/16/2023		Appeared on Talk of the Town radio show on WUTQ-Utica – discussed Herkimer County HMP Update, encourage for their input	
9/2022	2	Public project website developed: www.herkimercountynyhmp.com	Core Planning Team, Contract Planner
9/2022	2	Online Public Hazard Preparedness and Mitigation survey developed	Core Planning Team, Contract Planner
9/2022	2	Online Stakeholder Hazard Mitigation surveys developed	Core Planning Team, Contract Planner

Date	DMA 2000 Requirement	Description of Activity	Participants
9/26/2022	1a, 3a, 3b, 3c, 3d	Planning Partnership Meeting	See Appendix D
10/12/2022	1a, 2, 4a, 4b, 4c	Annex Support Meeting	See Appendix D
10/12/2022	1a, 2, 4a, 4b, 4c	Workshop Support Meeting	See Appendix D
10/12/2022	1b, 2, 3a-c, 3e	Planning Partnership Homework Support Meeting	See Appendix D
1/17/2023	All requirements	Steering Committee Meeting	Steering Committee; See Appendix D
2/27/23	1a, 3a, 3b, 3c, 3d	Planning Partnership Meeting	See Appendix D
4/24/23	1a, 2, 4a, 4b, 4c	Mitigation Strategy Workshop	See Appendix D
5/25/2023	1b, 2, 3a, 3b, 3c, 4a	Town Supervisors HMP Update Meeting: Encourage Town leaders to continue to update their annex in the plans, offered help and assistance to any towns that need additional	Town Supervisors and Town leaders
6/20/2023	2	County Annex Meeting	See Appendix D
7/25/2023	5a, 5b, 5c	Steering Committee Draft Plan Review Meeting	See Appendix D
10/30/2023	2	Draft Plan posted to public project website	Public and Stakeholders
12/2023	1b, 2	Public and stakeholder comments to Draft Plan received and incorporated into Final Plan.	Public and Stakeholders
12/22/2023	All requirements	Final plan submitted to NYS DHSES and FEMA Region II	NYS DHSES, FEMA Region II
Upon plan approval by FEMA	1a	Plan adoption by resolution by the governing bodies of all participating municipalities	All plan participants

Note: TBD = to be determined.

Each number in column 2 identifies specific DMA 2000 requirements, as follows:

1a – Prerequisite – Adoption by the Local Governing Body

1b – Public Participation

2 – Planning Process – Documentation of the Planning Process

3a – Risk Assessment – Identifying Hazards

3b – Risk Assessment – Profiling Hazard Events

3c – Risk Assessment – Assessing Vulnerability: Identifying Assets

3d – Risk Assessment – Assessing Vulnerability: Estimating Potential Losses

3e – Risk Assessment – Assessing Vulnerability: Analyzing Development Trends

4a – Mitigation Strategy – Local Hazard Mitigation Goals

4b – Mitigation Strategy – Identification and Analysis of Mitigation Measures

4c – Mitigation Strategy – Implementation of Mitigation Measures

5a – Plan Maintenance Procedures – Monitoring, Evaluating, and Updating the Plan

5b – Plan Maintenance Procedures – Implementation through Existing Programs

5c – Plan Maintenance Procedures – Continued Public Involvement

3.3 STAKEHOLDER OUTREACH AND INVOLVEMENT

This section details the outreach to, and involvement of, the many agencies, departments, organizations, non-profits, districts, authorities and other entities that have a stake in managing hazard risk and mitigation, commonly referred to as stakeholders.

Diligent efforts were made to assure broad regional, county, and local representation in this planning process. To that end, a comprehensive list of stakeholders was developed with the support of the Steering and Planning committees. Stakeholder outreach was performed early and throughout the planning process. In addition to "mass media" notification efforts, identified stakeholders were invited to attend the kick-off meeting, while key stakeholders were requested to participate on the Steering and/or Planning committees. Information and input provided by these stakeholders has been included throughout this plan where appropriate, as identified in the references.

The following is a list of the various stakeholders that were invited to participate in the development of this plan, along with a summary of how these stakeholders participated and contributed to the plan. This summary listing cannot represent the sum total of stakeholders that were aware of and/or contributed to this plan since formal and informal outreach efforts were utilized throughout the process by the many planning partners involved in the overall effort. Complete documentation of such broad-based and often locally-focused efforts is impossible. Instead, this summary is intended to demonstrate the scope and breadth of the stakeholder outreach efforts made during the planning process.

3.3.1 Federal Agencies

FEMA Region II: Provided updated planning guidance; provided summary and detailed NFIP data for planning area; facilitated a presentation of non-regulatory flood products; attended meetings; conducted a Mitigation Strategy Workshop; conducted plan review.

U.S. Army Corps of Engineers (NY Division): Relevant NY Division projects and activities summarized in plan.

National Weather Service (NWS): Provided data and information, provided subject matter expert review of atmospheric/weather-related hazard profile.

National Oceanic and Atmospheric Agency (NOAA) – Coastal Resources Center: Provided data and information through their Digital Coast program.

3.3.2 State Agencies

New York State Department of Homeland Security and Emergency Services (NYS DHSES: Headquarters and Region II): Administered planning grant and facilitated FEMA review; provided updated planning guidance; attended meetings; facilitated workshops (e.g., hazard mitigation

planning and RiskMAP, Sandy HMGP, updating mitigation strategies), provided review of Draft and Final Plan.

New York State Department of Environmental Conservation (NYSDEC): Provided data and information.

3.3.3 County and Regional Agencies, Commissions and Non-Profits

Herkimer County Department of Emergency Services: Secured and administered FEMA planning grant, managed project, arranged and attended meetings, served on Steering Committee, provided data and information, facilitated and supported public and stakeholder outreach, identified ongoing and potential mitigation projects and initiatives, reviewed draft and final plan sections.

Herkimer County Legislature: Served on the Steering Committee, attended meetings, and reviewed and provided input. The County Chairman, Public Safety Chairman, and the County Administrator were engaged throughout the project supporting meetings and provided with agendas and minutes for awareness.

Herkimer County Office of the Administrator: Served on the Steering Committee, attended meetings, and reviewed and provided input.

Herkimer County Department of Health: Served on the Steering Committee, attended meetings, and identified vulnerabilities and mitigation actions.

Herkimer County Office of the Aging: Served on the Steering Committee, attended meetings, and reviewed and provided input.

Herkimer County Industrial Development Agency: Served on the Steering Committee, attended meetings, and reviewed and provided input.

Herkimer-Fulton-Hamilton-Otsego BOCES: Served on the Steering Committee, attended meetings, and reviewed and provided input.

Herkimer Oneida Counties Comprehensive Planning Program: Served on Steering Committee, provided critical data and information, reviewed progress on original mitigation strategy, identified new projects/initiatives, reviewed and provided input on draft and final plan sections.

Herkimer County Sheriff Department: Served on the Steering Committee, attended meetings, and reviewed and provided input.

Herkimer County Highway Department: Served on the Steering Committee, attended meetings, reviewed progress on previous mitigation actions, provided data and information, identified vulnerabilities, updated mitigation strategies.

Herkimer County Soil and Water Conservation District: Served on the Steering Committee and provided input.

Catholic Charities of Herkimer County: Served on the Steering Committee, attended meetings, and reviewed and provided input.

Herkimer ARC: Served on the Steering Committee, attended meetings, and reviewed and provided input.

The following entities were requested to provide input to the stakeholder survey and review the draft plan to provide feedback:

- USDA National Resources Conservation Service (NRCS):
- New York Farm Service Agency
- New York State Department of Environmental Conservation (NYSDEC)
- New York State Department of Transportation
- U.S. Geological Survey (Ithaca, NY)
- U.S. Fish and Wildlife Service
- NY Power Authority (NYPA) – NY Canals Corp

New York Power Authority (NYPA) provided information regarding dam risk and indicated an ongoing commitment to work with the County to better quantify dam impacts including those related to the Hinkley Dam.

3.3.4 Regional and Local Stakeholders

U.S. Geological Survey (USGS): Provided data and information.

Academia (School districts and other academic institutions): Many municipalities directly involved school district representatives in the planning process, as identified in Table 3-3. The following school districts, colleges, and academic organizations in the county were invited to review the draft plan and provide feedback:

- Herkimer College
- Herkimer-Fulton-Hamilton-Otsego BOCES

Law Enforcement: Many municipalities directly involved police and other law enforcement representatives in the planning process, as identified in Table 3-3. Further, the following police departments and law enforcement agencies in the County were invited to complete a stakeholder survey:

- Village of Dolgeville Police Department
- City of Little Falls Police Department
- Village of Herkimer Police Department
- Village of Mohawk Police Department
- Village of Ilion Police Department
- Village of Frankfort Police Department

- Town of Frankfort Police Department
- Town of Webb Police Department

Fire Districts and Fire Departments: Many municipalities directly involved fire district/department, haz-mat teams, and rescue team representatives in the planning process, as identified in Table 3-3. The following fire district/department, haz-mat teams, and rescue team representatives in the County were invited to complete a stakeholder survey:

- Big Moose FD
- Cedarville FD
- Dolgeville FD
- Eagle Bay FD
- East Herkimer FD
- Frankfort FD
- Frankfort Center FD
- Frankfort Hill FD
- Herkimer FD
- Ilion FD
- Little Falls FD
- Middleville FD
- Mohawk FD
- Old Forge FD
- Poland FD
- Salisbury FD
- Schuyler FD
- Van Hornesville FD
- West Winfield FD

The Hazard Mitigation Plan update was discussed in multiple Herkimer County Fire Advisory Board meetings well as well multiple Herkimer County Fire Chiefs meetings.

Hospitals and Health-Care Facilities:

Bassett Healthcare: Served on the Steering Committee, attended meetings, and reviewed and provided input.

The following hospitals and health-care facilities in the County were invited to complete a stakeholder survey:

- Mohawk Valley Health System (MVHS)
- Bassett Healthcare
- ARC Herkimer

Ambulance/Emergency Medical Services: The following ambulance and emergency medical service providers in the County were invited to complete a stakeholder survey:

- MOVAC (Mohawk Valley Ambulance Corp)
- Kuyahoora Valley Ambulance Corp

- Old Forge Volunteer Ambulance Corp

The Hazard Mitigation Plan was discussed in several Herkimer County EMS Advisory Board meetings and it was also discussed in REMSCO meetings. (Regional EMS Board).

Utilities:

Newport Telephone: Served on the Steering Committee, attended meetings, and reviewed and provided input.

The following utility companies in the County were invited to complete a stakeholder survey:

- National Grid
- New York State Electric & Gas (NYSEG)
- Newport Telephone Company

Transportation: The following transportation companies and organizations in the County were invited to complete a stakeholder survey:

- Birnie Bus

Business Community:

Tractor Supply: Served on the Steering Committee, attended meetings, and reviewed and provided input.

3.3.5 Vulnerable Populations:

The below listed agencies that work with and represent the vulnerable populations in Herkimer County were contacted to provide input to the planning process, to review the plan, and to utilize the plan as an ongoing resource.

Agency/Entity	Vulnerable Populations Served
Herkimer County Department of Health	Elderly, Disabled, Low-Income, Non-English Speaking
Herkimer County Office of the Aging	Elderly
Herkimer-Fulton-Hamilton-Otsego BOCES	Youth, Disabled
Catholic Charities of Herkimer County	Elderly, Disabled, Low-Income, Non-English Speaking
Herkimer ARC	Elderly, Disabled, Low-Income, Non-English Speaking

Bassett Healthcare:	Elderly, Disabled, Low-Income, Non-English Speaking
Birnie Bus	Non-Car owners

3.3.6 Adjacent Jurisdictions:

The County has made an effort to keep surrounding jurisdictions appraised of the project and allowed the opportunity to provide input to this planning process via a stakeholder survey and a request to review the draft plan. Specifically, the following adjoining county and state representatives were contacted on October 26, 2022 to inform them about the availability of the project website, draft plan documents and surveys, and invited to provide input to the planning process:

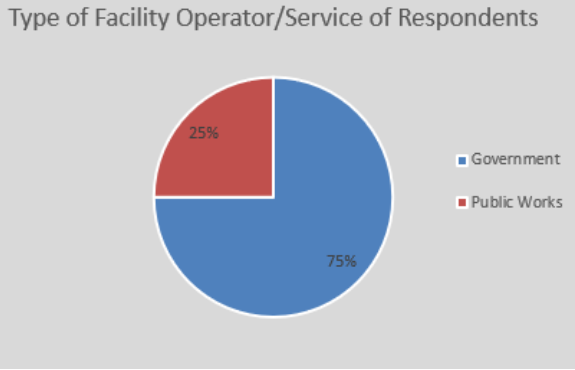
- Fulton County
- Hamilton County
- Lewis County
- Montgomery County
- Oneida County
- Otsego County
- St. Lawrence County

Input from neighboring counties which responded to the survey is summarized in the section below.

3.4 STAKEHOLDER AND NEIGHBORING COUNTY SURVEY SUMMARIES

The following provides a summary of the results and feedback received by stakeholders who completed the survey. Feedback was reviewed by the Steering Committee and integrated where appropriate in the plan.

Figure 3-1 Stakeholder Types



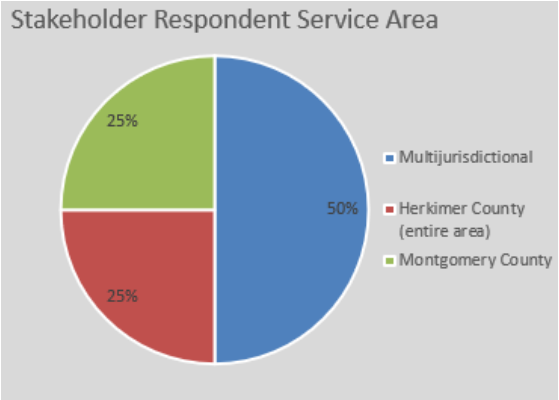
Stakeholder Survey

The stakeholder survey was designed to help identify general needs for hazard mitigation and resiliency within Herkimer County from the perspective of stakeholders, as well as to identify specific projects that may be included in the mitigation plan. It was distributed to identified stakeholders, including the various county and municipal departments and agencies in the County. As of June 17, 2023, 4

stakeholders completed the survey, with 75% of respondents coming from the public works sector as shown in Figure 3-1.

When asked if the organization maintains or manages anything within their designated service area, only 25% do not manage any facilities. For those that do manage facilities, they indicated the following facilities: buildings, roads, bridges, stormwater infrastructure, reservoirs and dams, gas and electric utilities, and substations. Out of these 25% of the respondents provided county-wide services, and a total of 50% service multiple jurisdictions as shown in Figure 3-2.

Figure 3-2 Stakeholder Service Area



The Stakeholder Survey was broken down into 3 sections: Hazard and Damage Identification, Community Preparedness, and Project Identification, each detailed below. Survey results were shared with the Steering Committee and Planning Partnerships in scheduled meetings for consideration in the development of mitigation strategies.

Hazard and Damage Identification

Half of survey respondents (50%) indicated that buildings, facilities, or structures their organization is involved with have been impacted by a natural hazard. Of these, almost all were impacted by flooding. One respondent noted reoccurring flooding events in 2006, 2013, 2017, 2019, and 2021 that caused impacts to buildings, facilities, or structures. A respondent also noted that ice damming is a consistent problem.

Figure 3-3 Facilities Affected by Hazard Events

In addition to asking about whether or not their facilities were damaged, stakeholders were also asked what areas they believe to be the most vulnerable to natural hazards, and the problems they face. The respondents provided hazards and impacts:

What areas (in which you provide services to) do you believe to be the most vulnerable to natural hazards?

- *Erie Canal and associated facilities*
- *Utility distribution poles and wires*

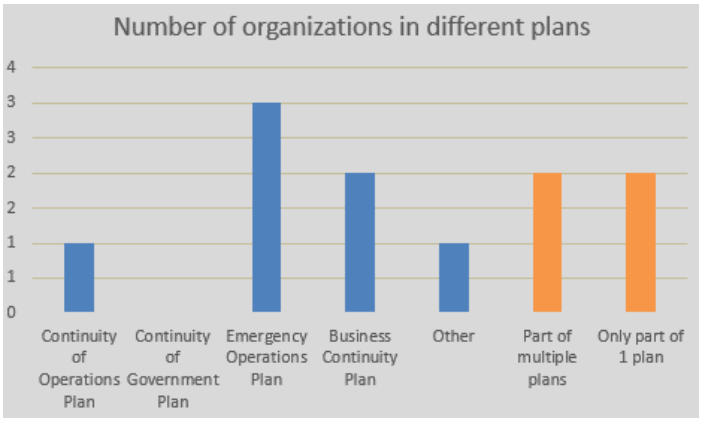
- The Erie Canal and associated facilities are highly susceptible to flooding
- Distribution poles and wires for electric service are subject to weather hazards

As facilities have been previously impacted by hazard events, most respondents (50%) indicated that their facilities have been impacted by a natural hazard, with all (100%) of these noted hazards involving flooding. 75% of respondents indicated they believe their facilities are mostly prepared or prepared to a certain degree for withstanding natural disasters, and 25% said their facilities are adequately prepared for withstanding natural disasters. None of the respondents stated that their facilities are not prepared for withstanding natural disasters.

Community Preparedness

Respondents were asked if their organizations were covered by any continuity and emergency plans. The majority (75%) of respondent's organizations have, or are part of, an Emergency Operations Plan. Half (50%) of responding organizations are part of multiple plans, with 75% of total respondents being part of an Emergency Operations Plan, 25% being part of a Business Continuity Plan, and 25% being part of a Continuity of Operations Plan. One stakeholder (New York State Electric & Gas) indicated that their organization has their own internal operations plan.

Figure 3.4-4 Plan Involvement



Project Identification

Respondents identified the following projects or programs that could reduce their organization's vulnerability to damages, including operation of service:

- Increase system hardening
- Conduct a patrol of distribution and transmission lines within the county along with outside lines that serve the county and perform maintenance of rights-of-ways to reduce tree damage
- Develop updates to hazard mitigation planning
- Seek a Climate Smart grant to move county services buildings out of flood plains

The following were identified as recently implemented projects that reduced vulnerabilities to hazard events:

- Ensure remote work capabilities
- Continue hazard mitigation planning
- Obtain funding to move county services buildings out of flood plains

Neighboring County Survey

The neighboring county survey was sent to the surrounding counties of Herkimer due to their proximity to the county and because the effects of hazard events that impact Herkimer County would be similar to that of their neighbors. As of Tuesday, July 18th, 2023, one county (St. Lawrence County) submitted the survey.

The Neighboring County Survey was broken down into 5 sections: Emergency Operations and Continuity of Operations Planning, Risk and Vulnerability, Evacuation and Sheltering, Information Sharing, and Projects, Grants, Education and Outreach, each detailed below.

Emergency Operations and Continuity of Operations Planning

Seven counties were sent the neighboring community survey, but only Saint Lawrence County submitted a response. Saint Lawrence County indicated they work with Herkimer County as participants on each respective planning team to develop both counties' comprehensive emergency operations plans. However, the two counties do not collaborate on their respective Continuity of Operations plans. Saint Lawrence County indicated that mitigation project information is not routinely shared across counties during project planning and implementation phases.

The survey asked respondents to explain how emergency operations is communicated between the counties, but no responses were received for this question.

Risk and Vulnerability

The one respondent to the survey indicated that their county does share risk and vulnerability assessments, including flood mapping, and HAZUS data, with Herkimer County.

Evacuation and Sheltering

The respondent indicated there is collaboration with Herkimer County on establishing evacuation routes, alternative evacuation routes, and shelters. The respondent notes that they do not share any suitable spaces for temporary housing with Herkimer County.

Information Sharing

The respondent from Saint Lawrence County states that they do have access to contact information for Herkimer County's emergency operation centers.

Projects, Grants, Education and Outreach

The respondent indicated they do not know of any projects that require cross-collaboration between jurisdictional boundaries. A respondent provided comments about their answers to cross-collaboration projects and noted that Herkimer County and Saint Lawrence County have not collaborated on grant applications. Additionally, the respondent stated they are unaware of any organizations that carry out education and outreach efforts regarding hazards in both communities.

Public Outreach

To facilitate better coordination and communication between the Planning Committee and citizens and to involve the public in the planning process, it was determined that draft documents will be made available to the public through a variety of venues including printed and online format. This effort is intended to increase the likelihood of hazard mitigation becoming one of the standard considerations in the evolution and growth of Herkimer County.

The Steering and Planning committees have made the following efforts toward public participation in the development and review of the Plan:

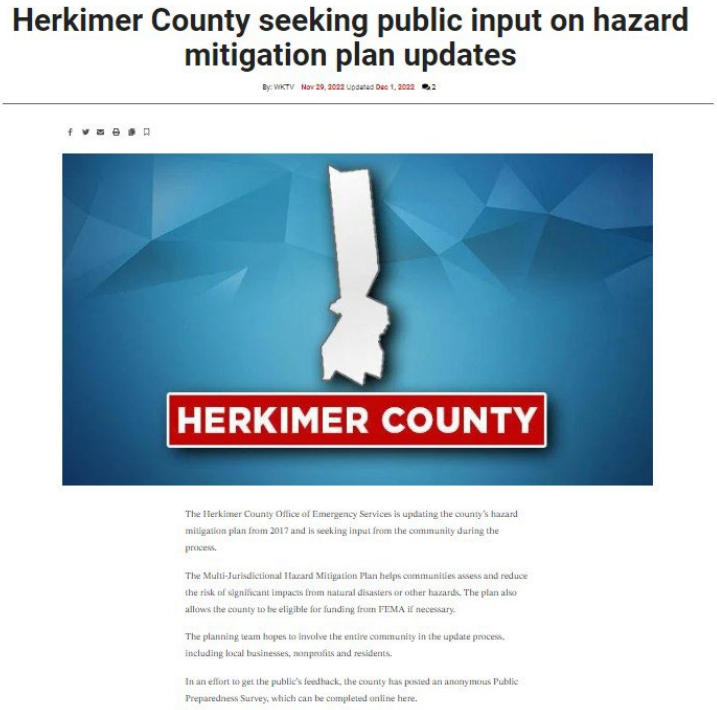
- The public was informed of the hazard mitigation planning effort commencement at the kick-off meeting and through press releases, news articles, and public service announcements released throughout the planning process. Copies of these announcements may be found in Appendix C.
- The Director of Emergency Services was featured on 100.7 Radio on November 16, 2022 and provided an overview to the hazard mitigation plan update process as well as the benefits it will provide the County. A recording of the show is available online at this link: https://wutqfm.com/director-john-raymond-discusses-herkimer-county-office-of-emergency-services-and-hazard-mitigation-survey/ .
- The County shared a Media Release to local news sources on October 30, 2022.
- To inform the public and county agencies of the ongoing plan update effort, updates regarding the mitigation planning process have been made at county-wide meetings including those of the Local Emergency Preparedness Working Group, and County Department Heads Meeting.
- A public website is being maintained as another way to facilitate communication between the Steering Committee, planning partnership, public and stakeholders (https://www.herkimercountynyhmp.com/). The public website contains a project overview, County and local contact information, access to the citizens survey and various stakeholder surveys, and sections of the HMP for public review and comment.
- All participating municipalities have been encouraged to distribute press releases on the project, including links to the project webpage and citizen and stakeholder surveys. Municipalities posting information and supporting online outreach include the Town of Frankfort and the City of Little Fall.

- A number of Facebook postings provided information to the public requesting public review and input.
- An article was published by WKTV to inform the public.
- 50 hard copies of the Herkimer County HMP informational brochure were located in municipal and community facilities.
- In order to facilitate coordination and communication between the Planning Committee and citizens and involve the public in the planning process, the Plan Update will be available to the public through a variety of venues. A printed version of the Plan will be maintained at the Herkimer County Office of Emergency Management.
- An on-line natural hazards preparedness citizen survey was developed to gauge household preparedness that may impact Herkimer County and to assess the level of knowledge of tools and techniques to assist in reducing risk and loss of those hazards. The questionnaire asks quantifiable questions about citizen perception of risk, knowledge of mitigation, and support of community programs. The questionnaire also asks several demographic questions to help analyze trends.
- The questionnaire was posted on the County website on April 10, 2023 and was available through August 31, 2023 for public input. All participating municipalities were requested to advertise the availability of the survey via local homepage links, and other available public announcement methods (e.g. Facebook, Twitter, email blasts, etc.). 33 responses were collected. A summary of survey results is provided later in this Section with full results provided in Appendix C of this plan.
- To engage a wide variety of stakeholders, directed response surveys were distributed to Academia, Fire Departments, EMS, Hospitals and Healthcare Organizations, Business and Commercial interests, Utilities and Law Enforcement stakeholders as detailed in the Stakeholder outreach subsection of this chapter. summary of survey results is provided later in this Section with full results provided in Appendix C of this plan. In addition, an example of the directed stakeholder surveys is presented in Appendix C.
- The Draft Plan was posted to the public website as of October 30, 2023 for public review and comment. All public comments were collected via an on-line survey were forwarded to the appropriate jurisdiction and/or agency and incorporated into the final plan as appropriate.
- Once submitted to NYS DHSES/FEMA, the Final Plan will be available for public review and comment in the same manner and format as the Draft Plan, and as identified in Section 7, “Plan Maintenance”.

Figure 3-4. Herkimer County HMP Webpage and Local On-Line Outreach

Figure 3-5. Local Outreach – Town of Frankfort web posting

Figure 3-6. Media Outreach – WKTV Posting



Herkimer County seeking public input on hazard mitigation plan updates

By: WKTV Nov 29, 2022 Updated Dec 1, 2022 2

HERKIMER COUNTY

The Herkimer County Office of Emergency Services is updating the county's hazard mitigation plan from 2017 and is seeking input from the community during the process.

The Multi-Jurisdictional Hazard Mitigation Plan helps communities assess and reduce the risk of significant impacts from natural disasters or other hazards. The plan also allows the county to be eligible for funding from FEMA if necessary.

The planning team hopes to involve the entire community in the update process, including local businesses, nonprofits and residents.

In an effort to get the public's feedback, the county has posted an anonymous Public Preparedness Survey, which can be completed online here.

Figure 3-7. Sample Social Media Outreach – Facebook Posting

Citizen Survey Summary

Those that live and work in Herkimer County were given the opportunity to be involved in the planning process. One opportunity was the citizen survey. As stated above, the survey was developed to assess the level of knowledge of tools and techniques to assist in reducing risk and loss of those hazards. It asked quantifiable questions about citizen perception of risk, knowledge of mitigation, and support of community programs. The County advertised the survey on their website and social media accounts. As of July 2023, the survey received 33 responses.

Most residents (81.82%) receive information concerning natural hazards through TV news.

Demographically, survey respondents were from 15 municipalities within Herkimer County, with 72.00% having lived in the county for 20 years or more, and the vast majority (96.00%) in their own home of those that indicated their housing type. 96.15% of respondents live in a single-family detached home. The most common (38.46%) age of respondents was over between the ages of 51 to 60, and 96.16% of respondents were 41 years of age or older. The majority (81.82%) of residents receive information concerning a natural hazard through TV news. Over half (69.70%) receive information through the internet, 66.67% receive information through social media, and 60.61% receive information through both mass notification systems and radio news.

Respondents were asked if their home has been damaged by a past hazard event. 33.33% (11 respondents) indicated that their home had been damaged by a previous event, with many responses concerning basement flooding. Survey respondents identified the following as the top 5 most frequently occurring natural hazard events within Herkimer County in the past 10 years, as shown in Figure 3-3:

- Severe winter storms – blizzard, heavy snow, ice (72.73%)
- Pandemic (60.61%)
- Flooding – street/land (57.58%)
- Severe weather – tornado, thunderstorm, hail (45.45%)
- Flooding – basement (36.36%)

The highest hazards of concern (respondents reporting somewhat concerned, very concerned, or extremely concerned) include: Flooding, Severe Weather, Severe Winter Storms, and Transportation Accidents.

Figure 3.4. Most frequently experienced natural hazard events in Herkimer County

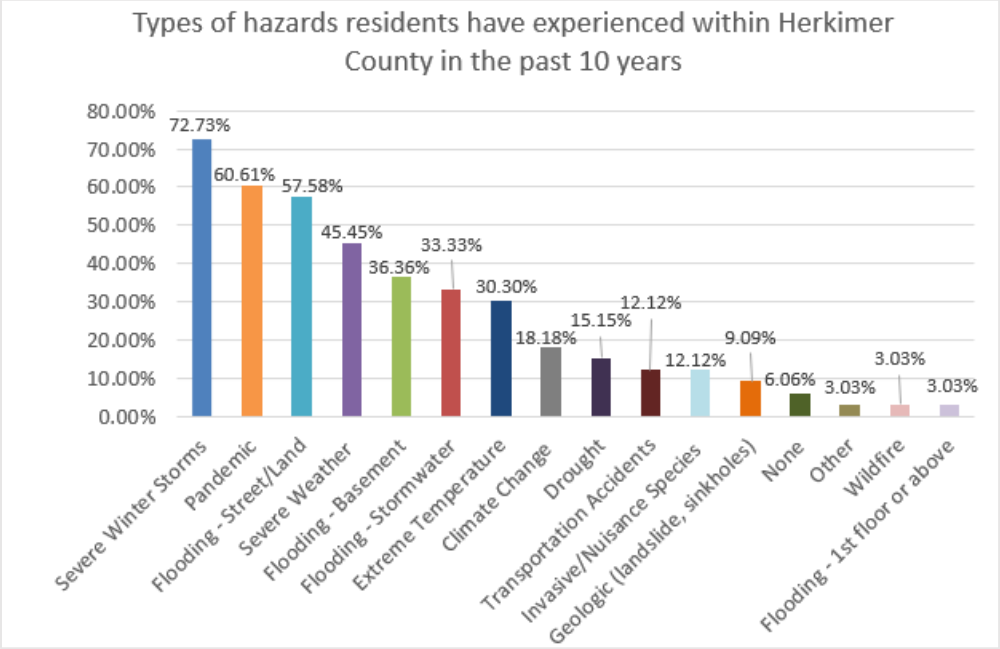
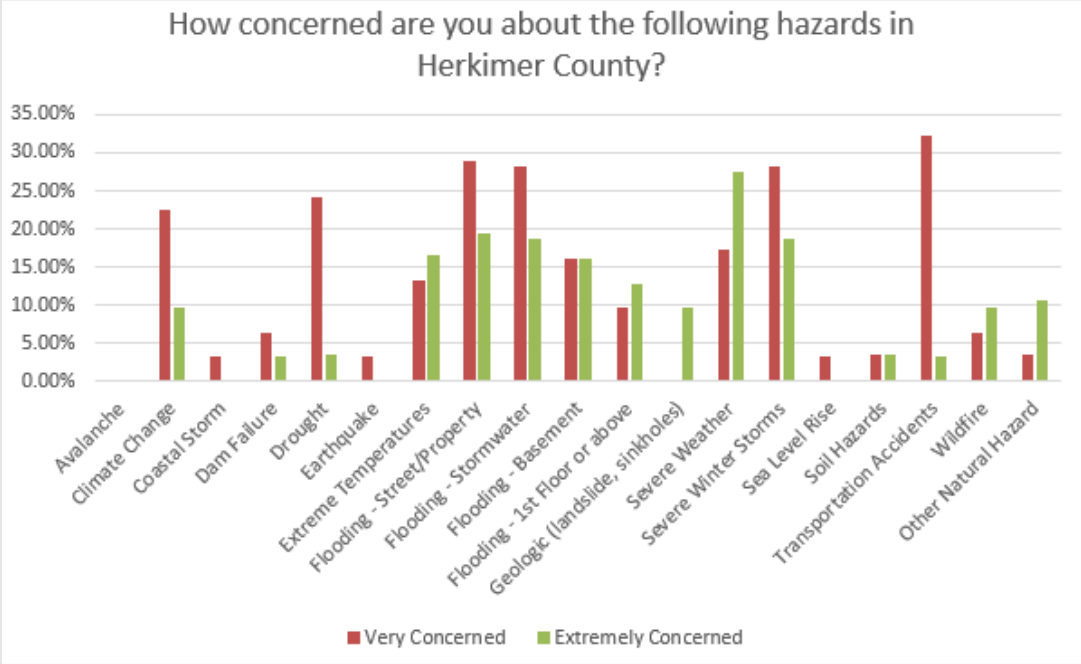


Figure 3.5. Most concerning hazards in Herkimer County



Respondents identified the following as desired projects to implement to reduce the damages due to natural hazards:

- Retrofit infrastructure, such as elevating roadways and improving drainage systems (73.08%)
- Work on improving the damage resistance of utilities (electricity, communications, water/wastewater facilities, etc.) (69.23%)
- Enhance stream maintenance programs/projects (61.54%)
- Replace inadequate or vulnerable bridges and causeways (61.54%)
- Retrofit and strengthen essential facilities such as police, schools, and hospitals (57.69%)

What types of projects you believe local, county, state or federal government agencies could be doing to reduce the damage and disruption of natural disasters in Herkimer County?

"Community solar"

"If there is a buyout program utilized, the municipality needs to be able to sell that property, with language in the transfer that doesn't allow any building or structures to be placed on the property that is bought out. The municipalities are being hurt financially due to loss of tax revenue and that's causing major issues within these areas."

"A better alert system would be helpful. Our road has been closed several times due to flooding and we receive no alert, when our road is closed due to flooding, we can't leave our road (bridge at each end)"

Respondents were then given the opportunity to propose their own projects they would like to see implemented in Herkimer County.

- Develop a community solar system to improve the damage resistance of utility systems.
- A respondent expressed concern with how buyout programs are utilized and suggested that tax revenue losses are considered within buyout strategies.
- Improve the emergency alert system. A respondent noted that they have experienced multiple road closures due to flooding without receiving an alert.
- Public safety relative to aging infrastructure was identified as a need with the Frankfort Schuyler Bridge identified for repairs.

Respondents were also asked about their property's location within the floodplain, and if they have flood insurance. Of the 32 respondents who answered this question, only 2 (6.25%) indicated that their property is located in a designated floodplain. Additionally, 2 residents (6.06%) indicated their home is covered by flood insurance. The most self-selected jurisdictions respondents indicated that they live in, include the Village of Ilion, Village of Herkimer, Village of Dolgeville, Town of Little Falls, and Village of Mohawk.

Municipality-specific responses can be found in Section 9 (Jurisdictional Annexes).

Refer to Appendix D (Public and Stakeholder Outreach) for the full list of survey questions and responses.

3.5 INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The Herkimer County plan strives to use the best available technical information, plans, studies and reports throughout the planning process to support hazard profiling; risk and vulnerability assessment; review and evaluation of mitigation capabilities; and the identification, development and prioritization of County and local mitigation strategies.

The asset and inventory data used for the risk and vulnerability assessments is presented in the County Profile (Section 4). Details of the source of this data, along with technical information on how the data was used to develop the risk and vulnerability assessment, is presented in the Hazard Profiling and Risk Assessment Section (Section 5), specifically within Section 5.3 (Data and Methodology), as well as throughout the hazard profiles in Section 5.4. Further, the source of technical data and information used may be found within the References section.

Plans, reports and other technical information were identified and accessed online or provided directly by the County, participating jurisdictions and numerous stakeholders involved in the planning effort, as well as through independent research by the planning consultant. The County and participating jurisdictions were tasked with updating the inventory of their Planning and Regulatory capabilities (see Capability Assessment section of each jurisdictional annex in Section 9) and providing relevant planning and regulatory documents as applicable. Relevant documents, including plans, reports, and ordinances were reviewed to identify:

- Existing municipal capabilities;
- Needs and opportunities to develop or enhance capabilities, which may be identified within the County or local mitigation strategies;
- Mitigation-related goals or objectives, considered in the review and update of the overall Goals and Objectives (see Section 6);
- Proposed, in-progress, or potential mitigation projects, actions and initiatives to be incorporated into the updated County and local mitigation strategies.

The following local regulations, codes, ordinances and plans were reviewed during this process in an effort to develop mitigation planning goals and objectives and mitigation strategies that are consistent across local and regional planning and regulatory mechanisms; and thus develop complementary and mutually supportive strategies, including:

- Comprehensive/Master Plans
- Building Codes
- Zoning and Subdivision Ordinances
- NFIP Flood Damage Prevention Ordinances
- Site Plan Requirements
- Local Waterfront Revitalization Plans

- Stormwater Management Plans
- Emergency Management and Response Plans
- Land Use and Open Space Plans
- Capital Plans
- Climate Smart Community Program
- Community Rating System
- New York State Standard Multi-Hazard Mitigation Plan, 2019

During the course of this planning process, a concerted effort was made to review all relevant plans contributing to the capability of the county and each municipality to integrate effective mitigation efforts into the daily activities of the county and municipalities. Documentation of this extensive review is reflected in the capability assessment table in each of the municipal annexes wherein the plan types, names, and dates are indicated in the table as well as a summary of how the plan supports mitigation and resilience. The A partial listing of the plans, reports and technical documents reviewed in the preparation of this plan (inclusive of those which provided the basis for capabilities in the previous plan) is included in Table 3-4. Additional plans providing source information are found in the annexes as noted above as well as the References section of this plan.

Table 3-4. Record Review (Municipalities) - Record of the review of existing programs, policies, and technical documents for participating jurisdictions

Existing plan, program or technical documents	Date	Jurisdictional Applicability
Herkimer-Oneida Counties Transportation Council Transportation Improvement Program	2023-2027	Herkimer/Oneida County
Unified Planning Work Program (UPWP)	April 2022	Herkimer Oneida County
Flood Hazard Mitigation Plan	2004	Countywide
Stormwater Management Plan	-	Countywide
Herkimer County Comprehensive Emergency Management Plan	April 2015	Countywide
Emergency Plan of Action for Highway Related Incidents	March 2008	Countywide
Herkimer County Community Development Strategic Plan	January 2022	Countywide
Herkimer County Agricultural and Farmland Protection Plan	July 2020	Countywide
NY Rising Countywide Resiliency Plan	July 2014	Countywide
Long-Range Transportation Plan Update	2015	Countywide
Herkimer County Risk Assessment Profile	2016	Countywide
Fulmer Creek Basin Multi-Community Flood Hazard Mitigation Plan	May 2004	Countywide
Mohawk River Watershed Management Plan	2015	Countywide
Herkimer County Empire Zone Law	2005	Countywide
Regulating Public and Private Sewers – Sewer Use Law	2016	Countywide
Town of Columbia Comprehensive Plan	2018	Town of Columbia
Town of Columbia Zoning Law	2002	Town of Columbia
Town of Danube Site Plan Review	2002	Town of Danube
Uniform Building and Fire Code	2020	Town of Danube
Flood Damage Prevention	1999	Town of Danube
Water Rules and Regs	1982	Town of Dolgeville
Fracking Moratorium	2012	Town of Dolgeville
Water Quality Report	2017	Town of Dolgeville
Zoning Laws	2000	Town of Dolgeville
Master Plan	2008	Town of Dolgeville
Sewer Law	2013	Town of Dolgeville
Land Use Regulation Law	1999	Town of Fairfield
Flood Damage Prevention	2000	Town of Frankfort
Streets, Sidewalks & Culverts	1987	Town of Frankfort
Subdivision of Land	1964	Town of Frankfort
Fire Prevention and Building	1987	Town of Frankfort
Zoning	1969	Town of Frankfort
Water & Wellhead Protection	2008	Town of Frankfort

Existing plan, program or technical documents	Date	Jurisdictional Applicability
Draft Plan	2021	Town of Frankfort
Sewer Code	1982	Town of Frankfort
2021 Water Quality Report	2021	Town of Frankfort
NYS Police Reform and Reinvention Collaborative Draft Plan	2021	Town of Frankfort
Flood Damage Prevention	2000	Town of Frankfort
Building Code	1998	Town of Frankfort
Fire Prevention and Building	2003	Town of German Flatts
Sewer Rules and Regs	2013	Town of Herkimer
Water Rules and Regs	2019	Town of Herkimer
Subdivision Guide	-	Town of Herkimer
Subdivision Ordinance	1985	Town of Herkimer
Property Maintenance	2019	Town of Herkimer
Comprehensive Plan Excerpt	-	Town of Herkimer
Annual Drinking Water Report	2022	Village of Herkimer
Comprehensive Plan	1978	Village of Herkimer
Zoning Ordinance	1962	Village of Herkimer
Flood Damage Protection Project	-	Village of Herkimer
2020 Master Plan	2018	Village of Herkimer
Fire Prevention and Building	1991	Village of Ilion
Flood Damage Prevention	2000	Village of Ilion
Sewer Code	1975	Village of Ilion
Streets and Sidewalks	1971	Village of Ilion
Subdivision of L:and	1971	Village of Ilion
Trees and Shrubs	1971	Village of Ilion
Zoning	1971	Village of Ilion
Comprehensive Plan Update in Process	1971	Village of Ilion
Comprehensive Plan	1971	Town of Litchfield
Flood Hazard Law	2001	Town of Litchfield
Land Development Code	2005	Town of Litchfield
Water Quality Report 2021	2021	City of Little Falls
Master Plan	2018	City of Little Falls
Waterfront District	2010	City of Little Falls
Zoning Regulations	1997	City of Little Falls

Existing plan, program or technical documents	Date	Jurisdictional Applicability
Waterfront Review Law	2001	City of Little Falls
Uniform Building and Fire Code	2010	City of Little Falls
Building Code	2017	Town of Little Falls
Subdivision Regs.	2000	Town of Little Falls
Zoning Ordinance	1996	Town of Manheim
Subdivision Regulations	1975	Town of Manheim
Site Plan Review Standards	2021	Town of Manheim
Stormwater Inspection	-	Town of Manheim
Flood Damage Prevention	2022	Town of Manheim
Water Quality Report 2020	2020	Town of Middleville
Stormwater Management Plan	-	Town of Middleville
Uniform Building and Fire Code	2010	Town of Middleville
Property Maintenance	2011	Town of Middleville
Development Standards	1998	Town of Middleville
Village Code Complete	2018	Village Mohawk
Comprehensive Plan	2011	Town of Newport
Comprehensive Plan Supporting Docs	2011	Town of Newport
Building Code	1982	Town of Newport
Flood Damage Prevention	1991	Town of Newport
Zoning Ordinance	2016	Town of Newport
Uniform Building and Fire Code Amended	2005	Town of Norway
Uniform Building and Fire Code	2006	Town of Ohio
Water Quality Report	2022	Village of Poland
Uniform Building and Fire Code	2007	Village of Poland
Flood Damage Prevention	1999	Village of Poland
Town of Russia Comprehensive Plan	2004	Town of Russia
Land Use Regulation Law	2012	Town of Russia
Building Code	2004	Town of Russia
Zoning Ordinance	2007	Town of Russia
Flood Damage Prevention	1999	Town of Russia
No website - No complete Regs	-	Town of Salisbury
Community Development Strategic Plan	2019	Town of Schuyler
Health Emergency Plan	2021	Town of Schuyler
Zoning Ordinance - file not complete	-	Town of Schuyler
Stormwater Management Plan	-	Town of Schuyler
Flood Damage Prevention	2001	Town of Schuyler
Building Code Adopted	2016	Town of Schuyler
Comprehensive Plan	2002	Town of Stark

Existing plan, program or technical documents	Date	Jurisdictional Applicability
Land Use Regulations	2004	Town of Stark
Subdivision Regulations	2002	Town of Stark
Subdivision Regulations	2021	Town of Warren
Site Plan Review	2019	Town of Warren
Uniform Fire and Building Code	2019	Town of Warren
Comprehensive Plan	2019	Town of Webb
Comprehensive Plan Appendices	2019	Town of Webb
Wastewater Infrastructure Plan	2008	Town of Webb
Zoning	1997	Town of Webb
Flood Damage Prevention	2013	Town of Webb
Streets and Sidewalks	2004	Town of Webb
Subdivision of Land	1990	Town of Webb
Water Regulations	-	Town of Webb
Uniform Fire and Building Code	2007	Town of West Winfield
Zoning Regulations	1974	Town of Winfield
Flood Hazard Areas	2000	Town of Winfield

3.6 INTEGRATION WITH EXISTING PLANNING MECHANISMS AND PROGRAMS

Effective mitigation is achieved when hazard awareness and risk management approaches and strategies become an integral part of public activities and decision-making. Within the county there are many existing plans and programs that support hazard risk management, and thus it is critical that this hazard mitigation plan integrate and coordinate with, and complement, those existing plans and programs.

The "Capability Assessment" section of Chapter 6 (Mitigation Strategy) provides a summary and description of the existing plans, programs and regulatory mechanisms at all levels of government (Federal, State, County and local) that support hazard mitigation within the county. Within each jurisdictional annex in Chapter 9, the County and each participating jurisdiction have identified how they have integrated hazard risk management into their existing planning, regulatory and operational/administrative framework ("integration capabilities") and how they intend to promote this integration ("integration actions").

A further summary of these continued efforts to develop and promote a comprehensive and holistic approach to hazard risk management and mitigation is presented in Section 7.

3.7 CONTINUED PUBLIC INVOLVEMENT

Herkimer County and participating jurisdictions are committed to the continued involvement of the public in the hazard mitigation process. This Plan update will be posted on-line (currently at https://www.herkimercountynyhmp.com/), and municipalities will be encouraged to maintain links to the plan website. Further, the County will make the Plan available for review digitally on its website, on local websites, and at public locations as identified on the public plan website.

A notice regarding annual updates of the plan and the location of plan will be publicized annually after the Planning Committee's annual evaluation and posted on the public website (currently https://www.herkimercountynyhmp.com/).

Each jurisdiction's governing body shall be responsible for receiving, tracking, and filing public comments regarding this plan.

The public will have an opportunity to comment on the plan as a part of the annual mitigation planning evaluation process and the next five-year mitigation plan update. The HMP Coordinator (currently Ms. Kelly Wares, Deputy Director of Herkimer County Emergency Services) is responsible for coordinating the plan evaluation portion of the meeting, soliciting feedback, collecting and reviewing the comments, and ensuring their incorporation in the 5-year plan update as appropriate; however, members of the Planning Committee will assist the HMP Coordinator. Additional meetings may also be held as deemed necessary by the Planning Committee. The purpose of these meetings would be to provide the public an opportunity to express concerns, opinions, and ideas about the plan.

Further details regarding continued public involvement are provided in Section 7.

After completion of this plan, implementation and ongoing maintenance will continue to be a function of the Planning Committee. The Planning Committee will review the plan and accept public comment as part of an annual review and as part of five-year mitigation plan updates.

A notice regarding annual updates of the plan and the location of plan copies will be publicized annually after the HMP Committee's annual evaluation and posted on the public web site.

Ms. Kelly Wares, Deputy Director of Herkimer County Emergency Services has been identified as the ongoing County All-Hazard Mitigation Plan Coordinator (see Section 7), and is responsible for receiving, tracking, and filing public comments regarding this Plan Update. Contact information is:

Mailing Address:	**Herkimer County Emergency Services** **COML – COMT | NYS COMU** 71 Reservoir Road Herkimer, New York 13350
Contact Name:	**Kelly Wares, Deputy Director**

Email Address: kwares@herkimercounty.org

Telephone: (315) 867-1212

SECTION 4. COUNTY PROFILE

Profile information is presented and analyzed to develop an understanding of a study area, including the economic, structural, and population assets at risk and the concerns that may be related to hazards analyzed later in this plan (e.g., areas prone to flooding or a high percentage of vulnerable persons in a particular area). This section describes the general profile of Herkimer County (government, physical setting, population and demographics, general building stock, land use, and population trends) and critical facilities located within the county.

4.1 GENERAL INFORMATION

Figure 4-1. Herkimer County Courthouse

Source: Kerr 2009

The land area that is now Herkimer County was part of the original Albany County when counties were first established in New York State in 1683. The counties were reorganized between 1766 and 1791 during subsequent geographical realignment. Herkimer County, the longest in the state, assumed its present form in 1817. Early in its history, the natural environment supported the county's population growth and economy. Forests in the northern region provided wood products and recreational opportunities in the Adirondack Mountains, while the southern creeks and river valleys sustained industry and agriculture, especially dairying. The Mohawk River and Erie Canal offered efficient transportation routes for passengers and trade. These, combined with a growing railroad network, created recreational opportunities and later contributed to the tourism economy. This trend was supported by the creation of Adirondack Park in 1892. The Erie Canal, proposed in 1808 and completed in 1825, contributed to the development of communities in the Mohawk Valley and provided the means to transport goods from the east coast to inland markets via Lake Erie and other inland waterways. Industries, such as Remington Arms, the oldest industry in Herkimer County, continue to play a major economic role and provide many jobs. Local firms have for 200 years produced rifles, typewriters, farm equipment, furniture, textiles, shoes, data records, bicycles,

Figure 4-2. Herkimer County Line

Source: Emerson 2017

nutcrackers, paper, and dairying equipment. The growing economy drew immigrants from throughout Europe to work in industry and agriculture, thereby building a diverse local culture.2 The natural hazards affecting Herkimer County are well documented. Newcomers to the region settled along the waterways crisscrossing the land. Consequently, the county and its municipalities have been repeatedly affected by flooding that caused loss of life and property damage (Previous HMP).

4.2 MAJOR PAST HAZARD EVENTS

Presidential disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government, although no specific dollar loss threshold has been established for these declarations. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses, and public entities. Some of the programs are matched by state programs. Review of presidential disaster declarations helps establish the probability of reoccurrence for each hazard and identify targets for risk reduction. Table 4-1 shows Federal Emergency Management Agency (FEMA) disaster declarations that included Herkimer County through May 2023 (records date back to 1954).

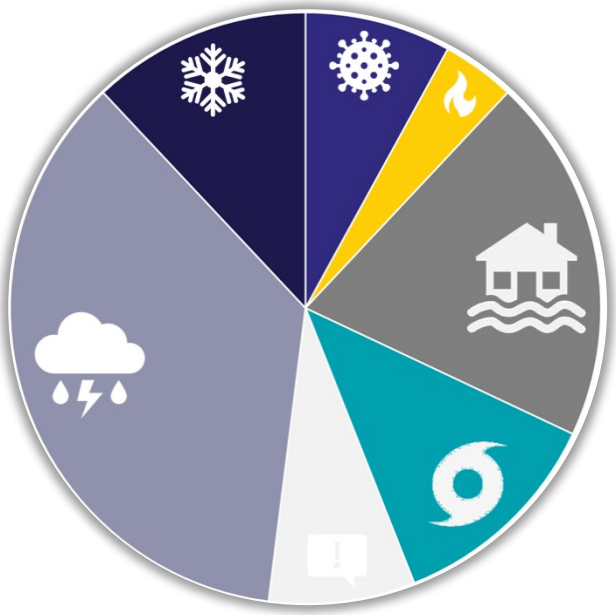


Table 4-1. History of Hazard Events in Herkimer County, New York

Disaster Number	Event Date(s)	Declaration Date	Incident Type	Title
DR-447	July 23, 1974	July 23, 1974	Flood	Severe Storms & Flooding
DR-515	July 21, 1976	July 21, 1976	Flood	Severe Storms & Flooding
EM-3107	March 13-17, 1993	March 17, 1993	Snow	Severe Blizzard
DR- 1095	January 19-30, 1996	January 24, 1996	Flood	Severe Storms & Flooding
DR-1244	September 7, 1998	September 11, 1998	Severe Storms	NY – Severe Weather
DR-1335	May 3-August 12, 2000	July 21, 2000	Severe Storms	Severe Storms & Flooding
EM-3155	May 22-November 1, 2000	October 11, 2000	Other	West Nile Virus
DR-1391	September 11, 2001	September 11, 2001	Fire	Fires and Explosion
EM-3173	December 25, 2002 to January 4, 2003	February 25, 2003	Snow	Snowstorms
EM-3186	August 14-16, 2003	August 23, 2003	Other	Power Outage

Disaster Number	Event Date(s)	Declaration Date	Incident Type	Title
DR-1534	May 13-June 17, 2004	August 3, 2004	Severe Storms	Severe Storms & Flooding
EM-3262	August 29-October 1, 2005	September 30, 2005	Hurricane	Hurricane Katrina Evacuation
DR-1650	June 26-July 10, 2006	July 1, 2006	Severe Storms	Severe Storms & Flooding
DR-1670	November 16-17, 2006	December 12, 2006	Severe Storms	Severe Storms & Flooding
DR-1993	April 26-May 8, 2011	June 10, 2011	Flood	Severe Storms, Flooding, Tornadoes, and Straight-Line Winds
DR-4020	August 26-September 5, 2011	August 31, 2011	Hurricane	Hurricane Irene
EM-3341	September 7-11, 2011	September 8, 2011	Severe Storms	Remnants Of Tropical Storm Lee
DR-4031	September 7-11, 2011	September 13, 2011	Severe Storms	Remnants Of Tropical Storm Lee
EM-3351	October 27-Nveomber 8, 2012	October 28, 2012	Hurricane	Hurricane Sandy
DR-4129	June 26-July 10, 2013	July 12, 2013	Flood	Severe Storms & Flooding
DR-4180	May 13-22, 2014	July 8, 2014	Severe Storms	Severe Storms & Flooding
DR-4322	March 14-15, 2017	July 12, 2017	Snow	Severe Winter Storm and Snowstorm
DR-4472	October 31-November 1, 2019	December 19, 2019	Severe Storms	Severe Storms, Straight-Line Winds, and Flooding
EM-3434	January 20, 2020 to May 11, 2023	March 13, 2020	Biological	Covid-19
DR-4480	January 20, 2020 to May 11, 2023	March 20, 2020	Biological	Covid-19 Pandemic

4.3 PHYSICAL SETTING

This section presents the physical setting of Herkimer County, including its location, topography, hydrography and hydrology, climate, and land use and land cover.

4.3.1 Location

Herkimer County is in central New York State, northwest of Albany and east of Syracuse. It has 7 neighbors: Hamilton County, Fulton County, Lewis County, Montgomery County, Oneida County, Otsego County and St. Lawrence County. Refer Figure 4-3 for an overview map of Herkimer County.

4.3.2 Topography and Geology

Topography

The land in Herkimer County generally slopes from north to south. The highest point (2,704 feet) is atop an unnamed peak in the West Canada Creek State Wilderness Area. The lowest elevation (303

feet) is near the Mohawk River. The average elevation is 1,480 feet. The topography of Herkimer causes slight variations in the general climate conditions from the northern region to the southern region.

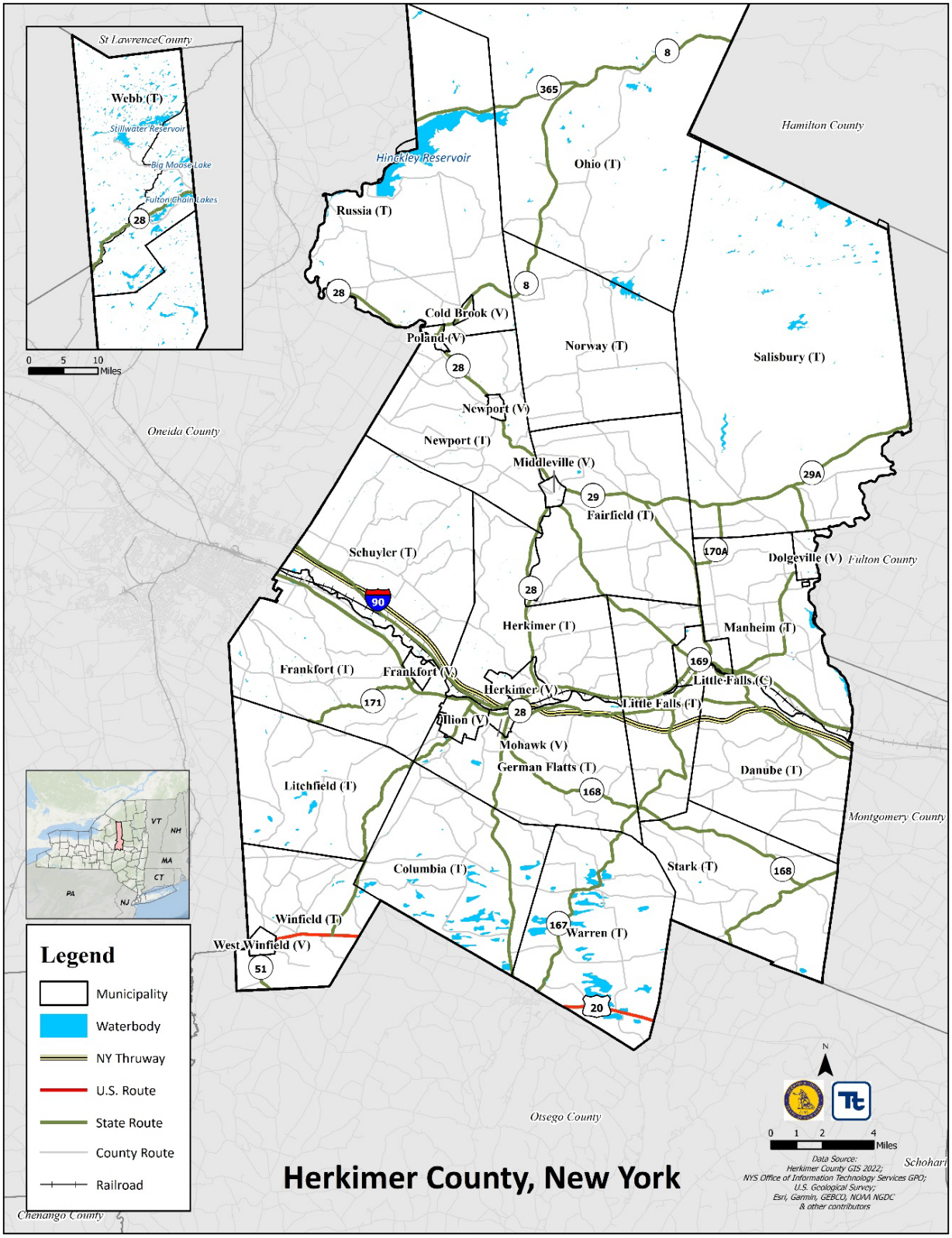
Between the Mohawk River Valley at the south end and the Adirondack Mountains to the north lies a diverse mixture of geography, geology, and biology. The terrain ranges from wetlands and rolling hills to steep mountains. In general, water drains from the northern areas into numerous watersheds moving south into the Mohawk River. Waterways south of the river generally drain northwards into the river. Floodplains and areas of riparian habitat along the rivers and streams in the county provide locations for groundwater recharge and stormwater management. (Previous HMP)

Geology

The northern part of the county is in Adirondack Park, which is sparsely populated and largely under the jurisdiction of the Adirondack Park Agency (APA). Large segments are forested and crossed by creeks and streams that flow toward the Mohawk River Valley and into the Mohawk River, which flows across the southern portion of the county. Areas bordering or located near the Mohawk River and its tributaries are the most densely populated.

The Erie Canalway National Heritage Corridor is made up of geology, soils, and landforms shaped by construction of the canals almost 200 years ago. The segment of the canal that traverses the Planning Area includes approximately 40 percent of New York State's freshwater resources and drains nearly half of the state's total area (Erie Canalway National Heritage Corridor 2022).

Figure 4-3. Location of Herkimer County, New York



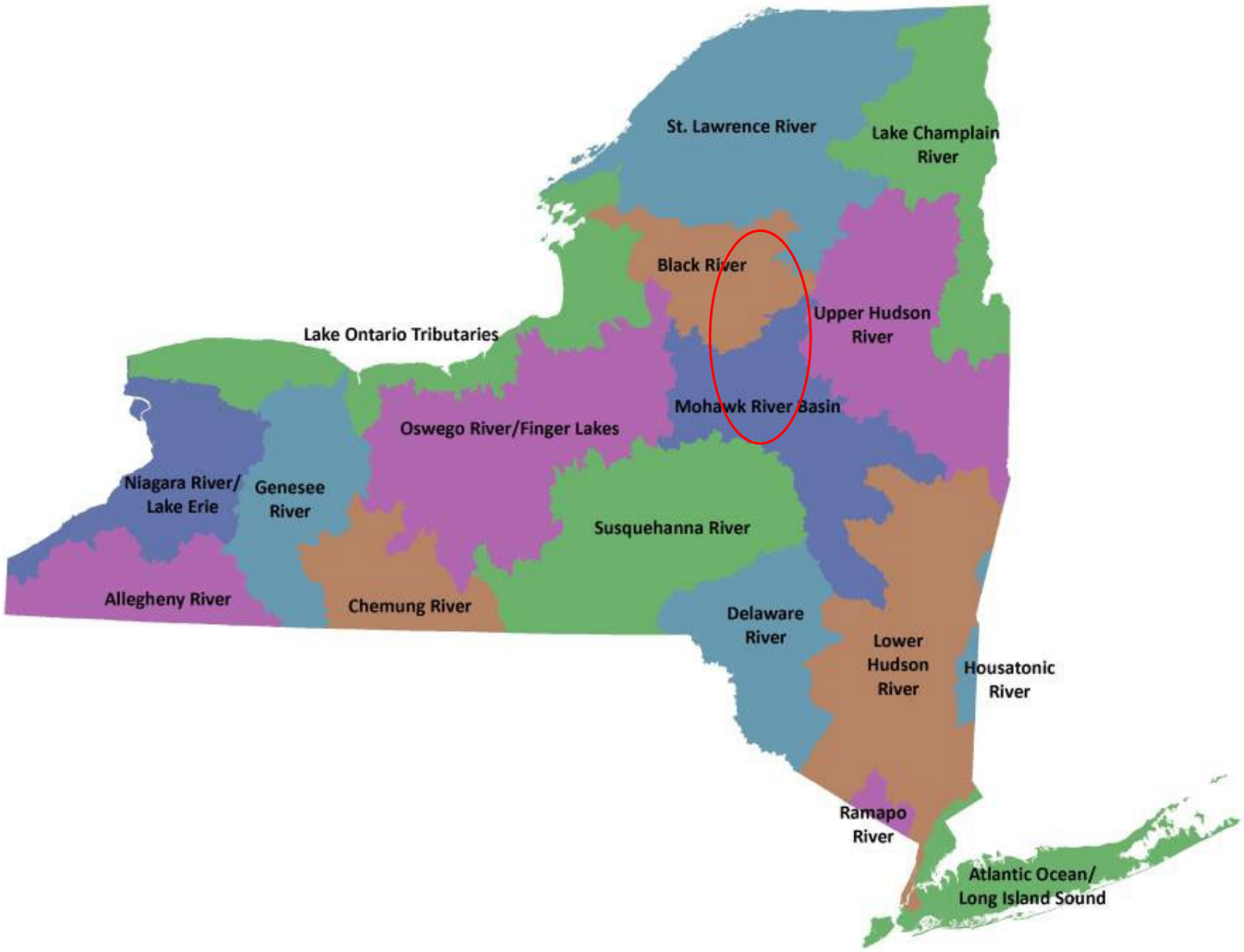
4.3.3 Hydrography and Hydrology

Numerous ponds, lakes, creeks, and rivers make up the waterscape of Herkimer County. Some waterbodies include Baby Lakes, Bear Creek, Beaver Brook, Beaver River, Bellinger Brook, Big Moose Lake, Big Otter Lake, Black Creek, Cold Brook, East Canada Creek, Fulmer Creek, Fulton Chain Lakes, Hinckley Reservoir, Honnedaga Lake, Independence River, Left Channel of Mohawk River, Lily Lake, Little Moose Lake, Little Woodhull Lake, Mohawk River, Moyer Creek, Mud Lake, Nowadaga Creek, NYDOT Canal, Ocquionis Creek, Otsquago Creek, Otter Creek, Panther Lake, Stearns Mudhole, Steele Creek, Steele Creek, Stillwater Reservoir, West Canada Creek, West Canada Creek Reach 1, West Canada Creek Reach 2, West Canada Creek Reach 3, and Woodhull Lake (NYSDEC 2023).

Figure 4-4 presents a map of watersheds in Herkimer County. The County is located within the Saint Lawrence River Basin, Mohawk River Basin and the Black River Basin.

- **Saint Lawrence River Basin** - The Saint Lawrence River Basin lies at the border of New York State and Canada. The Saint Lawrence River serves as the gateway between the North Atlantic and the Great Lakes. At its most downstream point in the Unites States the Saint Lawrence drains an area of nearly 300,000 square miles. Within New York State the watershed drains the northern and western Adirondack Mountains and the lake plain region of the Saint Lawrence Valley. It is located in northern New York State and contains all of Saint Lawrence County, most of Franklin County, much of northern Jefferson, Lewis, Herkimer and Hamilton Counties, and small portions of western Essex and Clinton Counties (NYSDEC 2023).
- **Mohawk River Basin** - The Mohawk River Basin lies entirely within the borders of New York State. The Mohawk River originates in the valley between the western Adirondacks and the Tug Hill Plateau and flows 140 miles to the east where it joins the Hudson River. The Mohawk River Basin comprises about one-quarter of the larger Hudson River Basin. Sections of the Mohawk River also serve as the New York State Barge (Erie) Canal. It is located in central New York State and contains all of Montgomery County, most of Schoharie County, much of Schenectady, Greene, Fulton, Herkimer and Oneida Counties, and smaller portions of Albany, Saratoga, Delaware, Otsego, Hamilton, Madison and Lewis Counties (NYSDEC 2023).
- **Black River Basin** - The Black River Basin drains the western slope of the Adirondack Mountains and the eastern edge of the Tug Hill Plateau before flowing north and west and emptying into Lake Ontario. The Black River watershed is mostly forested and sparsely populated; the primary population center is located in Watertown. It is located in central New York State and contains much of Jefferson, Lewis, and Herkimer Counties, and portions of western Hamilton and northern Oneida Counties (NYSDEC 2023).

Figure 4-4. Watersheds in New York State



Source: NYSDEC 2023
Note: The red circle indicates the approximate location of Herkimer County.

4.3.4 Climate

The climate of the county is classified as continental-humid, with cold winters and mild summers with precipitation well distributed throughout the year. The result of this climate is an abundance of flora and fauna throughout the region and a wealth of water resources. Temperature wise, the July high is around 79 degrees, while the January low is around 10 degrees. On average Herkimer County gets about 47 inches of rain a year and 105 inches of snow a year (Climate in Herkimer County n.d.).

4.3.5 Land Use and Land Cover

According to the United States Geological Survey (USGS), the greatest share of land use/land cover in Herkimer County is forest, covering 68.4 percent of all land in the county. The next largest shares

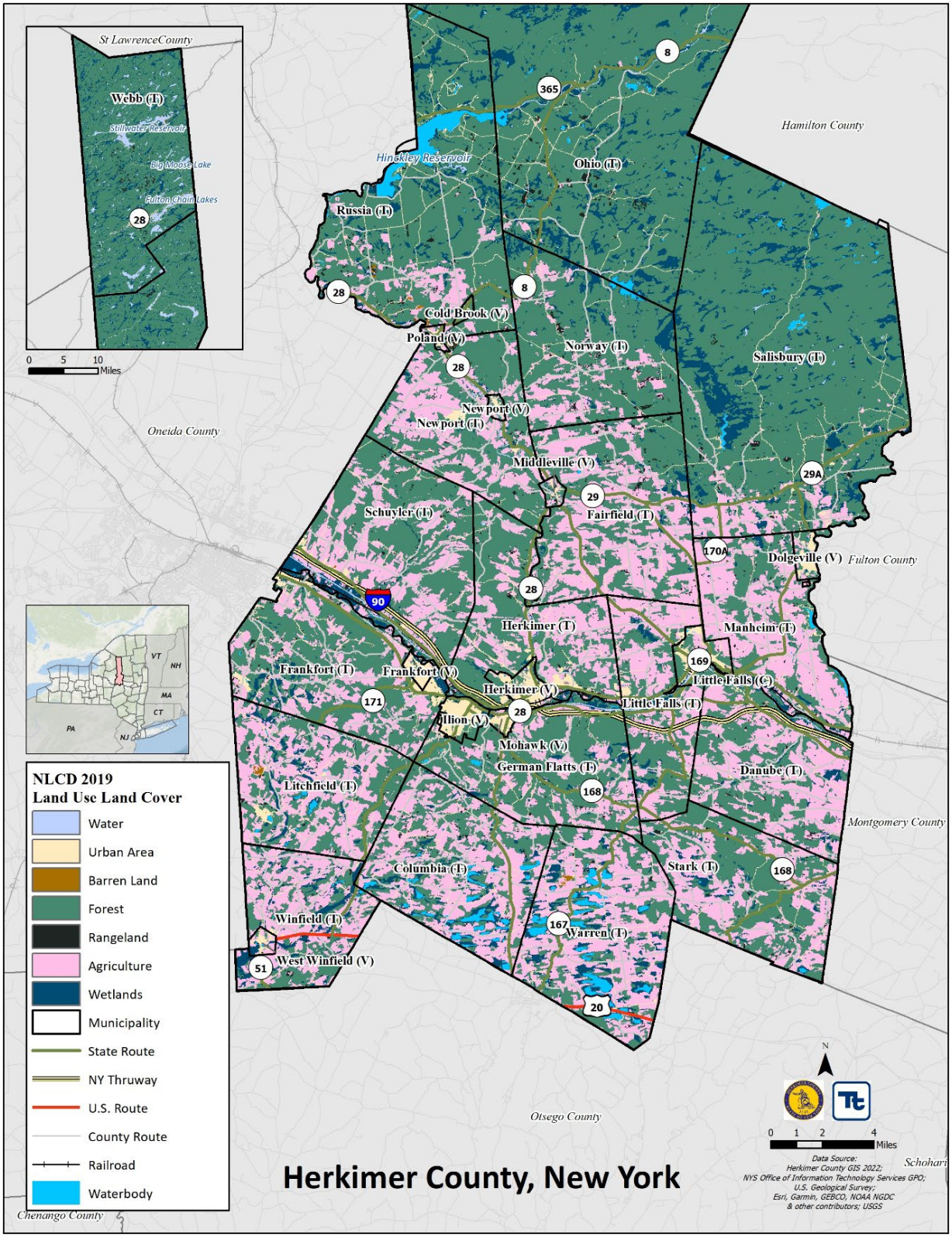
are agriculture with 14.3 percent, followed by wetland and urban, with 9.2 percent and 3.8 percent, respectively. Table 4-2 summarizes the land cover categories by the total area classified under each category (USGS 2011).

Table 4-2. Herkimer County Land Use Classification Table

Category Description*	Property Acreage	Area (percent)
Agriculture	133,084	14.3%
Barren	773	0.1%
Forest	637,657	68.4%
Rangeland	10,675	1.1%
Urban	35,110	3.8%
Water	29,452	3.2%
Wetland	86,106	9.2%
Herkimer County Total	**932,857**	**100.0%**

Source: Herkimer County GIS – 2022; NLCD –2019
**Agriculture – areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops; or areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20-percent of total vegetation*
**Barren – areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material.*
**Forest – areas dominated by trees, typically greater than 15 feet tall, and greater than 20-percent total vegetation cover*
**Rangeland – areas dominated by shrubs, less than 15 feet tall with shrub canopy, includes shrubs, young trees in an early successional stage or trees stunted from environmental conditions; or areas dominated by herbaceous vegetation, generally greater than 80-percent of total vegetation*
**Urban – areas with a mixture of constructed materials and vegetation consisting of residential homes, parks, golf courses, and vegetation planted in developed settings*
**Water – areas of open water, generally with less than 25-percent cover of vegetation*
**Wetland - areas where forest or shrubland vegetation accounts for greater than 20-percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water*

Figure 4-5. Herkimer County Land Use and Land Cover



4.4 POPULATION AND DEMOGRAPHICS

An understanding of the planning area population characteristics provides a foundation for deciphering the impacts of natural hazards in the county. As noted in Section 5.1 (Methodology) of this plan, modeling of the impacts of natural hazards on the population was performed using FEMA's Hazards U.S. Multi-Hazard (HAZUS-MH) in which the available population information includes the 2010 U.S. Decennial Census data, which indicates a county population of 62,259. However, more current data, according to U.S. Decennial Census Bureau in 2020 indicates a county population of approximately 60,139, which is a 6.8-percent decrease in population since 2010. Table 4-3 shows the 2020 Decennial Census for Herkimer County and its jurisdictions.

Various Census Bureau products were used as sources for the population trends section. The Decennial Census is the official population count taken every 10 years. American Community Survey 5-Year Estimates are used to show annual population changes, but it is not an official population count. 5-Year Estimates are used because they are the most accurate form of American Community Survey with the largest sample size, which allows for greater accuracy at smaller geographic areas. The American Community Survey 5-Year Estimate products were used to establish annual changes in population. The numbers provided are not official census counts but are official estimates provided to communities so that they may have a greater understanding in population changes within their jurisdictions.

For the purposes of this plan, the default population data available in Hazus-MH v5.1* are used for Hazus estimated results (representing 2010 data) to support the analysis for displaced households and number of persons seeking shelter. Population exposure results are based upon the 2020 Decennial Census and the vulnerable population exposure results are based upon the 2021 American Community Survey 5-Year Estimate (ACS).

Table 4-3. Herkimer County Population Statistics (2020)

Jurisdiction	Total	Percent of County Total
Cold Brook (V)	250	0.4%
Columbia (T)	1,569	2.6%
Danube (T)	953	1.6%
Dolgeville (V)	2,042	3.4%
Fairfield (T)	1,197	2.0%
Frankfort (T)	4,691	7.8%
Frankfort (V)	2,320	3.9%
German Flatts (T)	2,202	3.7%
Herkimer (T)	2,332	3.9%
Herkimer (V)	7,234	12.0%
Ilion (V)	7,646	12.7%
Litchfield (T)	1,444	2.4%
Little Falls (C)	4,605	7.7%
Little Falls (T)	1,497	2.5%
Manheim (T)	1,040	1.7%
Middleville (V)	407	0.7%
Mohawk (V)	2,415	4.0%
Newport (T)	1,321	2.2%

Jurisdiction	Total	Percent of County Total
Newport (V)	543	0.9%
Norway (T)	740	1.2%
Ohio (T)	962	1.6%
Poland (V)	464	0.8%
Russia (T)	1,702	2.8%
Salisbury (T)	1,830	3.0%
Schuyler (T)	3,296	5.5%
Stark (T)	714	1.2%
Warren (T)	1,029	1.7%
Webb (T)	1,797	3.0%
West Winfield (V)	733	1.2%
Winfield (T)	1,164	1.9%
Herkimer County (Total)	**60,139**	**100%**

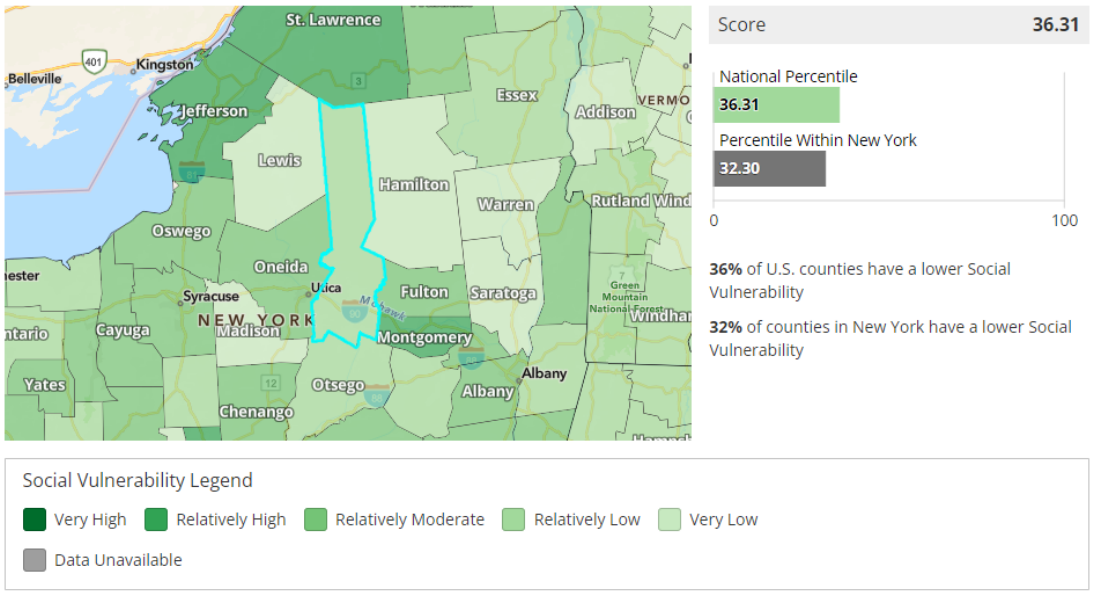
Source: U.S. Census 2020

4.4.1 Vulnerable Populations

DMA 2000 requires that HMPs consider socially vulnerable populations. These populations can be more susceptible to hazard events based on several factors, including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. The vulnerable populations in the 2023 HMP include (1) the elderly (persons aged 65 and over), (2) those identified as living below the poverty threshold (households with two adults and two children with an annual household income below $25,926 per year), (3) the physically or mentally disabled, and (4) non-English speakers. Identifying concentrations of vulnerable populations can assist communities in targeting preparedness, response, and mitigation actions.

Populations with a higher level of vulnerability can be more seriously affected during the course of an emergency or disaster. Vulnerable populations have unique needs that need to be considered by public officials to help ensure the safety of demographics with a higher level of risk. Additionally, different types of vulnerable populations are impacted by different types of hazard events. For example, those with limited access or no access to a vehicle may be more impacted by a hazard event as they will likely have more issues evacuating if necessary.

Figure 4-6. Herkimer County Social Vulnerability Index (FEMA NRI)



Additionally, the FEMA National Risk Index (NRI) was utilized to determine risk index, social vulnerability, and community resilience scores of Herkimer County. The NRI indicated that Herkimer County has a relatively low social vulnerability score with a score of 36.31 out of 100, which notes that the county has a relatively low susceptibility to the impacts of natural hazards when compared to the rest of the U.S.

Due to the relatively low social vulnerability, additional community outreach to vulnerable populations was deemed necessary above and beyond engaging agencies that work with and represent the residents of Herkimer County.

Table 4-4 summarizes Herkimer County's 2021 ACS vulnerable population estimates by jurisdiction. Figure 4-7 displays the population densities by census tract for the vulnerable populations in the County.

Figure 4-7. Vulnerable Populations in Herkimer County

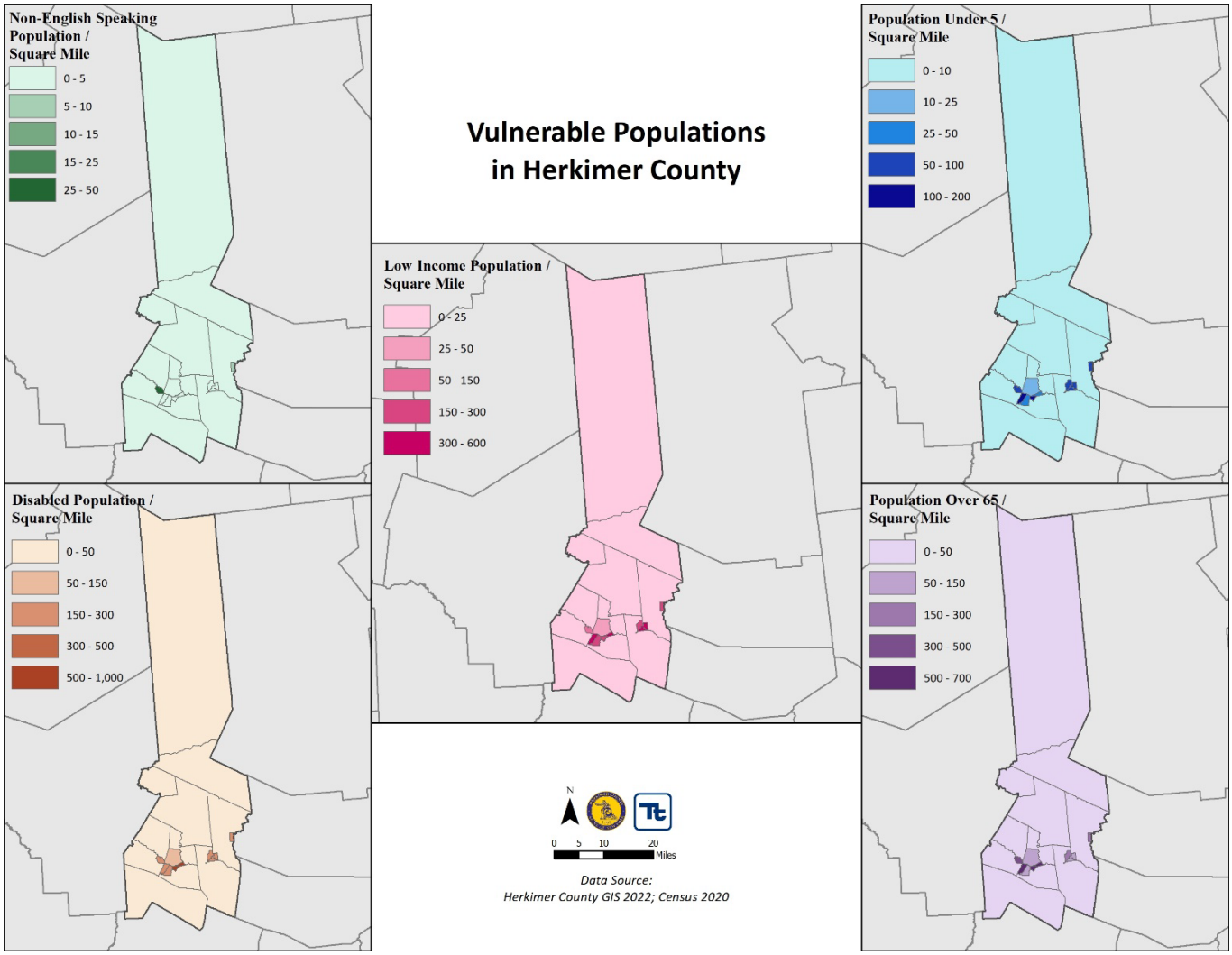


Table 4-4. Herkimer County Vulnerable Population Statistics

Herkimer County Jurisdiction	Population (2021 ACS)	% of County Total	American Community 5-Year Estimates 2021 Population									
			Over 65	% of Jurisdiction Total	Under 5	% of Jurisdiction Total	Non-English Speaking	% of Jurisdiction Total	Disability	% of Jurisdiction Total	Poverty Level	% of Jurisdiction Total
Cold Brook (V)	256	0.4%	32	12.5%	12	4.7%	0	0.0%	41	16.0%	40	15.6%
Columbia (T)	1,444	2.4%	247	17.1%	79	5.5%	5	0.3%	164	11.4%	157	10.9%
Danube (T)	803	1.3%	153	19.1%	85	10.6%	0	0.0%	124	15.4%	92	11.5%
Dolgeville (V)	2,402	4.0%	466	19.4%	151	6.3%	22	0.9%	358	14.9%	361	15.0%
Fairfield (T)	1,119	1.8%	195	17.4%	148	13.3%	0	0.0%	90	8.1%	104	9.3%
Frankfort (T)	4,771	7.9%	1,162	24.4%	255	5.3%	117	2.4%	683	14.3%	365	7.7%
Frankfort (V)	2,296	3.8%	424	18.5%	112	4.9%	32	1.4%	310	13.5%	152	6.6%
German Flatts (T)	1,930	3.2%	412	21.3%	145	7.5%	0	0.0%	286	14.8%	236	12.2%
Herkimer (T)	2,396	4.0%	614	25.6%	79	3.3%	22	0.9%	340	14.2%	290	12.1%
Herkimer (V)	7,239	11.9%	1,801	24.9%	143	2.0%	56	0.8%	1,632	22.5%	913	12.6%
Ilion (V)	7,826	12.9%	1,439	18.4%	232	3.0%	0	0.0%	1,046	13.4%	1,041	13.3%
Litchfield (T)	1,360	2.2%	276	20.3%	97	7.1%	0	0.0%	155	11.4%	100	7.4%
Little Falls (C)	4,634	7.6%	793	17.1%	328	7.1%	0	0.0%	809	17.5%	1,135	24.5%
Little Falls (T)	1,712	2.8%	259	15.1%	74	4.3%	7	0.4%	177	10.3%	82	4.8%
Manheim (T)	707	1.2%	203	28.7%	56	7.9%	0	0.0%	148	20.9%	43	6.1%
Middleville (V)	620	1.0%	109	17.6%	55	8.9%	0	0.0%	102	16.5%	61	9.8%
Mohawk (V)	2,595	4.3%	565	21.8%	175	6.7%	10	0.4%	506	19.5%	261	10.1%
Newport (T)	1,060	1.7%	207	19.6%	51	4.8%	15	1.4%	116	10.9%	202	19.0%
Newport (V)	531	0.9%	132	24.9%	26	4.9%	0	0.0%	96	18.1%	43	8.1%
Norway (T)	812	1.3%	108	13.3%	20	2.5%	0	0.0%	87	10.7%	54	6.7%
Ohio (T)	1,049	1.7%	288	27.5%	40	3.8%	0	0.0%	159	15.2%	139	13.3%
Poland (V)	545	0.9%	57	10.5%	68	12.5%	0	0.0%	44	8.1%	69	12.7%
Russia (T)	1,826	3.0%	339	18.6%	154	8.4%	0	0.0%	296	16.2%	264	14.5%
Salisbury (T)	2,281	3.8%	362	15.9%	70	3.1%	0	0.0%	375	16.4%	399	17.5%
Schuyler (T)	3,311	5.5%	738	22.3%	109	3.3%	85	2.6%	490	14.8%	325	9.8%
Stark (T)	652	1.1%	122	18.7%	50	7.7%	5	0.7%	65	10.0%	79	12.1%
Warren (T)	1,167	1.9%	141	12.1%	53	4.5%	12	1.0%	194	16.6%	222	19.0%
Webb (T)	1,340	2.2%	518	38.7%	24	1.8%	0	0.0%	166	12.4%	87	6.5%
West Winfield (V)	745	1.2%	174	23.4%	32	4.3%	15	2.0%	103	13.8%	71	9.5%
Winfield (T)	1,167	1.9%	202	17.3%	55	4.7%	34	2.9%	88	7.5%	367	31.4%
Herkimer County (Total)	**256**	**0.4%**	**12,538**	**20.7%**	**2,978**	**4.9%**	**435**	**0.7%**	**9,250**	**15.3%**	**7,754**	**12.8%**

Socially Vulnerable Populations

Social vulnerability refers to a community's capacity to prepare for and respond to the stress of hazardous events ranging from natural disasters to human-caused threats.

While age and income have been traditional indicators of vulnerable populations, the CDC Social Vulnerability Index (SVI) is a recent tool used to identify socially vulnerable populations. The CDC defines socially vulnerable population using factors such as poverty, lack of access to transportation, and crowded housing. These factors may weaken a community's ability to prevent human suffering and financial lost in a disaster. The SVI uses U.S. Census data to determine the social vulnerability of every census tract. The SVI ranks each tract on 16 social factors, including poverty, lack of vehicle access, and crowded housing, and groups them into four related themes. Figure 4-8 depicts the social vulnerability of communities in Herkimer County, by census tract (Agency for Toxic Substances and Disease Registry 2022).

Figure 4-8. CDC/ATSDR Overall Social Vulnerability for Herkimer County (2020)

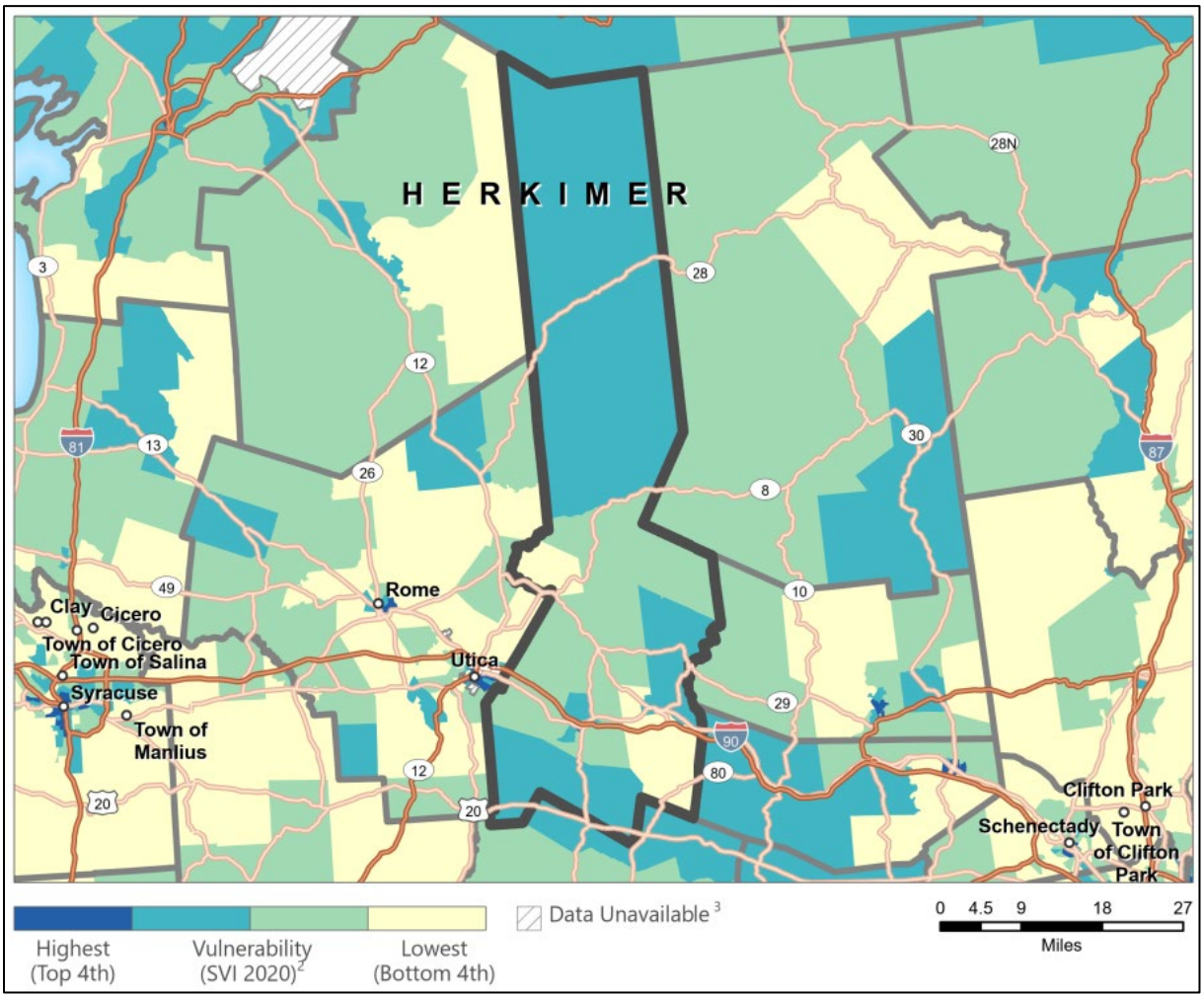
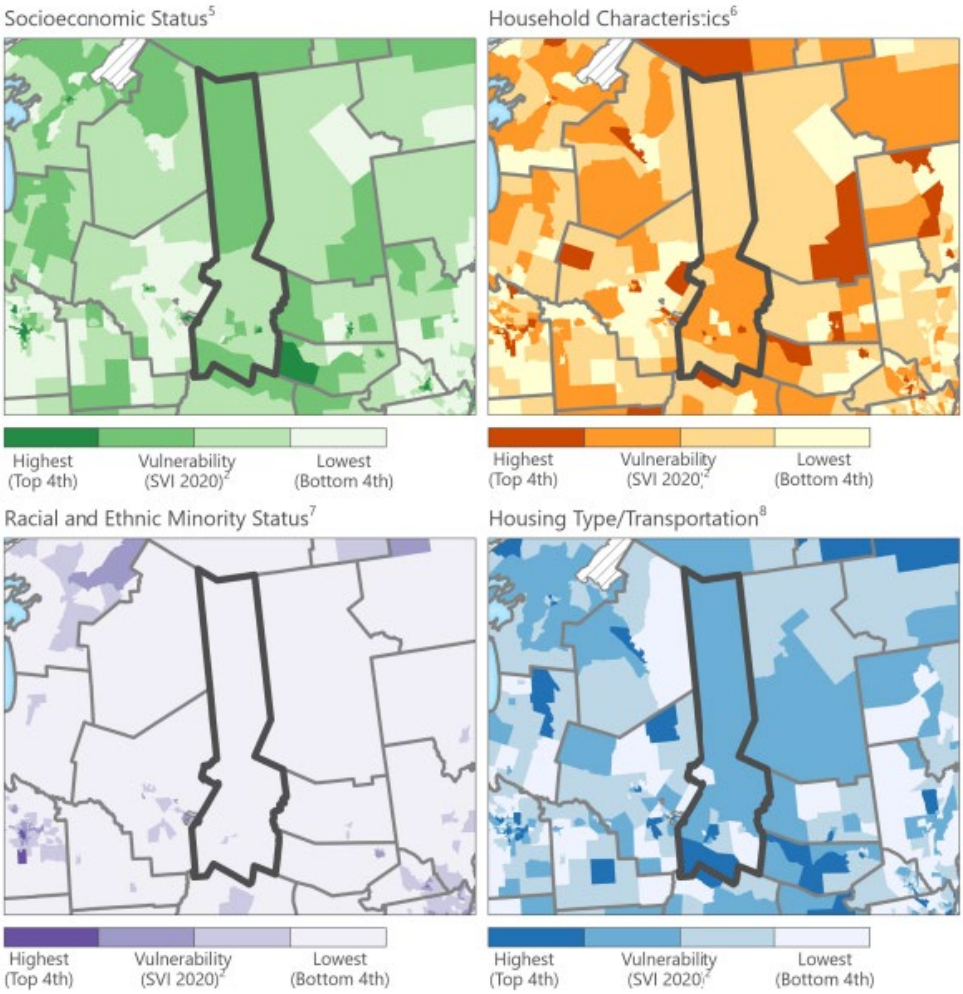


Figure 44-9. Herkimer County SVI Themes



Data Sources: [1]CDC/ATSDR/GRASP, U.S. Census Bureau, Esri® StreetMapTM Premium.
Notes: [1]Overal Social Vulnerability: All 16 variables. [2]Census tracts with 0 population. [4]The CDC/ATSDR SVI combines percentile rankings of US Census American Community Survey (ACS) 2016-2020 variables, for the state, at the census tract level. [5]Socioeconomic Status: Below 150% Poverty, Unemployed, Housing Costs Burden, No High School Diploma, No Health Insurance. [6]Household Characteristics: Aged 65 and Older, Aged 17 and Younger, Civilian with a Disability, Single-Parent Household, English Language Proficiency. [7]Race/Ethnicity: Hispanic or Latino (of any race); Black and African American, Not Hispanic or Latino; American Incian and Alaska Native, Not Hispanic or Latino; Asian, Not Hispanic or Latino; Native Hawaiian and Other Pacific Islander, Not Hispanic or Latino; Two or More Races, Not Hispanic or Latino; Other Races, Not Hispanic or Latino. [8]Housing Type/Transportation: Multi-Unit Structures, Mobile Homes, Crowding, No Vehicle, Group Quarters.
Projection: New York NAD 1983 UTM Zone 18N, CM shifted to -76.
References: Flanagan, B.E., et al., A Social Vulnerability Index for Disaster Management. *Journal of Homeland Security and Emergency Management*, 2011. 8(1).
CDC/ATSDR SVI web page: https://www.atsdr.cdc.gov/placeandhealth/svi/index.html.

The maps indicate that majority of population in the county have social vulnerability a theme index in the lower half of the spectrum. Regarding the household characteristics theme, the highest index is seen in the southern portion of the County. For the racial and ethnic minority theme the majority of the County reflects the lowest vulnerability with a small area in the southwest portion of the County indicating some vulnerability. The housing/transportation theme shows a range of vulnerability from the highest index in the southwest areas of the County. This analysis can inform planning and financial policy regarding social equity in the future. For each hazard type identified in the plan, there are different types of socially vulnerable population groups that may be more impacted. Considerations for improving outcomes for vulnerable populations will include increased outreach and public education, increased preventative measures, and strengthened local plans

and policies. In order to protect low-income populations during a hazard event, the plan supports investment in underserved areas, assessing social vulnerability indicators, and considering impacts before a mitigation project to ensure that it helps at-risk populations.

Age

Children are considered vulnerable to hazard events because they are dependent on others to safely access resources during emergencies and may experience increased health risks from hazard exposure. Older adults are more vulnerable before and after disasters and experience more causalities during and after disasters when compared to other age groups. Those living on their own may have more difficulty evacuating their homes. The elderly are also more likely to live in senior care and living facilities where emergency preparedness occurs at the discretion of facility operators. Factors include a greater prevalence of chronic conditions, multi-morbidity, cognitive impairment and medication concerns during disasters; greater dependence on assistive devices (i.e., walkers, glasses) and support requirements, from caregivers and others, during disasters; and likelihood of social isolation (American Red Cross 2020).

According to the 2021 ACS, the median age in Herkimer County is 44.3. Of the County's total population of 60,596, 20.7-percent (12,538 persons) of the County's population is age 65 and older and 4.9-percent (2,978 persons) are under the age of 5 (U.S. Census Bureau 2023). In order to protect the older population during hazard events, the plan supports adopting more resilient and efficient building and land use standards, avoiding siting senior housing and facilities near hazard-prone areas, reducing the risk to community lifelines, and ensuring that critical facilities and services have alternate power.

Income

The 2021 ACS provides that the median household income in Herkimer County was $60,561. The U.S. Census Bureau identifies households with two adults and two children with an annual household income below $25,926 per year as *low income* (U. S. Census 2021). The 2021 ACS indicates that 12.9-percent (7,754 persons) of persons are below the poverty level within the County (U.S. Census Bureau 2023).

Physically or Mentally Disabled

According to the Centers for Disease Control, "A disability is any condition of the body or mind (impairment) that makes it more difficult for the person with the condition to do certain activities (activity limitation) and interact with the world around them (participation restrictions) (CDC 2020)." Cognitive impairments can increase the level of difficulty that individuals might face during an emergency and reduce an individual's capacity to receive, process, and respond to emergency information or warnings. Individuals with a physical or sensory disability can face issues of mobility, sight, hearing, or reliance on specialized medical equipment. According to the 2021 ACS, 9,250 persons or 15.4-percent of residents in Herkimer County are living with a disability.

Non-English Speakers

Individuals who are not fluent or do not have a working proficiency in English are vulnerable because they can have difficulty with understanding information being conveyed to them. Cultural differences also can add complexity to how information is being conveyed to populations with limited proficiency of English (CDC 2021). According to the 2021 ACS, 0.7-percent of the County's population over the age of 5 primarily speaks a language other than English at home.

Other Vulnerability Factors

Additional vulnerability factors impact a community or group's ability to prepare, respond, or recover from a hazard event. These factors can increase vulnerability. Physical barriers, such as a lack of vehicle access or transportation options, can be a challenge. Herkimer County has 9.96% of households without a vehicle, a low rate per the FEMA Resilience Analysis and Planning Tool (RAPT). Another vulnerability factor is related to educational attainment. In Herkimer County, 9.13% of the population does not have a high school diploma (RAPT). Lastly, Herkimer County also has a low rate of the population with a disability rate of 15.41%. To protect against transportation related vulnerabilities, network drainage, transit system resilience, evacuation routes, and critical roadways should be considered and prioritized. To protect those with disabilities, accessibility must be a component of implemented resilience measures. Universal design is important to building far reaching resilience and mitigation projects.

4.4.2 General Building Stock

According to the 2021 ACS, there are 32,485 housing units located in Herkimer County. A household includes all the people who occupy a housing unit as their usual residence. A housing unit is a house, apartment, mobile home or trailer, a group of rooms, or a single room occupied as separate living quarters (or if vacant, intended for occupancy as separate living quarters). According to the 2021 ACS, the majority of housing units (71.4-percent) in Herkimer County are classified as one-unit detached homes. The median price of a single-family home in Herkimer County was estimated at $110,500 based on the 2021 ACS (U.S. Census Bureau 2023).

For this update, the default general building stock in HAZUS-MH v4.2 was used to estimate the number of structures and replacement cost value (structure and contents) for Herkimer County. The replacement cost values in HAZUS-MH are based on RS Means 2016 valuations. Approximately 30,655 structures were identified by the tax data and spatial data available. These structures account for a replacement cost value of approximately $12.2 billion (Table 4-5).

Figure 4-10 through Figure 4-12 shows the replacement cost value of residential, commercial, and industrial properties in Herkimer County.

Table 4-5. Building Stock Count and Replacement Cost Value (RCV) by Occupancy Class

Municipality	Total	
	Count	RCV
Cold Brook (V)	132	$31,447,000
Columbia (T)	714	$233,619,000
Danube (T)	491	$138,056,000
Dolgeville (V)	836	$380,709,000
Fairfield (T)	552	$167,531,000
Frankfort (T)	2,063	$809,592,000
Frankfort (V)	971	$419,877,000
German Flatts (T)	1,074	$329,725,000
Herkimer (T)	1,098	$449,516,000
Herkimer (V)	2,653	$1,713,408,000
Ilion (V)	2,779	$1,278,193,000
Litchfield (T)	757	$274,972,000
Little Falls (C)	1,848	$1,054,936,000
Little Falls (T)	690	$248,266,000
Manheim (T)	657	$217,981,000
Middleville (V)	250	$105,595,000
Mohawk (V)	1,092	$433,485,000
Newport (T)	526	$180,332,000
Newport (V)	263	$98,222,000
Norway (T)	404	$134,191,000
Ohio (T)	1,039	$272,235,000
Poland (V)	210	$100,894,000
Russia (T)	1,106	$318,980,000
Salisbury (T)	990	$258,689,000
Schuyler (T)	1,542	$467,196,000
Stark (T)	351	$82,011,000
Warren (T)	461	$230,094,000
Webb (T)	4,220	$1,396,251,000
West Winfield (V)	389	$194,977,000
Winfield (T)	497	$195,070,000
Herkimer County (Total)	**30,655**	**$12,216,050,000**

Figure 4-10. Distribution of Residential Building Stock and Value Density in Herkimer County

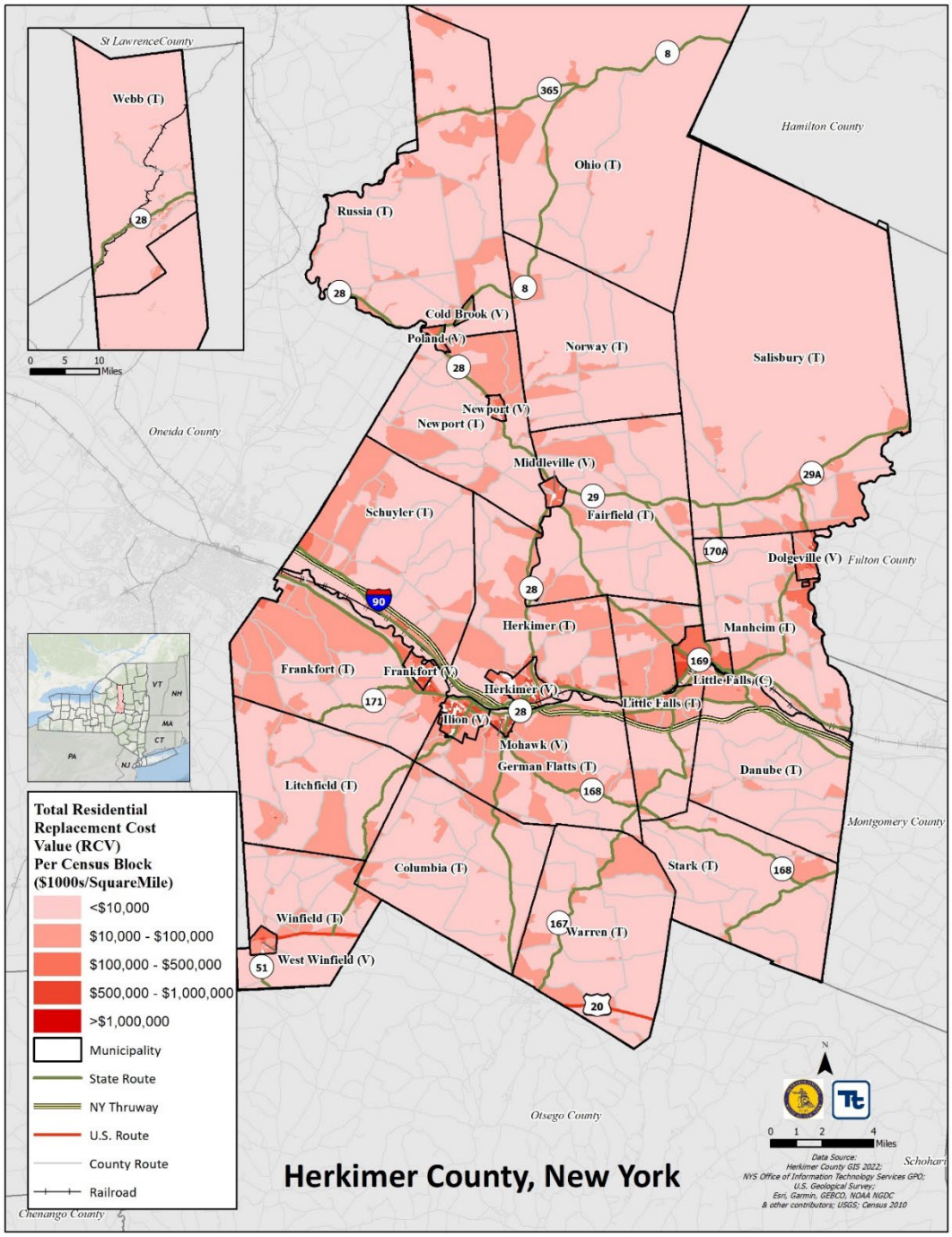


Figure 4-11. Distribution of Commercial Building Stock and Value Density in Herkimer County

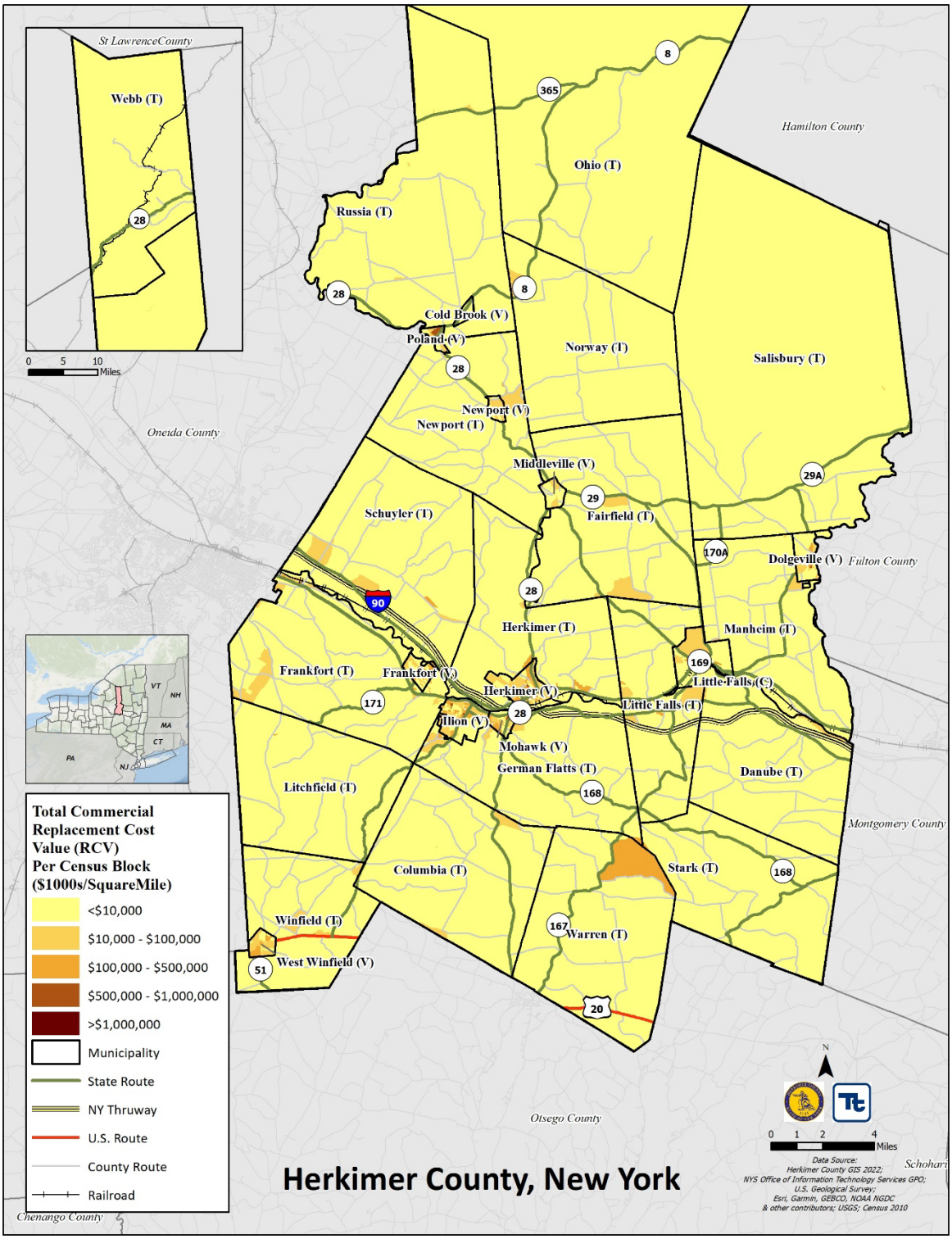
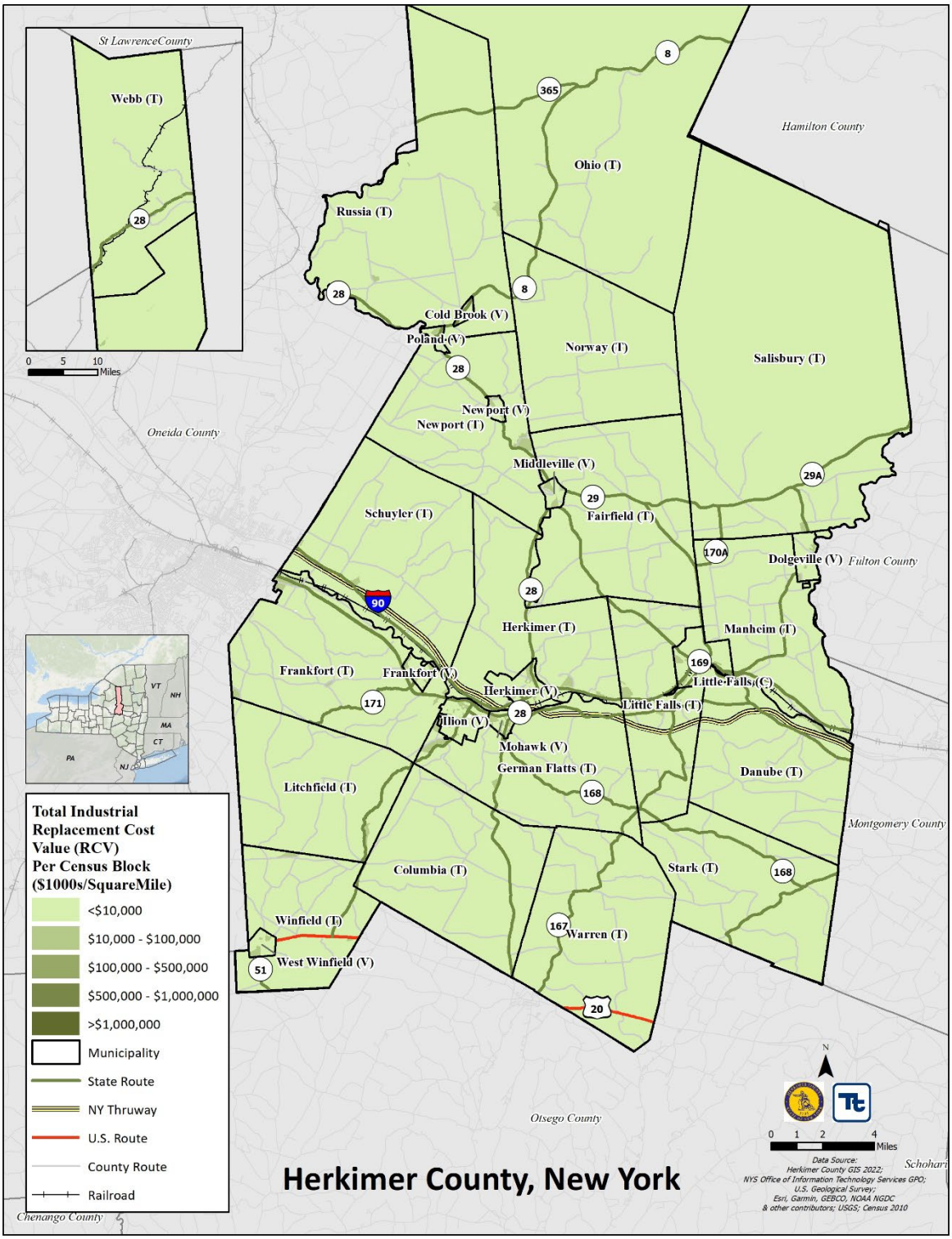


Figure 4-12. Distribution of Industrial Building Stock and Value Density in Herkimer County



4.5 LAND USE AND POPULATION TRENDS

Land use regulatory authority is vested in New York State's towns, villages, and cities. However, many development and preservation issues transcend location political boundaries. DMA 2000 requires that communities consider land use trends, which can impact the need for and prioritization of mitigation options over time. Land use trends significantly impact exposure and vulnerability to various hazards. For example, significant development in a hazard area increases the building stock and population exposed to that hazard.

This plan provides a general overview of population, land use, and types of development occurring within the study area. An understanding of these development trends can assist in planning for further development and ensuring that appropriate mitigation, planning, and preparedness measures are in place to protect human health and community infrastructure.

4.5.1 Land Use Trends

Herkimer County's population has fluctuated in recent decades. The Herkimer County Community Development Strategic Plan has identified revitalization and redevelopment of key areas in the county as a priority to attract and grow business (Fairweather Consulting 2022)

Agriculture

In Herkimer County's rural southern communities, people value the rural lands and small working farms, quiet lifestyles and slower paces, traditional agricultural communities and institutions like granges and volunteer fire departments. The Herkimer County Strategic Prioritization Plan of 2022 pushes for community supported agriculture, farm cooperatives and local food markets that can help protect growers from financial risks and losses that come with more unpredictable weather and storms in relation to climate change (Fairweather Consulting 2022)

Herkimer County contains 596 farms, a 13 percent decrease since 2012. These farms make up 117,780 acres of land within the county, a decrease of 16 percent from 2012, with the average farm size being 198 acres, a decrease of 3 percent from 2012. Out of the 117,780 acres of farmland, 59 percent is cropland, 13 percent is pastureland, 20 percent is woodland, and the rest is classified as other. In total, net cash farm income is $15,643,000 which is a 14 percent decrease (USDA 2017).

Economy

One of the most important findings from the economic analysis is that economic diversification should be an important consideration in Herkimer County's economic development. The County has always seen substantial growth in employment in Fabricated Metal Manufacturing due to an arms manufacturing center nearby and it accounts for between one-third to one-half of all manufacturing jobs in the County. However, currently the arms manufacturing center in the Village of Ilion is experiencing problems during and post COVID-19 (Fairweather Consulting 2022).

According to preliminary estimates from economic data firm EMSI, during the period from 2020 to 2021, the County saw a modest gain in overall employment including increases in retail trade (87 jobs), professional & technical services (12 jobs), accommodation & food services (49 jobs), offset by the loss of 79 jobs in manufacturing. In previous times, the most efficient system for warehousing and distribution involved extremely large warehouse facilities to gain economies of scale. In the Covid (and likely post-Covid) economy, that has given way to the creation of smaller warehouses located closer to markets to serve proliferating demand more quickly. As evidenced by the Amazon facility being developed in Frankfort, Herkimer County's location on I-90 makes it a potential candidate for these new types of facilities (Fairweather Consulting 2022).

The U.S. Census Bureau's Economic Census provides an annual series of sub-national economic data by industry covering the majority of the country's economic activity. According to the 2021 Herkimer County Economic Census, the professional, scientific, and technical services sector has the largest number of establishments, while the retail trade sector has the largest number of employees. The professional, scientific, and technical services sector comprises the highest payroll.

Table 4-6. Economic Census for Herkimer County, New York

Sector	Number of Establishments	Number of employees	Annual payroll ($1,000)
Accommodation and food services	160	1,307	$28,982
Administrative and support and waste management and remediation services	49	231	$10,096
Agriculture, forestry, fishing and hunting	4	5	$175
Arts, entertainment, and recreation	31	174	$10,271
Construction	142	484	$42,139
Educational services	8	164	$4,541
Finance and insurance	38	271	$10,218
Health care and social assistance	111	1,981	$82,429
Industries not classified	17	85	$3,505
Information	56	1,800	$95,916
Management of companies and enterprises	5	39	$2,135
Manufacturing	130	786	$17,350
Mining, quarrying, and oil and gas extraction	52	165	$6,529
Other services (except public administration)	36	111	$3,654
Professional, scientific, and technical services	163	1,948	$59,584
Real estate and rental and leasing	40	1,093	$40,052
Retail trade	7	47	$3,543
Transportation and warehousing	28	565	$44,844
Utilities	160	1,307	$28,982
Wholesale trade	49	231	$10,096
Total (does not include withheld data or range of numbers)	**1,081**	**11,343**	**$470,453**

Source: U.S. Census 2021

4.5.2 Population Trends

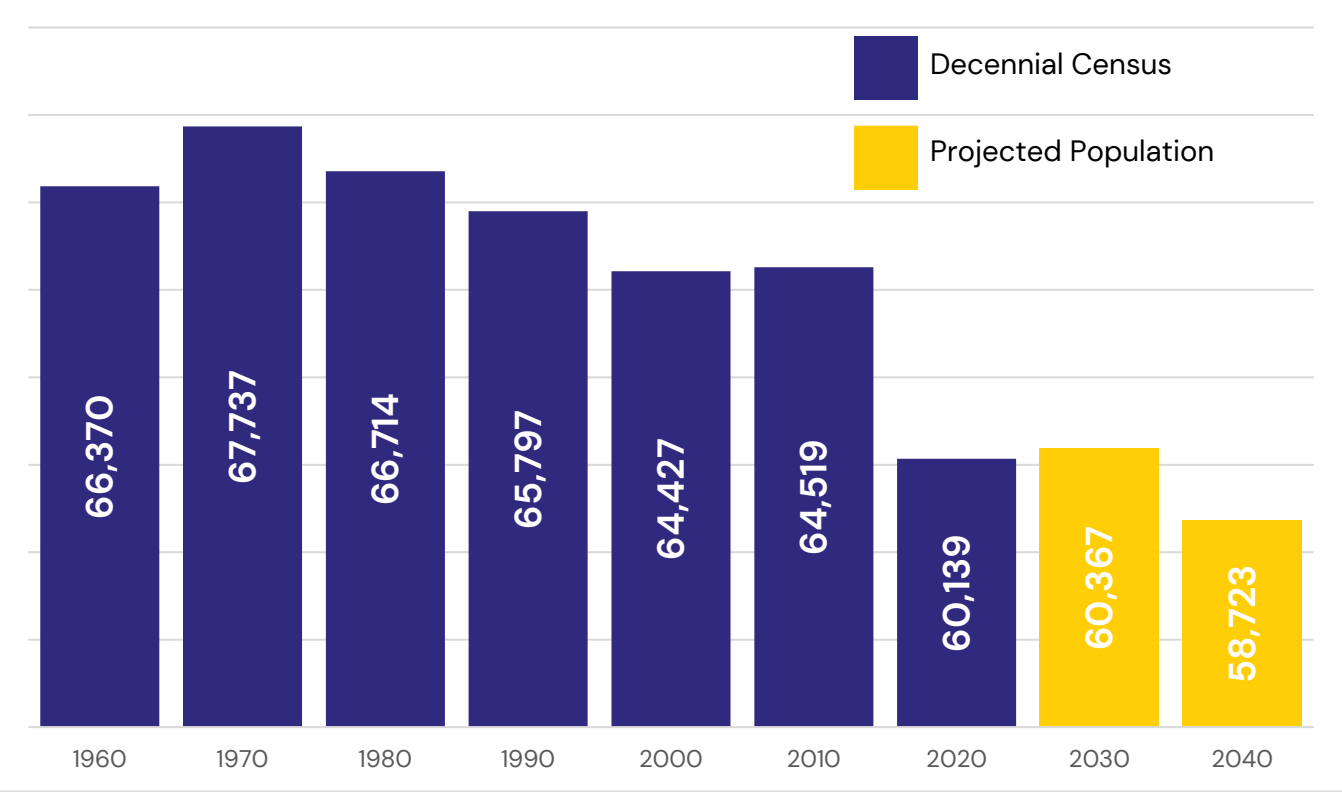
This section discusses population trend information used to estimate future shifts that could significantly change the character of the area. Population trends can provide a basis for making decisions on the type of mitigation approaches to be considered and the locations in which these approaches should be applied. This information can also be used to support planning decisions regarding future development in vulnerable areas. Herkimer County's population has fluctuated since 1960, as shown in Table 4-7 and Figure 4-13.

Table 4-7. Population Growth Projections

Jurisdiction	Historical (Decennial Census)							Projected	
	1960	1970	1980	1990	2000	2010	2020	2030	2040
Herkimer County	66,370	67,737	66,714	65,797	64,427	64,519	60,139	60,367	58,723

Source: Cornell Program on Applied Demographics 2017; Cornell Program on Applied Demographics 2018

Figure 4-13. Total Population and Projections for Herkimer County, 1960 to 2040



Source: Cornell Program on Applied Demographics 2017; Cornell Program on Applied Demographics 2018

4.5.3 Future Growth and Development

Details regarding development specific to each participating municipality is provided in Section 9 (Jurisdictional Annexes).

4.6 CRITICAL FACILITIES AND COMMUNITY LIFELINES

Critical facilities and infrastructure are those that are essential to the health and welfare of the population. These become especially important after any hazard event. Critical facilities are typically defined to include police and fire stations, schools, and emergency operations centers. Critical infrastructure can include the roads and bridges that provide ingress and egress and allow emergency vehicles access to those in need and the utilities that provide water, electricity, and communication services to the community. Also included are Tier II facilities (hazardous materials) and rail yards; rail lines hold or carry significant amounts of hazardous materials with a potential to impact public health and welfare in a hazard event.

Critical Facilities are those facilities considered critical to the health and welfare of the population and that are especially important following a hazard. As defined for this HMP, critical facilities include essential facilities, transportation systems, lifeline utility systems, high-potential loss facilities, and hazardous material facilities.

Essential facilities are a subset of critical facilities that include those facilities that are important to ensure a full recovery following the occurrence of a hazard event. For the county risk assessment, this category was defined to include police, fire, EMS, schools/colleges, shelters, senior facilities, and medical facilities.

Lifelines enable the continuous operation of critical business and government functions and are essential to human health and safety or economic security.

FEMA develop community lifelines to increase effectiveness in disaster operations and better position FEMA to respond to catastrophic incidents. This construct, known as "community lifelines", allows to characterize the incident and identify the root causes of priority issue areas and distinguish the highest priorities and most complex issues from other incident information. Lifelines are divided into eight categories which include:

- Safety and Security
- Food, Hydration, Shelter
- Health and Medical
- Energy (Power and Fuel)
- Communications
- Transportation
- Hazardous Materials
- Water Systems

To facilitate consistency with the National Response Framework, FEMA Strategic Plan, and guidance for the Building Resilient Infrastructure and Communities grant program, critical facilities in Herkimer County are discussed in terms of lifelines.

A comprehensive inventory of critical facilities and lifelines in Herkimer County was developed from various sources including input from the Planning Committees. The inventory of critical facilities presented in this section represents the current state of this effort at the time of publication of the HMP and was used for the risk assessment in Section 5 (Risk Assessment). Table 4-8 summarizes the community lifelines, by jurisdiction and lifeline category. The critical facilities and community lifelines included in the 2023 HMP were provided and reviewed by Herkimer County and facilities listed in Hazus v5.1. The list includes those facilities owned and/or operated by county, local, or private entities and does not include state owned or leased facilities.

Table 4-8. Critical Facilities and Community Lifelines in Herkimer County

Jurisdiction	Safety and Security	Food, Hydration, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials	Water Systems	Total
Cold Brook (V)	1	–	–	–	–	1	–	–	2
Columbia (T)	7	–	–	–	2	–	–	–	9
Danube (T)	2	–	–	–	1	7	–	–	10
Dolgeville (V)	11	–	1	–	1	–	4	1	18
Fairfield (T)	3	–	–	2	1	2	–	1	9
Frankfort (T)	9	–	2	2	1	15	3	2	34
Frankfort (V)	9	–	1	2	–	1	1	–	14
German Flatts (T)	5	1	–	2	–	8	–	1	17
Herkimer (T)	7	–	2	–	–	5	1	1	16
Herkimer (V)	18	3	5	2	1	11	4	1	45
Ilion (V)	9	1	2	–	1	5	1	2	21
Litchfield (T)	4	–	1	–	–	–	1	1	7
Little Falls (C)	12	1	2	1	1	4	6	2	29
Little Falls (T)	5	1	–	2	–	3	–	–	11
Manheim (T)	7	–	–	3	1	2	1	–	14
Middleville (V)	3	–	–	1	–	4	–	–	8
Mohawk (V)	6	–	1	–	–	3	–	1	11
Newport (T)	5	1	–	–	2	3	–	1	12
Newport (V)	5	–	–	–	1	1	–	1	8
Norway (T)	3	–	–	2	2	3	–	–	10

Jurisdiction	Safety and Security	Food, Hydration, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials	Water Systems	Total
Ohio (T)	15	-	-	2	-	7	-	-	24
Poland (V)	7	-	1	1	-	2	-	1	12
Russia (T)	21	-	-	-	1	8	-	1	31
Salisbury (T)	13	-	1	-	1	6	-	-	21
Schuyler (T)	7	-	2	1		10	-	1	21
Stark (T)	9	-	-	1	1	6	-	1	18
Warren (T)	6	-	-	3	1	-	-	1	11
Webb (T)	28	1	3	2	8	6	-	4	52
West Winfield (V)	6	-	2	1	1	1	-	-	11
Winfield (T)	5	-	1	3	1	1	-	-	11
Grand Total	**248**	**9**	**27**	**33**	**29**	**125**	**22**	**24**	**517**

4.6.1 Safety and Security

Safety and security community lifelines include facilities related to law enforcement/security, fire service, search and rescue, government service, and community safety facilities. For the purpose of this plan, safety and security facilities include correctional facilities, county facilities, dams, emergency operation centers (EOC), fire stations, municipal offices, police, education facilities, and public works. Overall, there are 248 safety and security lifelines in Herkimer County. Table 4-9 summarizes the number of each critical facility within the safety and security lifeline. Figure 4-14 shows the location of these facilities and Figure 4-15 shows the locations of dams in the County.

Table 4-9. Safety and Security Lifelines in Herkimer County

Correctional Facility	County Office	Dam	DOT	EOC	Fire Station	Municipal Office	Police	Post Secondary Education	Primary Education Facility	PSAP	Public Works	Secondary Education Facility	Grand Total
1	1	99	3	1	26	31	15	2	15	1	41	12	**248**

Source: Herkimer County GIS 2022

Figure 4-14. Safety and Security Lifelines in Herkimer County

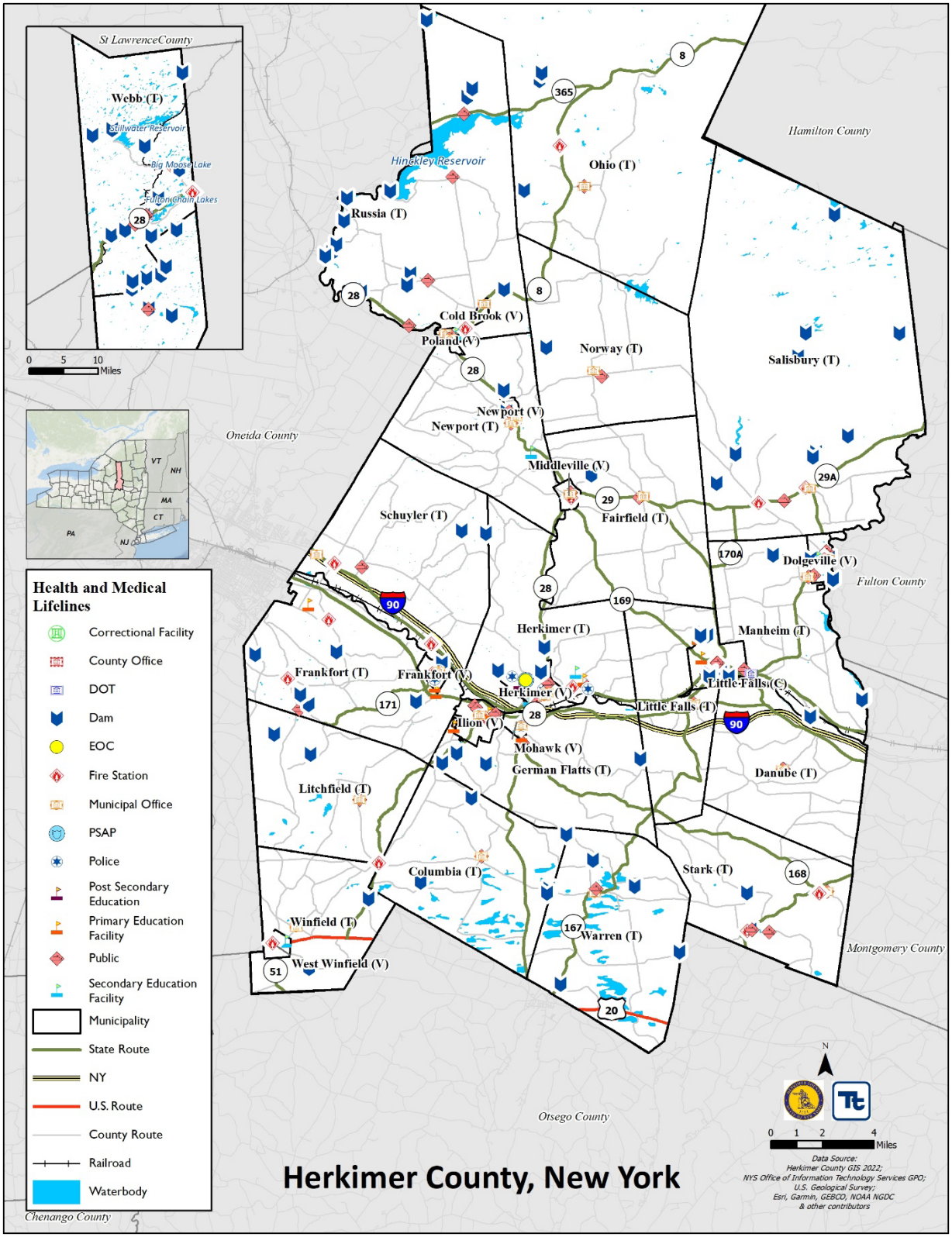
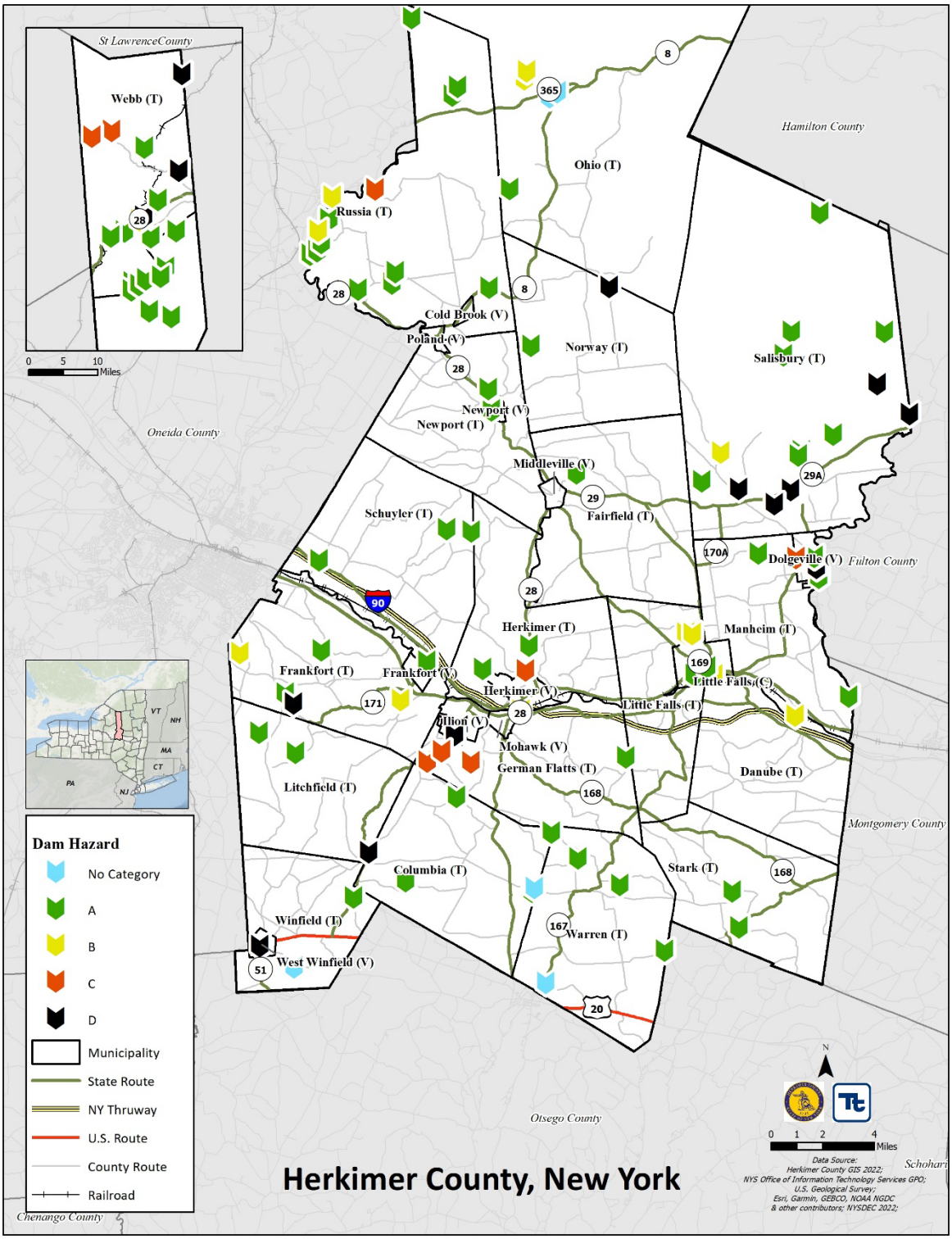


Figure 4-15. Dams Located in Herkimer County



4.6.2 Food, Hydration, and Shelter

Food, water, and shelter community lifelines include facilities related to food services, hydration, sheltering, and agriculture. For the purpose of this plan, food, hydration and shelter facilities include community centers and food pantries. Overall, there are eight food, hydration, and shelter lifelines in Herkimer County. Table 4-10 summarizes the number of each critical facility within the food, hydration, and shelter lifeline. Figure 4-16 shows the location of these facilities throughout the County.

Table 4-10. Food, Hydration, and Shelter Lifelines in Herkimer County

Community Center	Food Pantry	Grand Total
2	5	**8**

Source: Herkimer County GIS 2022

4.6.3 Health and Medical

Health and medical community lifelines include facilities related to medical care, patient moving, public health, fatality management, and medical supply chain. For the purpose of this plan, health and medical facilities include drug/alcohol rehabilitation center, EMS stations, hospitals, and public health. Table 4-11 summarizes the number of each facility within the health and medical lifeline. Figure 4-17 displays the location of these facilities in the County.

Table 4-11. Health and Medical Lifelines in Herkimer County

Drug/Alcohol Rehabilitation Center	EMS Station	Hospital	Public Health	Grand Total
4	20	1	2	**27**

Source: Herkimer County GIS 2022

4.6.4 Energy (Power and Fuel)

Energy (power and fuel) lifelines include power grid and fuel facilities. Herkimer County has 33 energy lifelines. For the purpose of this HMP update, the following facility types fall under the energy category: gas facilities, oil wells, substations, and wind power. Table 4-12 summarizes the number of energy lifelines, by critical facility type, in Herkimer County. Figure 4-18 shows the location of each facility in the County.

Table 4-12. Energy Lifelines in Herkimer County

Gas Facility	Oil Well	Substation	Wind Power	Grand Total
3	4	25	1	**33**

Source: Herkimer County GIS 2022

Figure 4-16. Food, hydration, and shelter lifelines Identified in Herkimer County

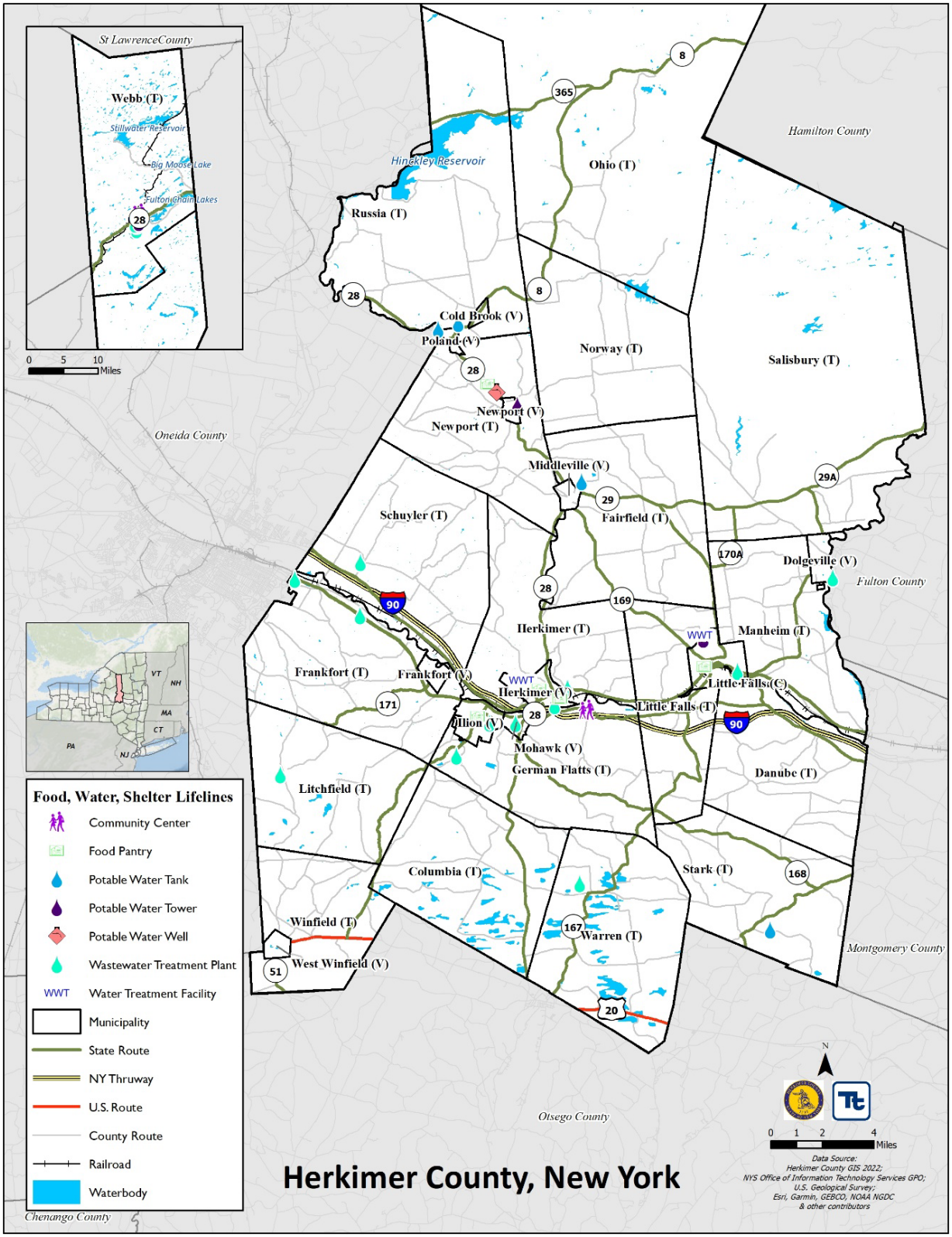


Figure 4-17. Health and Medical Lifelines Identified in Herkimer County

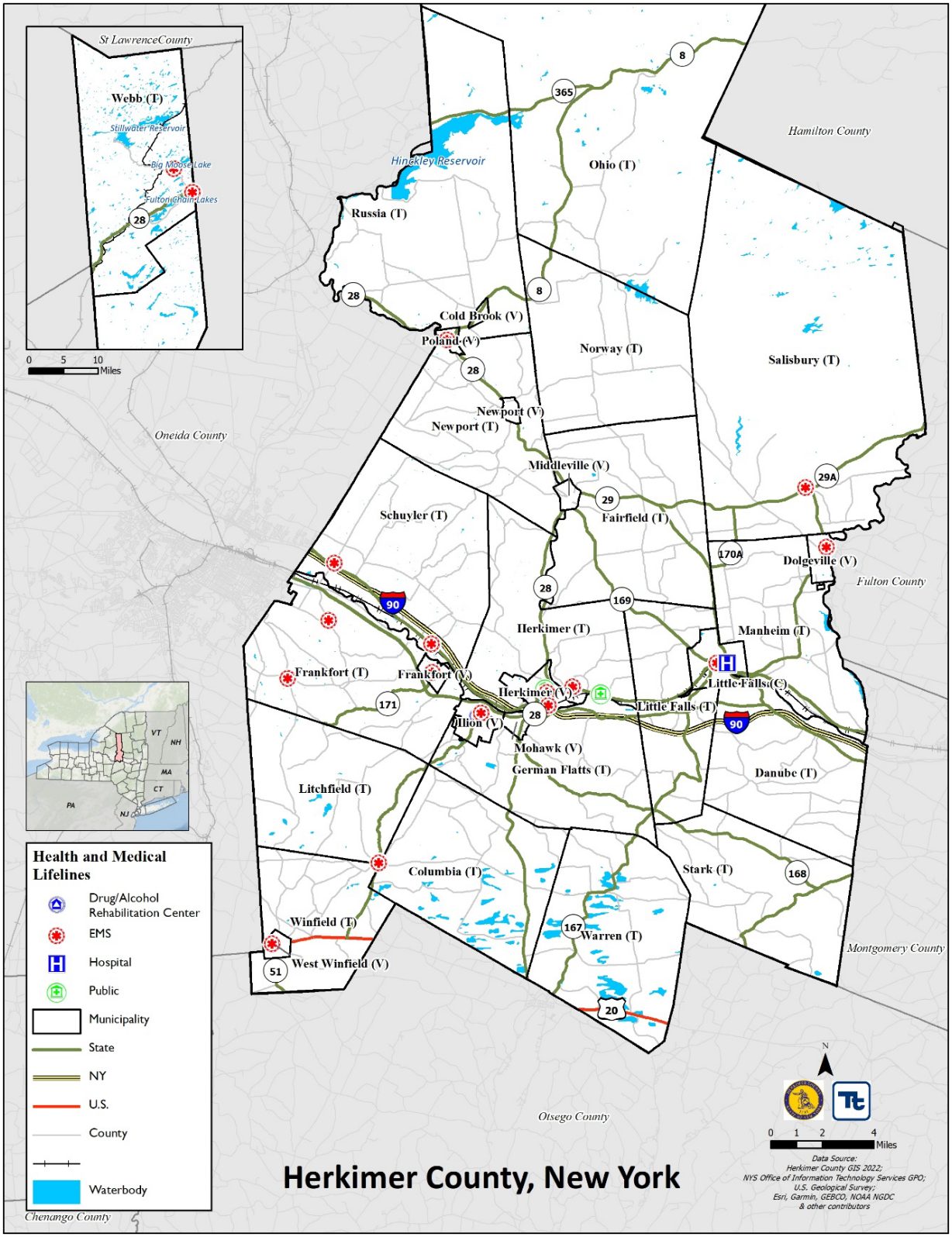
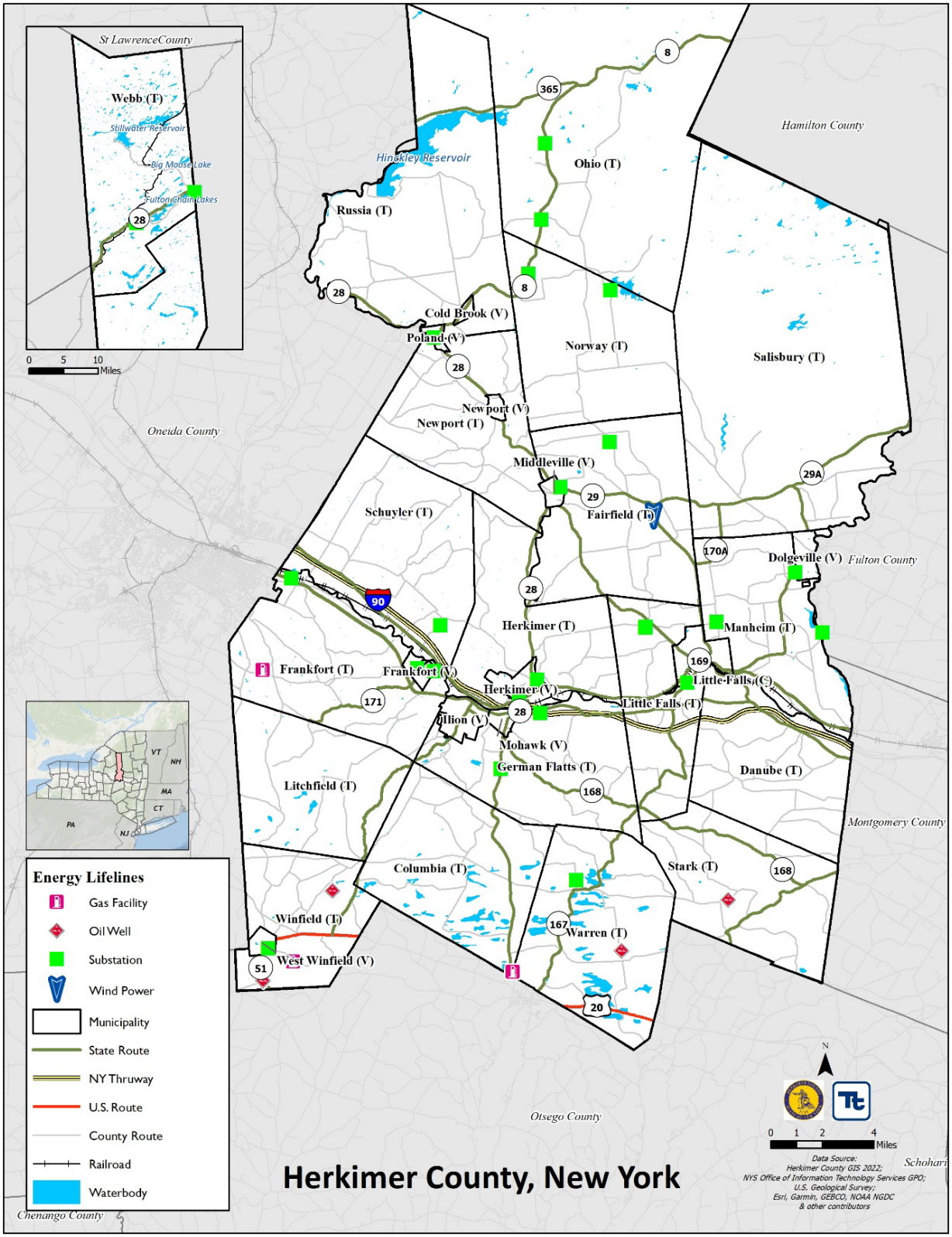


Figure 4-18. Energy Lifelines Identified in Herkimer County



4.6.5 Communications

Communication lifelines include infrastructure, alerts/warnings/messages, 911 and dispatch, responder communications, and finance. Overall, there are 29 communication facilities in Herkimer County. For the purpose of this HMP update, the following facility types fall under the communications category: communication towers and telephone facilities. Due to heightened security concerns, local utility lifeline data needed to complete the analysis were only partially obtained.

Table 4-13 summarizes the number of communication facilities, by critical facility type, in the County. Figure 4-19 shows the location of each communication facility in Herkimer County.

Table 4-13. Communications Lifelines in Herkimer County

Communication Tower	Telephone Facility	Grand Total
19	10	**29**

Source: Herkimer County GIS 2022

4.6.6 Transportation

Transportation lifelines include highways/roadways, mass transit, railway, aviation, and maritime. Herkimer County is mainly accessible by road, including the New York State Thruway (Interstate 90), which generally parallels the Mohawk River in the southern portion of the county. State roads (5, 5S, 8, 28, 29, 51, 167, 168, 169, 170, 171) connect communities within the county and adjacent jurisdictions. The Herkimer County Highway System consists of 578.31 miles of roads and 66 bridges (three co-owned with Fulton and Oneida Counties). The Erie Canal is a cornerstone of the local transportation network. Managed by the New York State Canal Corporation, 4 this navigable waterway carries recreational and commercial traffic and connects Lake Erie at the western terminus to the Hudson River, the eastern terminus of the canal. It is 524 miles long and includes 36 locks, two of which are in Herkimer County (Previous HMP).

Overall, there are 125 transportation facilities in Herkimer County. For the purpose of this HMP update, the following critical facilities fall under the transportation category: airports, bridges, bus facilities, freight stations, and passenger stations. Table 4-14 summarizes the number of transportation facilities and Figure 4-20 shows the location of these facilities.

Table 4-14. Transportation Lifelines in Herkimer County

Airport Facility	Bridge	Bus Facility	Freight Station	Passenger Station	Grand Total
4	116	2	2	1	**125**

Source: Herkimer County GIS 2022

Figure 4-19. Communications Lifelines in Herkimer County

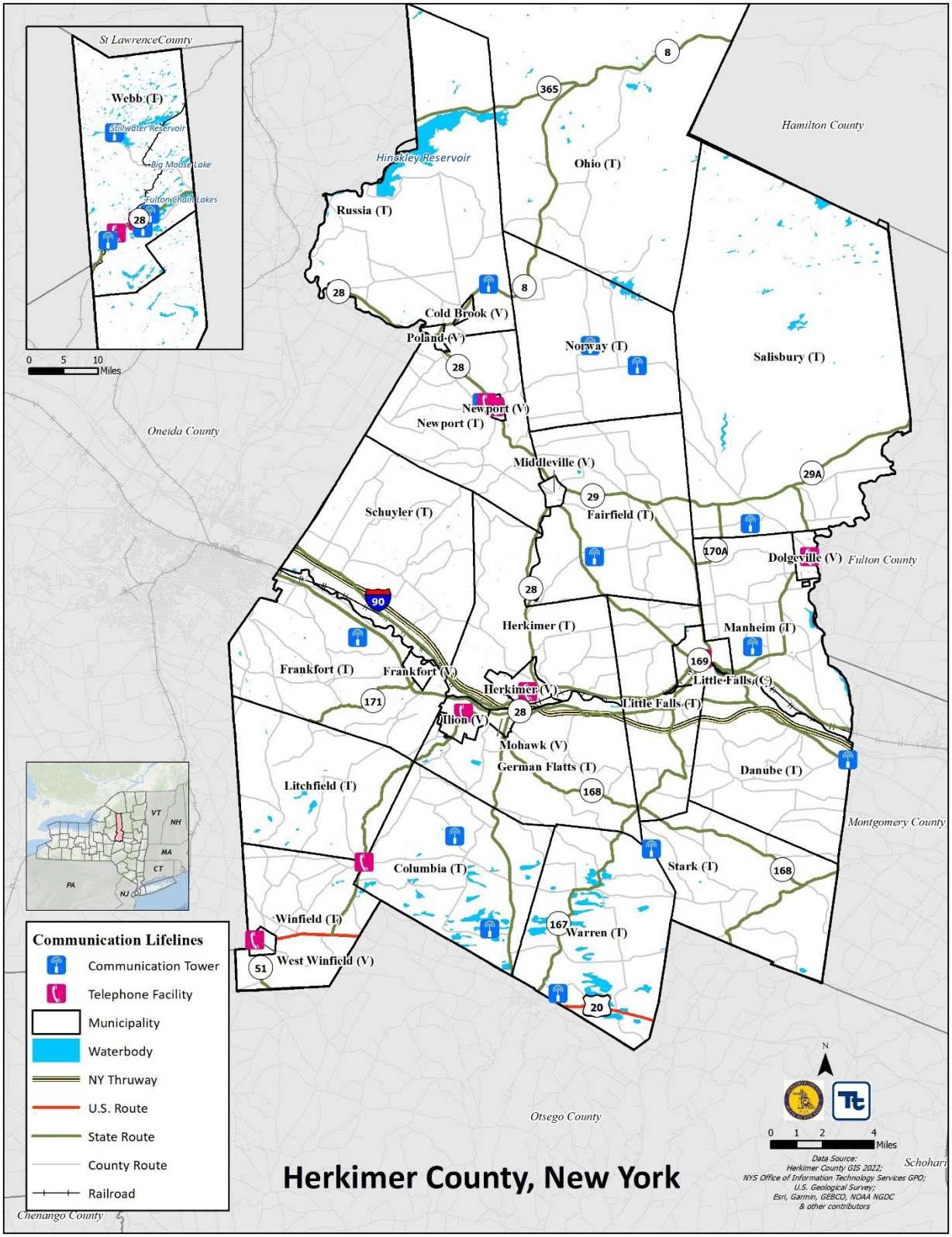
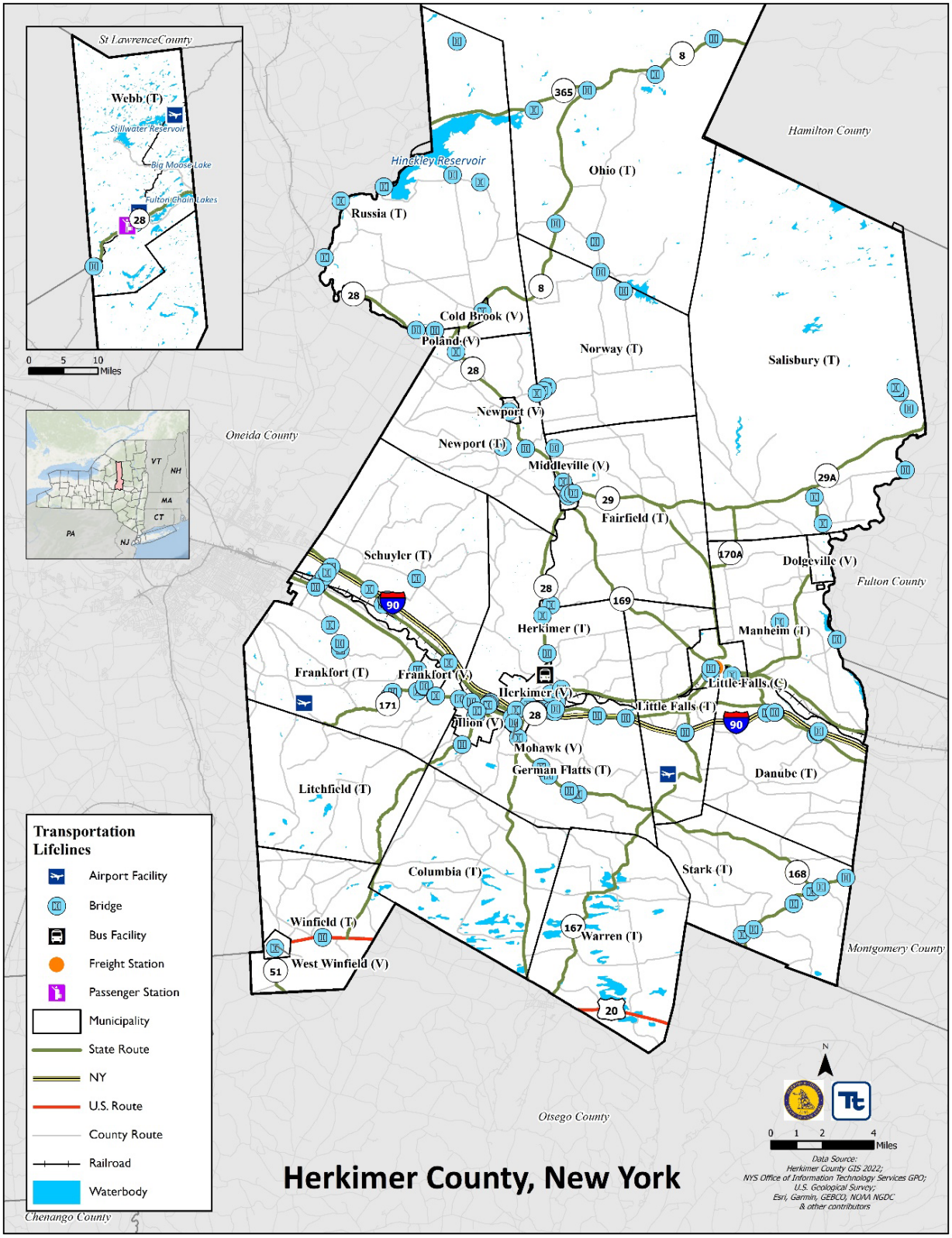


Figure 4-20. Transportation Lifelines Identified in Herkimer County



4.6.7 Hazardous Materials

Hazardous materials lifelines include facilities and hazmat/pollutants/contaminants. There are 22 hazardous material lifelines in Herkimer County, all identified as hazardous material facilities. Figure 4-21 shows the distribution of hazardous materials lifelines throughout the County.

HAZMAT Facilities

A Superfund site consists of land in the United States that has been contaminated by hazardous waste and identified by the U.S. Environmental Protection Agency (EPA) as a candidate for cleanup because it poses a risk to human health or the environment. These sites are placed on the National Priorities List (NPL), the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is intended primarily to guide EPA in determining which sites warrant further investigation.

Abandoned hazardous waste sites placed on the Federal NPL include those that EPA has determined present *a significant risk to human health or the environment*, with the sites being eligible for remediation under the Superfund Trust Fund Program. As of July 2023, Herkimer County hosts one Superfund site that is currently (US EPA 2023).

In addition to the hazardous waste sites, there are numerous hazardous facilities in Herkimer County cataloged by the NYSDEC's Bulk Storage Program Database. The Bulk Storage Program includes three types of facilities; Petroleum Bulk Storage (PBS), and Chemical Bulk Storage (CBS) that require registration with NYSDEC for all facilities with a total storage capacity of petroleum products of the following:

- PBS—1,100 gallons or more
- CBS underground tanks and all stationary aboveground tanks—185 gallons or more

As of July 2023, there are 465 sites listed in the NYSDEC's Bulk Storage Program Database in Herkimer County (NYSDEC 2023). The vast majority (94-percent) of these sites are petroleum bulk storage sites. The remaining 6-percent are chemical bulk storage sites.

4.6.8 Water Systems

Water system lifelines includes potable water infrastructure (e.g., intake, treatment, storage, and distribution) and wastewater management facilities (e.g., collection, storage, treatment, and discharge). Figure 4-16 illustrates the water systems lifelines in the County and Table 4-15 summarizes the lifelines, by critical facility type. In addition to the facilities outlined in the table below, there are 124 drinking water providers in Herkimer County - 18 surface water and 106 groundwater - serving over 51,000 people in the County (NYSDEC 2023). According to the NYSDEC, there are 2,025 registered domestic private wells in the County (NYSDEC 2023).

Table 4-15. Water Systems Lifelines in Herkimer County

Potable Water Tank	Potable Water Tower	Potable Water Well	Wastewater Treatment Plant	Grand Total
4	3	1	16	**24**

Source: Herkimer County GIS 2022

4.6.9 Additional Critical Facilities

In addition to the facilities and lifelines described above, Herkimer County identified daycare facilities as critical but not community lifelines. Daycare facilities in the County provide essential services to residents and childcare is a critical service that helps protect children's safety as it supports family stability after a disaster and helps the overall recovery of a community (U.S. Department of Health & Human Services 2023). There are 12 daycare facilities in Herkimer County, as shown in Figure 4-22.

Figure 4-21. Hazardous Materials Lifelines Identified in Herkimer County

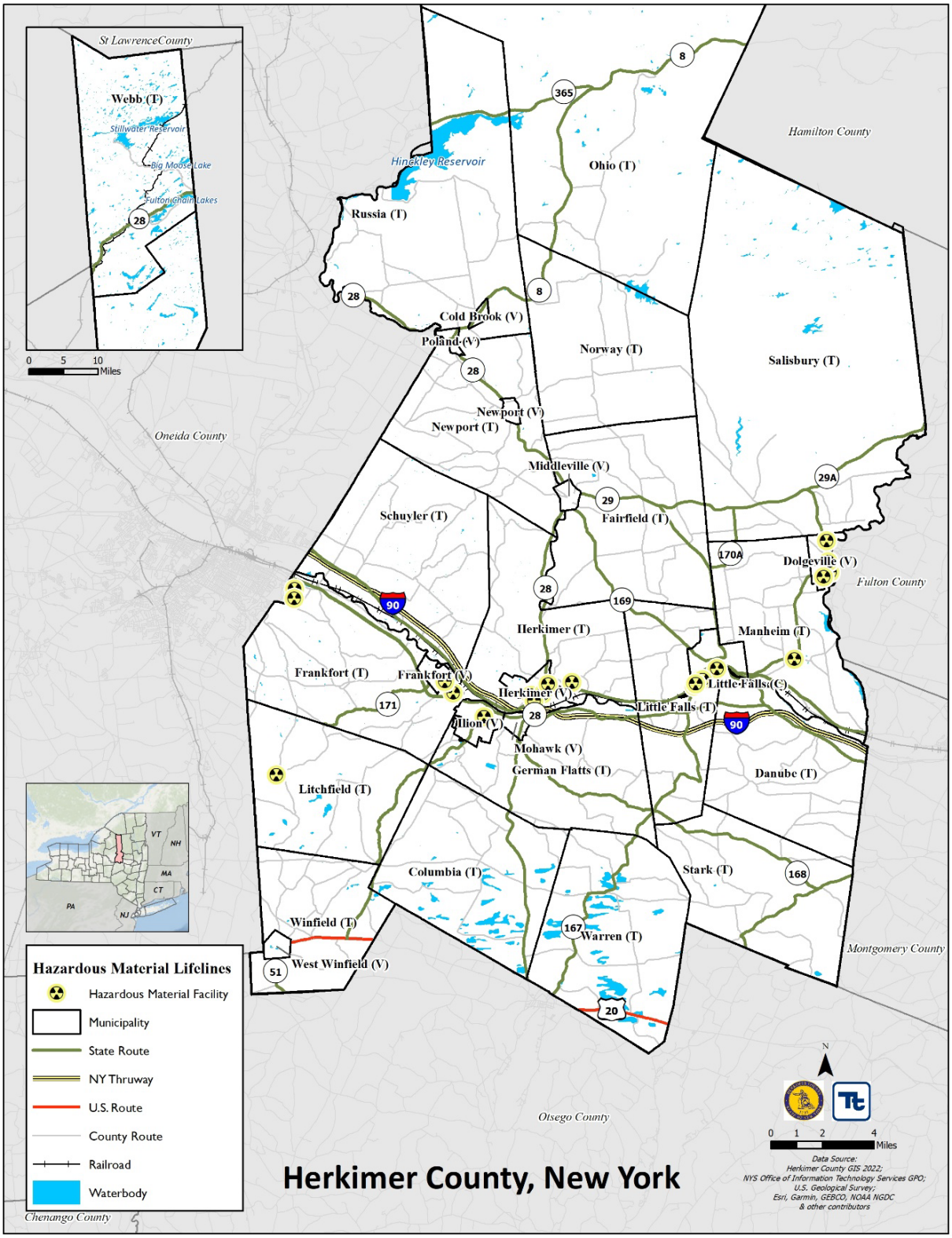
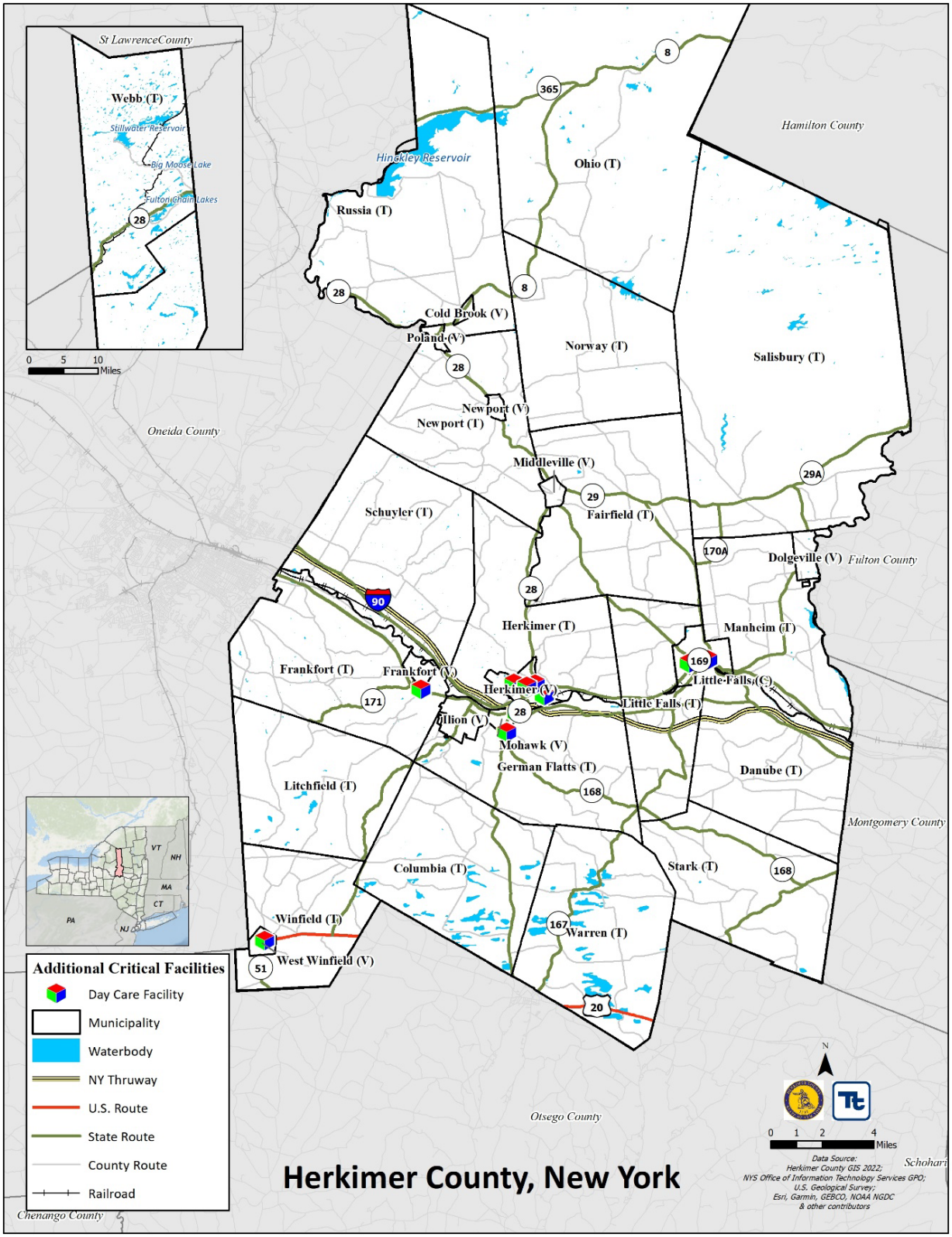


Figure 4-22. Additional Critical Facilities Identified in Herkimer County



SECTION 5. RISK ASSESSMENT

A risk assessment is the process of measuring the potential loss of life, personal injury, and economic and property damage resulting from identified hazards. Identifying potential hazards and vulnerable assets allows planning personnel to address and reduce hazard impacts and emergency management personnel to establish early response priorities. Results of the risk assessment are used in subsequent mitigation planning processes, including determining and prioritizing mitigation actions that reduce each jurisdiction's risk to a specified hazard. Past, present, and future conditions must be evaluated to assess risk most accurately for the county and each jurisdiction. The process focuses on the following elements:

- **Hazard identification**—Use all available information to determine what types of hazards may affect a jurisdiction.
- **Profile each hazard**—Understand each hazard in terms of:
    - Extent—Severity of each hazard.
    - Location—Geographic area most affected by the hazard.
    - Previous occurrences and losses
- **Assess Vulnerability –**
    - Exposure identification—Estimate the total number of assets in the jurisdiction that are likely to experience a hazard event if it occurs by overlaying hazard maps with the asset inventories.
    - Vulnerability identification and loss estimation—Assess the impact of hazard events on the people, property, economy, and lands of the region, including estimates of the cost of potential damage or cost that can be avoided by mitigation.
    - Future changes that may impact vulnerability—Analyze how demographic changes, projected development and climate change impacts can alter current exposure and vulnerability.

SECTION 5. RISK ASSESSMENT

5.1 METHODOLOGY AND TOOLS

A risk assessment is the process of measuring the potential loss of life, personal injury, and economic and property damage resulting from identified hazards. Identifying potential hazards and vulnerable assets allows planning personnel to address and reduce hazard impacts and emergency management personnel to establish early response priorities. Results of the risk assessment are used in subsequent mitigation planning processes, including determining and prioritizing mitigation actions that reduce each jurisdiction's risk to a specified hazard. Past, present, and future conditions must be evaluated to assess risk most accurately for the county and each jurisdiction. The process focuses on the following elements:

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  - Previous occurrences and losses
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  - Vulnerability identification and loss estimation—Assess the impact of hazard events on the people, property, economy, and lands of the region, including estimates of the cost of potential damage or cost that can be avoided by mitigation.
  - Future changes that may impact vulnerability—Analyze how demographic changes, projected development and climate change impacts can alter current exposure and vulnerability.

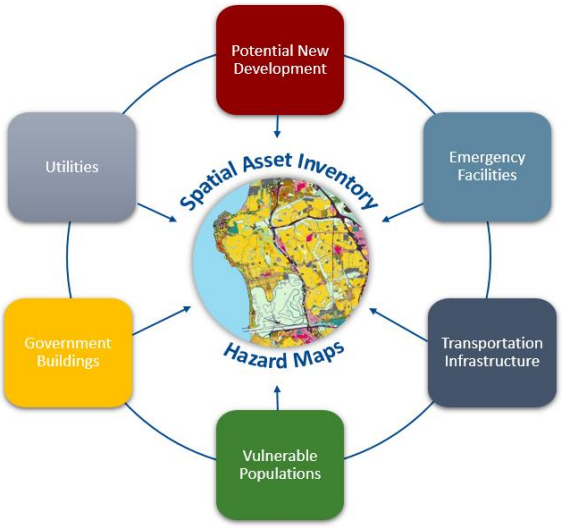
The Herkimer County risk assessment was updated using best available information.

- An updated building stock inventory was created using FEMA Hazus v5.1 modeling software and 2022 RS Means replacement cost values.
- 2020 Decennial and 2021 American Community Survey 5-year Population Estimates were utilized.
- A critical facility was generated and reviewed by the Planning Partnership and County jurisdictions.
- Lifelines were identified in the critical facility inventory to align with FEMA's lifeline definition.
- Hazus was used to estimate potential impacts to the flood and wind hazards.
- Best available hazard data was used as described in this section.

The following summarizes the asset inventories, methodology and tools used to support the risk assessment process.

5.1.1 Asset Inventories

Herkimer County assets were identified to assess potential exposure and loss associated with the hazards of concern. For the HMP update, Herkimer County assessed exposure and vulnerability of the following types of assets: population, buildings and critical facilities/infrastructure, new development, and the environment. Some assets may be more vulnerable because of their physical characteristics or socioeconomic uses. To protect individual privacy and the security of critical facilities, information on properties assessed is presented in aggregate, without details about specific individual personal or public properties.



Population

Herkimer County used the total population statistics from the 2020 Decennial Census data and 2017-2021 American Community Survey (ACS) 5-year estimate to estimate the exposure and potential impacts to the county's population in place of the 2010 U.S. Census block estimates. City, town, and village populations were extracted directly from the Census Bureau and ACS. Population counts at the jurisdictional level were averaged among the total number of residential properties for each dasymetric Census Block within the county to estimate the population distribution at the aggregate Census Block level. Limitations of these analyses are recognized, and thus the results are used only to provide a general estimate for planning purposes. Total population statistics from the 2020 Decennial Population were used to estimate the exposure and potential impacts to the County's population in place of the 2010 U.S. Census block estimates. To determine population statistics for village and towns, the population of villages was subtracted from the total town population.

The risk assessment included the collection and use of an expanded and enhanced asset inventory to estimate hazard exposure and vulnerability.

As discussed in Section 4 (County Profile), research has shown that some populations are at greater risk from hazard events because of decreased resources or physical abilities. Vulnerable populations in Herkimer County included in the risk assessment are children, elderly, population below the poverty level, limited English speaking individuals, and persons non-institutionalized with a disability.

Buildings

- Herkimer County used the default general building stock from FEMA Hazus v5.1 modeling software for the HMP update. The general building stock is analyzed at the aggregate Census Block and Census Tract levels and incorporates 2010 Census data with 2022 RS Means replacement cost values. The occupancy classes available in Hazus were condensed into the categories of residential, commercial, industrial, agricultural, religious, governmental, and educational to facilitate analysis and presentation of results. Residential loss estimates addressed both multi-family and single-family dwellings. Replacement cost value (RCV) is the current cost of returning an asset to its pre-damaged condition, using present-day cost of labor and materials. Total replacement cost value consists of both the structural cost to replace a building and the estimate value of contents of a building. Structural and content RCV were calculated for each building utilizing RS Means 2022 values.

Critical Facilities and Lifelines

*A **lifeline** provides indispensable service that enables the continuous operation of critical business and government functions, and is critical to human health and safety, or economic security (FEMA).*

The 2023 HMP critical facility inventory, which includes lifeline facilities, utilities, transportation features and user-defined facilities was updated by the Planning Partnership and County jurisdictions. The update involved a review for accuracy, additions, or deletions of new/moved critical assets, identification of backup power for each asset (if known) and whether the critical facility is considered a lifeline in accordance with FEMA's definition; refer to Appendix E (Risk Assessment Supplement). To protect individual privacy and the security of assets, information is presented in aggregate, without details about specific individual properties or facilities.

Environment and Land Use Area

National land use land cover data created by the U.S. Geological Survey (USGS) in 2019 was used to assess land use characteristics of the County. This dataset was converted from a raster to a vector polygon, which informed spatial areas of agriculture, barren land, forested land, urban areas, water, and wetlands.

National Hydrography data from NHD was used to assess waterbody coverage of the County. This dataset was used to calculate total acreage of land coverage within Herkimer County, as well as total land acreage that falls within Flood 100-yr and Flood 500-yr hazard areas.

New Development

In addition to assessing the vulnerability of the built environment, Herkimer County examined recent development over the last 5 years and anticipated new development in the next 5 years. Each jurisdiction was asked to provide a list by parcel ID or address of major development that has taken place within these timeframes.

New development was identified as 1) anticipated in the next five years and 2) recently developed over the last five years. An exposure analysis was conducted in Geographic Information System (GIS)

to determine hazard exposure to these development sites. Projects built on multiple parcels were assessed as one unit. If one parcel identified within the project boundary intersected a spatial hazard layer, the entire project was considered 'exposed' to the hazard area of concern.

Identifying these changes and integrating new development into the risk assessment provides communities information to consider when developing the mitigation strategy to reduce these vulnerabilities in the future (one tool in the Mitigation Toolbox discussed in Section 6 – Mitigation Strategy). The new development is mapped in Section 4 (County Profile) and hazard exposure analysis results are presented in Section 9 (Jurisdictional Annexes) as a table in each annex.

5.1.2 Methodology

To address the requirements of the DMA 2000 and to better understand potential vulnerability and losses associated with hazards of concern, Herkimer County used standardized tools, combined with local, state, and federal data and expertise to conduct the risk assessment. Three different levels of analysis were used depending upon the data available for each hazard as described below. Table 5.1-1 summarizes the type of analysis conducted by hazard of concern.

1. **Historic Occurrences and Qualitative Analysis** – This analysis includes an examination of historic impacts to understand potential impacts of future events of similar size. In addition, potential impacts and losses are discussed qualitatively using best available data and professional judgement.
2. **Exposure Assessment** – This analysis involves overlaying available spatial hazard layers, or hazards with defined extent and locations, with assets in GIS to determine which assets are located in the impact area of the hazard. The analysis highlights which assets are located in the hazard area and may incur future impacts.
3. **Loss estimation** — The FEMA Hazus modeling software was used to estimate potential losses for the following hazards: flood and hurricane.

Table 5.1-1. Summary of Risk Assessment Analyses

Hazard	Population	General Building Stock	Critical Facilities	New Development
Dam Failure	Q	Q	Q	Q
Disease Outbreak/Pandemic	Q	Q	Q	Q
Extreme Temperature	Q	Q	Q	Q
Flood	E, H, Q	E, H, Q	E, H, Q	Q
Invasive Species	Q	Q	Q	Q
Severe Storm	H, Q	H, Q	H, Q	Q
Severe Winter Storm	Q	Q	Q	Q
Wildfire	E	E	E	Q

E – Exposure analysis; H – Hazus analysis; Q – Qualitative analysis

Hazards U.S. – Multi-Hazard (Hazus)

In 1997, FEMA developed a standardized model for estimating losses caused by earthquakes, known as Hazards U.S. or Hazus. Hazus was developed in response to the need for more effective national-

, state-, and community-level planning and the need to identify areas that face the highest risk and potential for loss. Hazus was expanded into a multi-hazard methodology, Hazus with new models for estimating potential losses from wind (hurricanes) and flood (riverine) hazards. Hazus is a GIS-based software tool that applies engineering and scientific risk calculations, which have been developed by hazard and information technology experts, to provide defensible damage and loss estimates. These methodologies are accepted by FEMA and provide a consistent framework for assessing risk across a variety of hazards. The GIS framework also supports the evaluation of hazards and assessment of inventory and loss estimates for these hazards.

Hazus uses GIS technology to produce detailed maps and analytical reports that estimate a community's direct physical damage to building stock, critical facilities, transportation systems and utility systems. To generate this information, Hazus uses default data for inventory, vulnerability, and hazards; this default data can be supplemented with local data to provide a more refined analysis. Damage reports can include induced damage (inundation, fire, threats posed by hazardous materials and debris) and direct economic and social losses (casualties, shelter requirements, and economic impact) depending on the hazard and available local data. Hazus' open data architecture can be used to manage community GIS data in a central location. The use of this software also promotes consistency of data output now and in the future and standardization of data collection and storage. More information on Hazus is available at http://www.fema.gov/hazus.

In general, modeled losses were estimated in the program using depth grids for the flood analysis and probabilistic analyses were performed to develop expected/estimated distribution of losses (mean return period losses) for hurricane wind and seismic hazards. The probabilistic model generates estimated damages and losses for specified return periods (e.g., 100- and 500-year). Table 5.1-2 displays the various levels of analyses that can be conducted using the Hazus software.

Table 5.1-2. Summary of Hazus Analysis Levels

Hazus Analysis Levels	
Level 1	Hazus provides hazard and inventory data with minimal outside data collection or mapping.
Level 2	Analysis involves augmenting the Hazus provided hazard and inventory data with more recent or detailed data for the study region, referred to as "local data"
Level 3	Analysis involves adjusting the built-in loss estimation models used for the hazard loss analyses. This Level is typical done in conjunction with the use of local data.

Dam Failure

Assets that fall with dam inundation hazard areas within Herkimer County are at greatest risk of impacts from dam failure events. A qualitative assessment was conducted for the dam failure

hazard. Because of the sensitive nature of the dam failure inundation zones, potential losses have not been quantified and presented in the vulnerability assessment.

Disease Outbreak/Pandemic

Disease outbreak is a new hazard of concern for the Herkimer County HMP. All of Herkimer County is exposed to disease outbreak events. A qualitative assessment was conducted. Research from the Centers for Disease Control and Prevention was utilized to qualitatively assess the most recent COVID-19 outbreak.

Extreme Temperatures

All of Herkimer County is exposed to extreme temperature events. A qualitative assessment was conducted for the extreme temperatures hazard. Information from the National Weather Service (NWS), Centers for Disease Control and Prevention, stakeholder plans/reports, the 2019 New York City Hazard Mitigation Plan, and the Planning Partnership were used to assess the potential impacts to the County's assets.

Flood

The 1- and 0.2-percent annual chance flood events were examined to evaluate the County's risk from the flood hazard. These flood events are generally those considered by planners and evaluated under federal programs such as NFIP.

The following data was used to evaluate exposure and determine potential future losses for this plan update:

- The Herkimer County FEMA Digital Flood Insurance Rate Maps (DFIRM) dated December 13, 2019 (map index) and 8/3/2018 (all jurisdictions).
- The depth grid developed for the 2023 Herkimer County HMP using data from the USDA and NRCS 10-meter Resolution Digital Elevation Model

The effective Herkimer County FEMA DFIRM published in 2019 was used to evaluate exposure and determine potential future losses. The depth grid generated for the 2023 HMP was integrated into the Hazus riverine flood model used to estimate potential losses for the 1-percent annual chance flood event.

To estimate exposure to the 1-percent- and 0.2-percent annual chance flood events, the DFIRM flood boundaries were overlaid on the centroids of updated assets (critical facilities, and new development). Centroids that intersected the flood boundaries were totaled to estimate the building replacement cost value and population vulnerable to the flood inundation areas. A Level 2 Hazus riverine flood analysis was performed in Hazus v5.1. The critical facility inventory was formatted to be compatible with Hazus and its Comprehensive Data Management System (CDMS). Once updated with the inventories, the Hazus riverine flood model was run to estimate potential

losses in Herkimer County for the 1-percent annual chance flood events. Hazus calculated the estimated potential losses to the population (default 2010 U.S. Census data across dasymetric blocks), potential damage to the general building stock, and potential damage to critical facility inventories based on the depth grids generated and the default Hazus damage functions in the flood model.

Invasive Species

A qualitative analysis was conducted for the infestation and invasive species hazard. All of Herkimer County is considered exposed due to the historical existence and evidence of invasive species in New York State and Herkimer County. Data from the United States Department of Agriculture, New York Department of Environmental Conservation, the New York State Invasive Species Program, and Capital/Mohawk Region PRISM was used to develop the hazard profile and to determine risk and exposure.

Severe Storm

A Hazus probabilistic analysis was performed in Hazus v5.1 to analyze the wind hazard losses for Herkimer County for the 100- and 500-year MRP events. The probabilistic Hazus hurricane model activates a database of thousands of potential storms that have tracks and intensities reflecting the full spectrum of Atlantic hurricanes observed since 1886 and identifies those with tracks associated with Herkimer County. Hazus contains data on historic hurricane events and wind speeds. It also includes surface roughness and vegetation (tree coverage) maps for the area. Surface roughness and vegetation data support the modeling of wind force across various types of land surfaces. Default demographic and building inventories, along with updated critical facility inventories in Hazus were used for the analysis. Although damages are estimated at the census tract level, results were presented at the municipal level. Since there are multiple census tracts that contain more than one jurisdiction, a density analysis was used to extract the percent of building structures that fall within each tract and jurisdiction. The percentage was multiplied against the results calculated for each tract and summed for each jurisdiction.

Severe Winter Storm

All of Herkimer County is exposed and vulnerable to the winter storm hazard. In general, structural impacts include damage to roofs and building frames, rather than building content. Current modeling tools are not available to estimate specific losses for this hazard. A percentage of the custom-building stock structural replacement cost value was utilized to estimate damages that could result from winter storm conditions (i.e., 1-percent, 5-percent, and 10-percent of total replacement cost value). Given professional knowledge and currently available information, the potential losses for this hazard are considered to be overestimated; hence, providing a conservative estimate for losses associated with winter storm events.

Wildfire

The Wildland-Urban Interface (Interface and Intermix) obtained through the **SILVIS Laboratory, Department of Forest Ecology and Management, University of Wisconsin – Madison,** was referenced to delineate wildfire hazard areas. The University of Wisconsin – Madison wildland fire hazard areas are based on the 2010 Census and 2006 National Land Cover Dataset and the Protected Areas Database. For this risk assessment, the high-, medium-, and low-density interface areas were combined and used as the "Interface" hazard area, and the high, medium-, and low-density intermix areas were combined and used as the "Intermix" hazard areas.

To determine what assets are exposed to wildfire, available and appropriate GIS data were overlaid with the hazard area. Assets with their centroid located in the hazard area were totaled to estimate the totals and values exposed to a wildfire event.

Considerations for Mitigation and Next Steps

The following items are to be discussed for considerations for the next plan update to enhance the vulnerability assessment:

- All Hazards
  - Create an updated user-defined general building stock dataset.
  - Utilize updated and current demographic data. Utilize 2020 U.S. Census demographic data again and the current American Community Survey 5-Year Estimate populations counts at the Census tract level.
- Flood
  - The general building stock inventory can be updated to include attributes regarding first floor elevation and foundation type (basement, slab on grade, etc.) to enhance loss estimates.
  - Conduct a Hazus loss analysis for more frequent flood events (e.g., 10 and 50-year flood events).
  - Conduct a repetitive loss area analysis.
  - Continue to expand and update urban flood areas to further inform mitigation.
  - As more current FEMA floodplain data become available (i.e., DFIRMs), update the exposure analysis and generate a more detailed flood depth grid that can be integrated into the current Hazus version.
- Extreme Temperatures
  - Track extreme temperature data for injuries, deaths, shelter needs, pipe freezing, agricultural losses, and other impacts to determine distributions of most at risk areas.
- Severe Storm
  - The general building stock inventory can be updated to include attributes regarding protection against strong winds, such as hurricane straps, to enhance loss estimates.
- Wildfire

- General building stock inventory can be updated to include attributes such as roofing material or fire detection equipment or integrate distance to fuels as another measure of vulnerability.

5.1.3 Data Source Summary

Table 5.1-3 summarizes the data sources used for the risk assessment for this plan.

Table 5.1-3. Risk Assessment Data Documentation

Data	Source	Date	Format
Population data	U.S. Census Bureau; American Community Survey 5-Year Estimates	2020; 2021	Digital (GIS) format
Building Inventory	U.S. Census Bureau 2010; RS Means	2010; 2022	Digital (GIS) format
Wildfire Hazard	University of Wisconsin - Madison	2010	Digital (GIS) format
Critical facilities	Herkimer County GIS – 2022; Herkimer Planning Partners	2022	Digital (GIS) format
Digitized Effective FIRM maps (2019)	FEMA	2019	Digital (GIS) format
10-meter Resolution Digital Elevation Model	USDA and NRCS	2022	Digital (GIS) format
New Development Data	Herkimer Planning Partnership and County Jurisdictions	2023	Digital (GIS) Format

Limitations

Loss estimates, exposure assessments, and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

1. Approximations and simplifications necessary to conduct such a study.
2. Incomplete or dated inventory, demographic, or economic parameter data
3. The unique nature, geographic extent, and severity of each hazard
4. Mitigation measures already employed by the participating municipalities.
5. The amount of advance notice residents have to prepare for a specific hazard event
6. Uncertainty of climate change projections

These factors can result in a range of uncertainty in loss estimates, possibly by a factor of two or more. Therefore, potential exposure and loss estimates are approximate. These results do not predict precise results and should be used to understand relative risk. Over the long term, Herkimer County will collect additional data to collect additional data, update and refine existing inventories, to assist in estimating potential losses.

Potential economic loss is based on the present value of the general building stock utilizing best available data. The County acknowledges significant impacts may occur to critical facilities and infrastructure as a result of these hazard events causing great economic loss. However, monetized damage estimates to critical facilities and infrastructure, and economic impacts were not quantified and require more detailed loss analyses. In addition, economic impacts to industry such as tourism and the real-estate market were not analyzed.

5.2 IDENTIFICATION OF HAZARDS OF CONCERN

Hazards of Concern are those hazards that are considered most likely to impact a community. These are identified using available data and local knowledge.

Natural Hazards are those hazards that are a source of harm or difficultly created by a meteorological, environmental, or geological event.

To provide a strong foundation for mitigation actions considered in Sections 6 (Mitigation Strategy) and 9 (Jurisdictional Annexes), Herkimer County focused on considering a full range of hazards that could impact the area and then identified and ranked those hazards that presented the greatest concern. The hazard of concern identification process incorporated input from the county and participating jurisdictions; review of the New York State Hazard Mitigation Plan (NYS HMP 2019); review of the 2017 Herkimer County HMP (Herkimer County HMP 2017); research and local, state, and federal information on the frequency, magnitude, and costs associated with the various hazards that have previously, or could feasibly, impact the region; and qualitative or anecdotal information regarding natural (not manmade) hazards and the perceived vulnerability of the study area's assets to them. Table 5.2-1 documents the process of identifying the natural hazards of concern for further profiling and evaluation. Specific hazards not identified as a hazard of concern for Herkimer County will not be further discussed in detail.

5.2.1 Changes from 2017 Hazard Mitigation Plan

The 2017 Herkimer County Hazard Mitigation Plan included Ice Jam Flood, High Groundwater, and Local Drainage, Riverine and Flash Flood, High Wind Severe Weather, Thunderstorm/Heavy Rainfall Severe Weather, and Severe Winter Weather as individual hazards of concern. For the 2023 Hazard Mitigation Plan Update, the Steering Committee elected to regroup related hazards and add a number of hazards deemed to pose significant risk to the county. Those additional hazards include Disease Outbreak/Pandemic, Dam Failure, Drought, and Extreme Temperature, Invasive Species, and Wildfire. In addition, the Flood hazard includes flash, riverine, local flooding, and the Severe Winter Weather hazard includes the Ice Jam Flood hazard.

The 2023 Herkimer County Hazard Mitigation Plan Update includes best available data throughout the plan to present an updated understanding Herkimer County's risk.

5.2.2 Hazard Groupings

This 2023 Herkimer County HMP has been updated to include additional hazards of concern that could significantly affect the county and its communities. After a review of the hazards, the steering committee agreed to regroup the hazard based on the similarity of hazard events, typical concurrence or impacts, consideration of how hazards have been grouped in Federal Emergency Management Agency (FEMA) guidance documents (*FEMA 386-2 Understanding Your Risks, Identifying Hazards and Estimating Losses*; *Multi-Hazard Identification and Risk Assessment – The*

Cornerstone of the National Mitigation Strategy; *Local Mitigation Planning Handbook*), and consideration of hazard grouping in the NYS HMP.

The Dam Failure hazard profile includes the description, location, extent, previous occurrences and losses, probability of future occurrences, impact of climate change, and vulnerability assessment for the hazards posed by dams in Herkimer County.

The *Disease Outbreak/Pandemic* hazard profile addresses mosquito-borne, tick borne, and communicable respiratory diseases that have occurred in Herkimer County or have had a considerable impact on the county.

The *Drought* hazard profile specifically addresses drought events that occurred in Herkimer County or had a considerable impact on the county.

The *Extreme Temperature* hazard profile specifically addresses periods of extreme temperature that occurred in Herkimer County or had a considerable impact on the county.

The *Flood* hazard includes riverine flooding, flash flooding, shallow flooding, and ice jam flooding. Inclusion of the various forms of flooding under a general *Flood* hazard is consistent with that used in FEMA's *Multi-Hazard Identification and Risk Assessment* guidance and the NYS HMP.

The *Invasive Species* hazard profile specifically addresses invasive species that affect Herkimer County and the surrounding region including emerald ash borer and Japanese Knotweed.

The *Severe Storm* hazard includes windstorms that often entail a variety of other influencing weather conditions, including thunderstorms, hail, lightning, and tornadoes. Tropical disturbances (hurricanes, tropical storms, and tropical depressions) are often identified as a type of severe storm. For this HMP update *Severe Storm* includes thunderstorms, hail, lightning, tornadoes, hurricanes, tropical storms, and Nor'Easters.

The *Severe Winter Storm* hazard includes heavy snowfall, blizzards, freezing rain/sleet, and ice storms. This grouping is consistent with the NYS HMP.

The *Wildfire* hazard profile specifically addresses wildfires that occurred in Herkimer County or had a considerable impact on the county.

Technological (e.g., hazardous material incidents) and some man-made hazards (e.g., terrorism) are not being addressed in this planning process. The DMA 2000 regulations do not require consideration of such hazards, and due to limited funding, these were not chosen for inclusion in this plan by Herkimer County and planning participants. The county can expand the scope of this HMP to include other less frequent natural, technological, and more man-made hazards as resources permit.

Table 5.2-1. Identification of Hazards of Concern for Herkimer County

Hazard	Is this a hazard that may occur in Herkimer County?	If yes, does this hazard pose a significant risk as a Hazard of Concern Herkimer County?	Why was this determination made?	Source(s)
Avalanche	No	No	• The NYS HMP identifies avalanche as a hazard of concern; however, the daily probability of an avalanche for the state is 0.02 percent. • Avalanches can occur in any situation where snow, slope and weather conditions combine to create proper conditions. About 90 percent of all avalanches start on slopes of 30 to 45 degrees and about 98 percent of all avalanches occur on slopes of 25 to 50 degrees. • New York State, in general, has a very low occurrence of avalanche events based on statistics provided by National Avalanche Center – American Avalanche Association (NAC-AAA) between 1998 and 2020. • Avalanche was identified as a hazard in the NYS HMP and there have been occurrences in the state; however, there were no known occurrences in Herkimer County. The Steering and Planning Committees do not consider the hazard to be a significant concern.	• NYS DHSES • NAC-AAA • NY HMP • NOAA-NCEI
Coastal Erosion	No	No	• The NYS HMP identifies coastal erosion as a hazard of concern for New York State. Erosion can impact all the state's coastal counties along: Lake Erie and the Niagara River, Lake Ontario and the St. Lawrence River, Atlantic Ocean and Long Island Sound, Hudson River south of the federal dam in Troy, the East River, the Harlem River, the Kill van Kull and Arthur Kill, and all connecting waterbodies, bays, harbors, shallows and wetlands. • As stated above, coastal erosion is limited to the state's coastal counties. Herkimer County is not a coastal county and is in the middle of New York; therefore, the Steering and Planning Committees do not consider the hazard to be a significant concern.	• NYS DHSES • Input from Steering and Planning Committees
Dam Failure	Yes	Yes	• The 2019 NYS HMP identifies dam failure as a hazard of concern for New York State and includes it in the Flood hazard profiles. • According to the New York Dam Safety Inspection there are 41 dams are within Herkimer County, as shown in Section 4. Of these 41 dams, 18 are low hazard, 10 are intermediate hazard and 13 are high hazard (Herkimer County, New York Dam Safety Inspection n.d.).	• NYS DHSES • Input from Steering and Planning Committees • NYSDEC • NYS GIS
Disease Outbreak	Yes	Yes	• The 2019 NYS HMP does not identify disease outbreak as a hazard of concern for New York State. • The County has been impacted by the COVID-19 pandemic (DR-4480). Between March 15, 2020, and October 7, 2022, there have been 16,437 confirmed cases of COVID-19 with an average of 14 new cases reported daily	• NYS DHSES • NYS DEC • Input from Steering and Planning Committees

Hazard	Is this a hazard that may occur in Herkimer County?	If yes, does this hazard pose a significant risk as a Hazard of Concern Herkimer County?	Why was this determination made?	Source(s)
			(Tracking Coronavirus in Herkimer County, N.Y.: Latest Map and Case Count 2022) • The County has been impacted by various diseases (COVID-19, West Nile Virus, Lyme disease); therefore, the Steering and Planning Committees identified disease outbreak as a hazard of concern for Herkimer County.	
Drought	Yes	Yes	• The NYS HMP identifies drought as a hazard of concern for the state and the daily probability of a drought for the state is 0.38 percent. • Herkimer County has been impacted by nine drought events that have occurred in New York State. • Drought conditions can cause shortages in water for human consumption, impact agricultural production, and lead to reduced local firefighting capabilities. • New York State was included in one FEMA drought-related disaster declaration, which did not include Herkimer County. • Herkimer County entered an extreme drought at the end of 2020 ((National Drought Mitigation Center 2022)	• NYS DHSES • FEMA • USDA • Input from Steering and Planning Committees • NOAA-NCEI • NRCC
Earthquake	No	No	• The NYS HMP identified earthquake as a hazard of concern for the state however, the daily probability of an earthquake for the state is 0 percent. • New York State was included in one FEMA earthquake-related disaster declaration (DR-1415); Herkimer County was not included in this declaration. • According to the NYS HMP, the daily probability of an earthquake is 0 percent. • Based on the potential for significant loss and input from the Steering and Planning Committees, earthquake has not been identified as a hazard of concern for Herkimer County.	• NYS DHSES • Input from Steering and Planning Committees • USGS – Earthquake Hazards Program, Review of USGS Seismic Maps
Extreme Temperature	Yes	Yes	• The NYS HMP identified extreme temperatures as a hazard of concern for New York State. ○ Herkimer county has been apart of 29 extreme heat events (NY HMP). • The Steering and Planning Committees identified extreme temperature as a hazard of concern for Herkimer County.	• NYS DHSES • Input from Steering and Planning Committees • NOAA-NCEI USDA
Flood (riverine, ice jam, dam failure and flash)	Yes	Yes	• The NYS HMP identified flooding as a hazard of concern for New York State and the daily probability of a flood for the state is 21.75 percent. • Between 2010 and 2022, Herkimer County was included in 1 FEMA flood-related declaration.	• NYS DHSES • Input from Steering and Planning Committees • FEMA • NOAA-NCEI

Hazard	Is this a hazard that may occur in Herkimer County?	If yes, does this hazard pose a significant risk as a Hazard of Concern Herkimer County?	Why was this determination made?	Source(s)
			○ FEMA-DR-1993(Severe Storms Tornadoes, Winds and Flooding) – April 26, 2011 ○ FEMA-DR-4129 (Severe Storms, and Flooding) – July 2013. • Based on the history of flooding and its impacts on Herkimer County and input from the Steering and Planning Committees identified flooding as a hazard of concern for the county.	USACE CRREL Ice Jam Database
Hailstorm	Yes	Yes	Please see Severe Winter Storm	
Hurricane	Yes	Yes	Please see Severe Storm	
Ice Jams	Yes	Yes	Please see Flood	
Ice Storm	Yes	Yes	Please see Severe Winter Storm	
Infestation	Yes	Yes	Please see Invasive Species	
Invasive Species	Yes	Yes	• The 2019 NYS HMP does not identify invasive species as a hazard of concern for New York State. • New York State has been affected by various instances of invasive ticks and mosquitos. • The Herkimer County Soil and Water Conservation identifies Japanese Knotweed as an issue that can clog waterways and create bank erosion problems (Herkimer County Soil and Water Conservation n.d.). • In addition to the emerald ash borer, several species of animals, insects, and plants have impacted the county. The Herkimer County Steering and Planning Committees identified invasive species as a hazard of concern due to previous occurrences of invasive species within Herkimer County.	• NYS DEC • Input from Steering and Planning Committees
Land Subsidence	Yes	No	• The 2019 NYS HMP indicates New York State is vulnerable to land subsidence; however, this hazard is "extremely localized" and poses a "very low risk to population and property." • The Steering and Planning Committees did not identify land subsidence as a hazard of concern for Herkimer County.	• NYS DHSES • Input from Steering and Planning Committees • USGS
Landslide	Yes	No	• The 2019 NYS HMP includes landslide as a hazard of concern for New York State however, the daily probability of a landslide for the state is 0.04 percent. • According to the 2019 NYS HMP, Herkimer County has experienced 1 landslide event from 1996-2017. • Between 1954 and 2020 New York State has included in one landslide-related disaster declaration.	• NYS DHSES • Input from Steering and Planning Committees • FEMA

Hazard	Is this a hazard that may occur in Herkimer County?	If yes, does this hazard pose a significant risk as a Hazard of Concern Herkimer County?	Why was this determination made?	Source(s)
			• Past occurrences in the County have been documented in the 2017 Herkimer County HMP in the Town of German Flatts indicating road cuts, streambank slides, or bank failure due to flood.. • Based on previous occurrences and input from the Steering and Planning Committees, the landslide hazard was not identified as a hazard of concern for Herkimer County planning area.	
Nor'Easters	Yes	Yes	Please see Severe Storm	
Severe Storm (windstorms, thunderstorms, hurricanes / tropical storms, Nor'Easters, hail and tornados)	Yes	Yes	• The NYS HMP identified severe storm as a hazard of concern for New York State; however, for the state HMP, the hazards were profiled in individual sections thunderstorms, lightning, hail, tornadoes, high winds, and hurricanes/tropical storms. For the Herkimer County HMP, the hazards were combined into subheadings under one profile. • Between 2016 and 2022, Herkimer County was included in 1 FEMA severe storm-related declarations. ○ FEMA-DR-4472 (Severe Storms, Straight-line Winds and Flooding) – October 2019 • According to the NOAA, 8 tornado events took place in Herkimer County between 1950 and 2022. • Based on previous occurrences and input from the Steering and Planning Committees, severe storms are identified as a hazard of concern for Herkimer County.	• NYS DHSES • FEMA • NOAA-NCEI • SPC • Input from Steering and Planning Committees

Severe Winter Storm (heavy snow, blizzards, ice storms)	Yes	Yes	• The NYS HMP identified severe winter storm as a hazard of concern for New York State.
			• FEMA included Herkimer County in three winter storm-related disaster declarations:
			  ○ FEMA-EM-3107 (Severe Blizzard) – March 1993
			  ○ FEMA-DR-3173 (Snowstorms) – December 2002-January 2003
			  ○ FEMA-DR-4322 (Severe Winter Storm and Snowstorm) – March 2017
			• Based on previous occurrences and input from the Steering and Planning Committees, severe winter storms are identified as a hazard of concern for Herkimer County.
				• NYS DHSES
				• FEMA
				• NOAA-NCEI
				• Input from Steering and Planning Committees

Tornado	Yes	Yes	Please see Severe Storm	
Tsunami	No	No	• Tsunami is identified as a hazard of concern in the NYS HMP; however, while rare, tsunamis impact the coastal areas of the State and have a daily probability of .13 percent of occurring.	• NYS DHSES

Hazard	Is this a hazard that may occur in Herkimer County?	If yes, does this hazard pose a significant risk as a Hazard of Concern Herkimer County?	Why was this determination made?	Source(s)
			• Due to its inland location and based on input from the Steering and Planning Committees, tsunamis are not identified as a hazard of concern for Herkimer County.	• Input from Steering and Planning Committees
Volcano	No	No	• The NYS HMP did not identify volcano as a threat for New York State and, therefore, the Steering and Planning Committees does not consider volcano to be a hazard of concern for Herkimer County.	• NYS DHSES • Input from Steering and Planning Committees
Wildfire	Yes	Yes	• The NYS HMP identified wildfire as a hazard of concern for New York State, however the daily probability of a wildfire breakout for the state is .09 percent. • Two wildfire events were documented in Herkimer County between 1950-2022. • Based on available data, the Steering and Planning Committees identified wildfire as a hazard of concern for Herkimer County.	• NYS DHSES • Input from Steering and Planning Committees • FEMA
Windstorm	Yes	Yes	Please see Severe Storm	

CRREL *Cold Regions Research and Engineering Laboratory*
DR *Presidential Disaster Declaration Number*
EM *Presidential Disaster Emergency Number*
FEMA *Federal Emergency Management Agency*
NCEI *National Centers for Environmental Information*
NOAA *National Oceanic and Atmospheric*
NRCC *Northeast Regional Climate Center*
NYS DEC *New York State Department of Environmental Conservation*
NYS DHSES *New York State Division of Homeland Security and Emergency Services*
NYS HMP *New York State Hazard Mitigation Plan*
PGA *Peak ground acceleration*
SPC *Storm Prediction Center*
USDA *U.S. Department of Agriculture*
USGS *United States Geologic Survey*

5.2.3 Summary of Hazards of Concern

In summary, a total of 9 natural hazards of concern were identified as significant hazards affecting the entire planning area, to be addressed at the county level in this plan (shown here in alphabetical order):

- Dam Failure
- Disease Outbreak
- Drought
- Extreme Temperatures
- Flood
- Invasive Species
- Severe Storm (thunderstorm, hail, wind, tornado, hurricane/tropical storm, and Nor'Easter)
- Severe Winter Storm
- Wildfire

Other natural hazards of concern that might have occurred in Herkimer County but have a low potential to occur or result in significant impacts can be considered in future updates to this plan.

5.3 HAZARD RANKING

As discussed in Section 5.2 (Identification of Hazards of Concern), a comprehensive range of natural hazards that pose a significant risk to Herkimer County were selected and considered during development of this plan; however, each community in Herkimer County has differing levels of exposure and vulnerability to each of these hazards. It is important for each community participating in this plan to recognize those hazards that pose the greatest risk to their community and direct their attention and resources accordingly to manage risk and reduce losses most effectively and efficiently. The hazard ranking for the county and each participating jurisdiction can be found in their jurisdictional annexes in Volume II, Section 9 of this plan.

To this end, a hazard risk ranking process was conducted for Herkimer County and its municipalities using the method described below. This method includes four risk assessment categories—probability of occurrence, impact (population, property, and economy), adaptive capacity, and changing future conditions (climate change). Each were assigned a weighting factor to calculate an overall ranking value for each hazard of concern. Depending on the calculation, each hazard was assigned a high, medium, or low ranking. Details regarding each of these categories is described below.

5.3.1 Hazard Ranking Methodology

The methodology used to rank the hazards of concern for Herkimer County is described below. Estimates of risk for the county were developed using methodologies promoted by FEMA's hazard mitigation planning guidance, generated by FEMA's HAZUS-MH risk assessment tool, and input from Herkimer County and participating jurisdictions. The ranking includes a factor to evaluate capacity of the participating jurisdiction regarding ability to address the hazard through plans, policies, and mitigation strategies. For example, a community participating in the CRS has a high capacity to address and mitigation flooding issues, which will be reflected in the ranking benchmark. In addition, a factor addressing the degree of climate change impact is included in the methodology to adjust rankings for hazards expected to be significantly impacted by climate change. Table 5.3-1 shows the four risk assessment categories' values for each of Herkimer County's hazards. Details for each category are further described below.

Table 5.3-1. Summary of Hazard Ranking Approach

Category	Level / Category	Degree of Risk / Benchmark Value	Numeric Value	Weighted Value
Probability of Occurrence	Unlikely	A hazard event is not likely to occur or is unlikely to occur with less than a 1% annual chance probability.	0	30%
	Rare	Between 1 and 10% annual probability of a hazard event occurring.	1	

Category		Level / Category	Degree of Risk / Benchmark Value	Numeric Value	Weighted Value
		Occasional	Between 10 and 100% annual probability of a hazard event occurring.	2	
		Frequent	100% annual probability; a hazard event may occur multiple times per year.	3	
Impact (Sum of all 3)	Population (Numeric Value x 3)	Low	14% or less of population is exposed to a hazard with potential for measurable life safety impact due to its extent and location.	1	30%
		Medium	15% to 29% of population is exposed to a hazard with potential for measurable life safety impact due to its extent and location.	2	
		High	30% or more of population is exposed to a hazard with potential for measurable life safety impact due to its extent and location.	3	
	Property (Numeric Value x 2)	Low	Property exposure is 14% or less of the total number of structures for community.	1	
		Medium	Property exposure is 15% to 29% of the total number of structures for community.	2	
		High	Property exposure is 30% or more of the total number of structures for community.	3	
	Economy (Numeric Value x 1)	Low	Loss estimate is 9% or less of the total replacement cost for community.	1	
		Medium	Loss estimate is 10% to 19% of the total replacement cost for community.	2	
		High	Loss estimate is 20% or more of the total replacement cost for community.	3	
Capability		Weak	Weak/outdated/inconsistent plans, policies, codes/ordinances in place; no redundancies; limited to no deployable resources; limited capabilities to respond; long recovery.	-1	30%
		Moderate	Plans, policies, codes/ordinances in place and meet minimum requirements; mitigation strategies identified but not implemented on a widespread scale; county/jurisdiction can recover but needs outside resources; moderate county/jurisdiction capabilities.	0	
		Strong	Plans, policies, codes/ordinances in place and exceed minimum requirements; mitigation/protective measures in place; county/jurisdiction has ability to recover quickly because resources are readily available, and capabilities are high.	1	
Climate Change		Low	No local data is available; modeling projects are uncertain on whether there is increased future risk; confidence level is low (inconclusive evidence).	1	10%
		Medium	Studies and modeling projections indicate a potential for exacerbated conditions due to climate change; confidence level is medium to high (suggestive to moderate evidence).	2	
		High	Studies and modeling projections indicate exacerbated conditions/increased future risk due to climate change; very high confidence level (strong evidence, well-documented and acceptable methods).	3	

Probability of Occurrence

The probability of occurrence is the likelihood of a hazard event occurring in any given year. A review of historic events assists with this determination. Each hazard of concern is rated in accordance with the numerical ratings and definitions described in Table 5.3-2. The probability of occurrence is given a weighted value of 30%.

Table 5.3-2. Probability of Occurrence Ranking Factors

Numeric Value	Probability Category	Definition
0	Unlikely	A hazard event is not likely to occur or is unlikely to occur with less than a 1% annual chance probability.
1	Rare	Between 1 and 10% annual probability of a hazard event occurring.
2	Occasional	Between 10 and 100% annual probability of a hazard event occurring.
3	Frequent	100% annual probability; a hazard event may occur multiple times per year.

Impact

The impact of each hazard is considered in three categories: impact on population, impact on property (general building stock including critical facilities), and impact on the economy. Based on documented historic losses and individual assessments by each participating municipality, an impact rating of high, medium, or low is assigned with a corresponding numeric value for each hazard of concern. In addition, a weighting factor is assigned to each impact category: 3 for population, 2 for property, and 1 for economy. This gives the impact on population the greatest weight in evaluating the impact of a hazard. The total of each category is assigned a weighted value of 30%. Table 5.3-3 presents the numerical rating, weighted factor, and description for each impact category.

Table 5.3-3. Numerical Values and Definitions for Impacts on Population, Property and Economy

Category	Weighted Value	Low Impact* (1)	Medium Impact (2)	High Impact (3)
Population	3	14% or less of population is exposed to a hazard with potential for measurable life safety impact, due to its extent and location.	15% to 29% of population is exposed to a hazard with potential for measurable life safety impact, due to its extent and location.	30% or more of population is exposed to a hazard with potential for measurable life safety impact, due to its extent and location.
Property	2	Property exposure is 14% or less of the total number of structures for community.	Property exposure is 15% to 29% of the total number of structures for community.	Property exposure is 30% or more of the total number of structures for community.
Economy	1	Loss estimate is 9% or less of the total replacement cost for community.	Loss estimate is 10% to 19% of the total replacement cost for community.	Loss estimate is 20% or more of the total replacement cost for community.

Note: A numerical value of zero is assigned if there is no impact.

** For the purposes of this exercise, "impacted" means exposed for population and property and loss for economy.*

Additional Impacts

Along with impacts on population, property, and economy, the overall risk ranking looks at two additional impacts that impact the county's vulnerability: capability and climate change. Table 5.3-4 presents the numerical rating and description for each category.

Capability

Capability refers to a jurisdiction's ability to protect the community from or withstand a hazard event. Mitigation measures are already in place, including codes/ordinances, plans, and procedures to withstand hazards due to design or location, deployable resources, or plans and procedures in place to respond to an event. The capability category has a weighted factor of 30%.

Table 5.3-4. Numerical Values and Definitions for Adaptive Capability and Changing Future Conditions

Category	Weak	Moderate	Strong
Capability	Weak/outdated/inconsistent plans, policies, codes/ ordinances in place; no redundancies; limited to no deployable resources; limited capabilities to respond; long recovery.	Plans, policies, codes/ordinances in place and meet minimum requirements; mitigation strategies identified but not implemented on a widespread scale; county/jurisdiction can recover but needs outside resources; moderate county/ jurisdiction capabilities.	Plans, policies, codes/ordinances in place and exceed minimum requirements; mitigation/protective measures in place; county/jurisdiction has ability to recover quickly because resources are readily available, and capabilities are high.

Climate Change

Climate change refers to the impact that climate change projections have on increasing or decreasing the severity and frequency of a hazard. The climate change category has a weighted factor of 10%.

Table 5.3-5. Numerical Values and Definitions for Changing Future Conditions

Category	Low Impact	Medium Impact	High Impact
Climate Change	No local data is available; modeling projects are uncertain on whether there is increased future risk; confidence level is low (inconclusive evidence).	Studies and modeling projections indicate a potential for exacerbated conditions due to climate change; confidence level is medium to high (suggestive to moderate evidence).	Studies and modeling projections indicate exacerbated conditions/increased future risk due to climate change; very high confidence level (strong evidence, well-documented and acceptable methods).

Risk Ranking Value

Each impact was then weighted and the risk ranking for each hazard is then calculated using the following formula:

Example Risk Ranking Equation

Risk Ranking = [(Impact on Population x 3) + (Impact on Property x 2) + (Impact on Economy x 1) x .30] + [Capability x 30%] + [Climate Impact x 10%] + [Probability of Occurrence x 30%]

Based on the total for each hazard, a priority ranking is assigned to each hazard of concern (high, medium, or low). The rankings were categorized as follows: Low = values less than 3.9; Medium = values between 3.9 and 4.9; High = values greater than 4.9.

5.3.2 Hazard Ranking Results

Using the process described above, the risk ranking for the identified hazards of concern was determined for Herkimer County. The hazard ranking for Herkimer County is detailed in the subsequent tables that present the step-wise process for the ranking. The countywide risk ranking includes the entire planning area and might not reflect the highest risk indicated for any of the participating jurisdictions. The resulting ranks of each municipality indicate the differing degrees of risk exposure and vulnerability. The results support the appropriate selection and prioritization of initiatives to reduce the highest levels of risk for each municipality. Both the county and the participating jurisdictions have applied the same methodology to develop the countywide risk and local rankings to ensure consistency in the overall ranking of risk; jurisdictions had the ability to alter rankings based on local knowledge and experience in handling each hazard.

This hazard ranking exercise serves four purposes: 1) to describe the probability of occurrence for each hazard; 2) to describe the impact each would have on the people, property, and economy; 3) evaluate the capabilities a community has with regards to natural hazards; and 4) to consider changing future conditions (i.e., climate change) in Herkimer County. Estimates of risk for Herkimer County were developed using methodologies promoted by FEMA's hazard mitigation planning guidance, generated by FEMA's HAZUS-MH risk assessment tool and input from the county and participating municipalities.

Table 5.3-6 shows the county-wide probability ranking assigned for likelihood of occurrence for each hazard.

Table 5.3-6. Probability of Occurrence Ranking for Hazards of Concern for Herkimer County

Hazard of Concern	Probability	Numeric Value
Dam Failure	Occasional	2
Disease Outbreak	Frequent	3

Hazard of Concern	Probability	Numeric Value
Extreme Temperature	Occasional	2
Drought	Occasional	2
Flood	Occasional	2
Infestation	Frequent	3
Severe Storm	Occasional	2
Severe Winter Storm	Occasional	2
Wildfire	Rare	1

Table 5.3-7 shows the impact evaluation results for each hazard of concern, including impact on property, structures, and the economy on the county level. It is noted that several hazards that have a high impact on the local jurisdictional level can have a lower impact when analyzed countywide. Jurisdictional ranking results are presented in each local annex in Section 9 (Jurisdictional Annexes) of this plan. The weighting factor results and a total impact for each hazard also are summarized. Values in red indicate values that were altered by the county based on local knowledge and experience with each hazard.

Table 5.3-7. Impact Ranking for Hazards of Concern for Herkimer County

Hazard of Concern	Population			Property			Economy			Total Impact Rating (Population + Property + Economy)
	Impact	Numeric Value	Multiplied by Weighing Factor (3)	Impact	Numeric Value	Multiplied by Weighing Factor (2)	Impact	Numeric Value	Multiplied by Weighing Factor (1)	
Dam Failure	Medium	2	6	Medium	2	4	Low	1	1	11
Disease Outbreak	High	3	9	Low	1	2	Medium	2	2	13
Extreme Temperature	Medium	2	6	Low	1	2	Low	1	1	9
Drought	Low	1	3	Low	1	2	Medium	2	2	7
Flood	High	3	9	Medium	2	4	Low	1	1	14
Infestation	Low	1	3	Medium	2	4	Medium	2	2	9
Severe Storm	High	3	9	Medium	2	4	Low	1	1	14
Severe Winter Storm	High	3	9	Low	1	2	Low	1	1	12
Wildfire	Medium	2	6	Medium	2	4	High	3	3	13

Table 5.3-8 shows the additional impact rankings for the hazards of concern. This includes the overall capabilities of the county and municipalities and the consideration of changing future conditions, such as climate change.

Table 5.3-8. Additional Impact Ranking for Hazards of Concern for Herkimer County

Hazard of Concern	Capabilities	Numeric Value		Climate Change	Numeric Value
Extreme Temperature	Moderate	0		High	2
Drought	Moderate	0		High	2
Flood	Moderate	0		High	2
Severe Storm	Moderate	0		High	2
Severe Winter Storm	Strong	1		Medium	2
Wildfire	Moderate	0		High	3
Infestation	Moderate	0		Medium	2
Dam Failure	Moderate	0		Medium	2
Disease Outbreak	Moderate	0		Medium	2

Table 5.3-9 presents the total calculations for each hazard ranking value for the hazards of concern.

Table 5.3-9. Total Hazard Ranking Values for the Hazards of Concern for Herkimer County

Hazard of Concern	Probability x 30%	Total Impact x 30%	Adaptive Capacity x 30%	Changing Future Conditions x 10%	Total Risk Ranking Value
Dam Failure	0.6	3.3	0	0.2	4.1
Disease Outbreak	0.9	3.9	0	0.2	5
Extreme Temperature	0.6	2.7	0	0.3	3.6
Drought	0.6	2.1	0	0.3	3
Flood	0.9	4.2	0	0.3	5.4
Infestation	0.9	2.7	0	0.2	3.8
Severe Storm	0.9	4.2	0	0.3	5.4
Severe Winter Storm	0.9	3.6	0.3	0.2	4.4
Wildfire	0.3	3.9	0	0.3	4.5

Low = values less than 3.9; Medium = values between 3.9 and 4.9; High = values greater than 4.9.

Table 5.3-10 presents the jurisdictional hazard ranking for each hazard. An evaluation of the total risk ranking score determined ranking categories that were grouped into three categories, low, medium, and high. It also includes input by the municipalities. The rankings were categorized as follows: Low = values less than 3.9 ;Medium = values between 3.9 and 4.9; High = values greater than 4.9.

These rankings have been used as a factor to identify the jurisdictional hazard mitigation strategies included in Section 9 (Jurisdictional Annexes) of this plan. The summary rankings for the county reflect the results of the vulnerability analysis for each hazard of concern and can vary from the specific results of each jurisdiction. For example, the severe storm hazard may be ranked low in one

jurisdiction, but due to the exposure and impact countywide, it is ranked as a high hazard and is addressed in the county mitigation strategy accordingly. The table below represents the initial calculated rankings presented to each jurisdiction. Each jurisdiction was able to review the rankings and adjust as necessary. Refer to Section 9 (Jurisdictional Annexes) for the adjusted rankings.

Table 5.3-10. Summary of Overall Ranking of Natural Hazards by Jurisdiction

Herkimer County Municipalities	Dam Failure	Disease Outbreak	Extreme Temperature	Drought	Flood	Infestation	Severe Storm	Severe Winter Storm	Wildfire
Cold Brook (V)	Low	Medium	Low	Medium	Medium	Low	High	Medium	Low
Columbia (T)	Low	Medium	Low	Low	Low	Low	High	Medium	Low
Danube (T)	Low	Medium	Low	Low	Medium	Low	High	Medium	Low
Dolgeville (V)	Low	High	Medium	Low	High	Low	High	Medium	Low
Fairfield (T)	Low	Medium	Low	Low	Medium	Low	High	Medium	Medium
Frankfort (T)	Medium	High	Medium	Low	High	Low	High	Medium	High
Frankfort (V)	Low	Medium	Low	Low	High	Low	High	Medium	Low
German Flatts (T)	Medium	Medium	Low	Low	Low	Low	High	Medium	High
Herkimer (T)	Low	Low	Low	Low	High	Low	High	Medium	High
Herkimer (V)	Medium	Medium	Low	Low	High	Low	High	Medium	Low
Ilion (V)	Low	Medium	Low	Low	High	Low	High	Medium	Low
Litchfield (T)	Low	Medium	Low	Low	Low	Low	High	Medium	Low
Little Falls (C)	Medium	Medium	Low	Low	High	Low	High	Medium	Low
Little Falls (T)	Low	Medium	Low	Low	Low	Low	High	Medium	Medium
Manheim (T)	Medium	Medium	Low	Low	Low	Low	High	Medium	High
Middleville (V)	Medium	High	Medium	Low	High	Low	High	Medium	Low
Mohawk (V)	Low	High	Medium	Low	High	Low	High	Medium	Low
Newport (T)	Low	Medium	Low	Low	High	Low	High	Medium	Medium
Newport (V)	Low	Low	Low	Low	High	Low	High	Medium	Low
Norway (T)	Low	Medium	Low	Low	Low	Low	High	Medium	High
Ohio (T)	Medium	High	Medium	Medium	High	Low	High	Medium	Low
Poland (V)	Low	Medium	Low	Low	Low	Low	High	Medium	High
Russia (T)	Medium	Medium	Low	Medium	Medium	Low	High	Medium	High
Salisbury (T)	Medium	Medium	Low	Low	Medium	Low	High	Medium	High
Schuyler (T)	Low	Medium	Low	Low	Medium	Low	High	Medium	High
Stark (T)	Low	Medium	Low	Low	Medium	Low	High	Medium	High
Warren (T)	Low	Medium	Low	Low	Low	Low	High	Medium	Medium
Webb (T)	Medium	High	Medium	Medium	Medium	Low	High	Medium	Medium
West Winfield (V)	Low	Medium	Low	Low	Low	Low	High	Medium	Low
Winfield (T)	Low	Medium	Low	Low	Low	Low	High	Medium	Low
Herkimer County	Medium	Medium	Low	Low	High	Low	High	Medium	Medium

Low = Values less than 3.9; Medium = Values between 3.9 and 4.9; High = Values greater than 4.9.

5.4.1 Dam Failure

Hazard Description

Dam Failure

A dam is an artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material for the purpose of storage or control of water (FEMA 2007). Dams are man-made structures built across a stream or river that impound water and reduce the flow downstream (FEMA 2003). They are built for the purpose of power production, agriculture, water supply, recreation, and flood protection. Dam failure is any malfunction or abnormality outside of the design that adversely affects a dam's primary function of impounding water (FEMA 2007). Dams can fail for one or a combination of the following reasons:

- Overtopping caused by floods that exceed the capacity of the dam (inadequate spillway capacity due to uncontrolled release or exceedance of design);
- Prolonged periods of rainfall and flooding;
- Deliberate acts of sabotage (terrorism);
- Structural failure of materials used in dam construction;
- Movement and/or failure of the foundation supporting the dam;
- Settlement and cracking of concrete or embankment dams;
- Piping and internal erosion of soil in embankment dams;
- Inadequate or negligent operation, maintenance, and upkeep;
- Failure of upstream dams on the same waterway; or
- Earthquake (liquefaction / landslides) (FEMA 2018).

A break in a dam can produce extremely dangerous flood situations because of the high velocities and large volumes of water released by such a break. Sometimes they can occur with little to no warning. Breaching of dams often occurs within hours after the first visible sign of dam failure, leaving little or no time for evacuation (FEMA 2007).

Levee Failure

A levee is a physical barrier constructed to protect areas from rising floodwaters. Levees typically remove valuable floodplain storage and block the ability of the channel to move water. There are also concerns with rainfall that falls on the levee itself. Most important is the possibility for catastrophic and sudden failure under extreme flood events, potentially resulting in loss of life and total destruction of property (FEMA 2020).

A levee breach occurs when part of a levee gives way, creating an opening through which floodwaters may pass. A breach may occur gradually or suddenly. The most dangerous breaches happen quickly during periods of high water. Earthen levees can be damaged in several ways. Strong river currents and waves can erode the surface. Trees growing on a levee can blow over, leaving a hole where the root wad and soil used to be. Burrowing animals can create holes that enable water

to pass through a levee. If severe enough, any of these situations can lead to a zone of weakness that could cause a levee breach. In seismically active areas, earthquakes and ground shaking can cause a loss of soil strength, weakening a levee and possibly resulting in failure. Seismic activity can also cause levees to slide or slump, both of which can lead to failure (FEMA 2018).

Location and Extent

Dams

NYSDEC maintains an inventory of dam failure data. Hazard classification, location, volume, elevation, and condition information for each dam in Herkimer County that has a federal identification number is included in the inventory.

According to the NYSDEC Division of Water Bureau of Flood Protection and Dam Safety, the hazard classification of a dam is assigned according to the potential impacts of a dam failure pursuant to 6 New York Codes, Rules, and Regulations (NYCRR) Part 673.3 (NYS DEC 2009). Dams are classified in terms of potential for downstream damage if the dam were to fail. These hazard classifications are identified and defined below:

- *Low Hazard (Class A)* is a dam located in an area where failure will damage nothing more than isolated buildings, undeveloped lands, or township or county roads and/or will cause no significant economic loss or serious environmental damage. Failure or mis-operation would result in no probable loss of human life. Losses are principally limited to the owner's property.
- *Intermediate Hazard (Class B)* is a dam located in an area where failure may damage isolated homes, main highways, minor railroads, interrupt the use of relatively important public utilities, and/or will cause significant economic loss or serious environmental damage. Failure or mis-operation would result in no probable loss of human life, but can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be in areas with population and significant infrastructure.
- *High Hazard (Class C)* is a dam located in an area where failure may cause loss of human life, serious damage to homes, industrial or commercial buildings, important public utilities, main highways, or railroads and/or will cause extensive economic loss. This is a downstream hazard classification for dams in which excessive economic loss (urban area including extensive community, industry, agriculture, or outstanding natural resources) would occur as a direct result of dam failure.
- *Negligible or No Hazard (Class D)* is (1) a dam that has been breached or removed, or has failed or otherwise no longer materially impounds waters, or (2) a dam that was planned but never constructed. Class "D" dams are considered to be defunct dams posing negligible or no hazard. The department may retain pertinent records regarding such dams (NYS DEC 2009).

According to data from NYS DEC, Herkimer County has 112 dams. Of the 112 dams located in Herkimer County, 12 are high hazard dams (Class C). These dams are in the Town of German Flats, Village of Herkimer, Town of Manheim, Town of Ohio, Town of Trenton, and the Town of Webb as shown in Table 5.4.1-1.

Table 5.4.1-1. Dams in Herkimer County

Dam Name	Classification	Municipality
Ilion Reservoir #2 Dam	High Hazard Dam	Town of German Flatts
Stillwater Reservoir Dam	High Hazard Dam	Town of Webb
Ilion Reservoir #3 Dam	High Hazard Dam	Town of German Flatts
Ilion Reservoir #1 Dam	High Hazard Dam	Town of German Flatts
Woodhull Lake Dam	High Hazard Dam	Town of Webb
North Lake B Dam	High Hazard Dam	Town of Ohio
North Lake C Dam	High Hazard Dam	Town of Ohio
South Lake Dam	High Hazard Dam	Town of Ohio
Mirror Lake Dam	High Hazard Dam	Village of Herkimer
Moshier Dam	High Hazard Dam	Not Found
Beaver Brook Site #1 Dam	High Hazard Dam	Town of Manheim
Hinckley Dam	High Hazard Dam	Town of Russia, Town of Trenton
Old Forge Reservoir Dam	Intermediate Hazard Dam	Town of Webb
Spruce Lake Dam	Intermediate Hazard Dam	Town of Salisbury
Finches Pond Lower Dam	Intermediate Hazard Dam	Town of Ohio
Finches Pond Upper Dam	Intermediate Hazard Dam	Town of Ohio
Prospect Dam	Intermediate Hazard Dam	Not Found
Movable Dam At Herkimer	Intermediate Hazard Dam	Town of German Flatts, Village of Mohawk, Town of Herkimer, Village of Herkimer
Trenton Falls Dam	Intermediate Hazard Dam	Town of Russia, Town of Trenton
Graffenburg Reservoir Dam	Intermediate Hazard Dam	Town of Frankfort
Movable Dam at Rocky Rift	Intermediate Hazard Dam	Town of Manheim, Town of Danube
Frankfort Reservoir Dam	Intermediate Hazard Dam	Town of Frankfort
Little Falls Reservoir Dam	Intermediate Hazard Dam	City of Little Falls
Lock E-17 DAM AT LITTLE FALLS	Intermediate Hazard Dam	City of Little Falls
Little Falls District Reservoir Dam	Intermediate Hazard Dam	City of Little Falls
Carl Gogol Recreational Pond Dam	Low Hazard Dam	Not Found
Flat Creek Pond Dam	Low Hazard Dam	Not Found
Little Moose Lake Dam	Low Hazard Dam	Not Found
Joslyn's Dam	Low Hazard Dam	Not Found
Middleville Reservoir Dam	Low Hazard Dam	Not Found
G Clifford Pond Dam	Low Hazard Dam	Not Found
Raymond Gifford Wildlife Marsh Pond Dam	Low Hazard Dam	Not Found

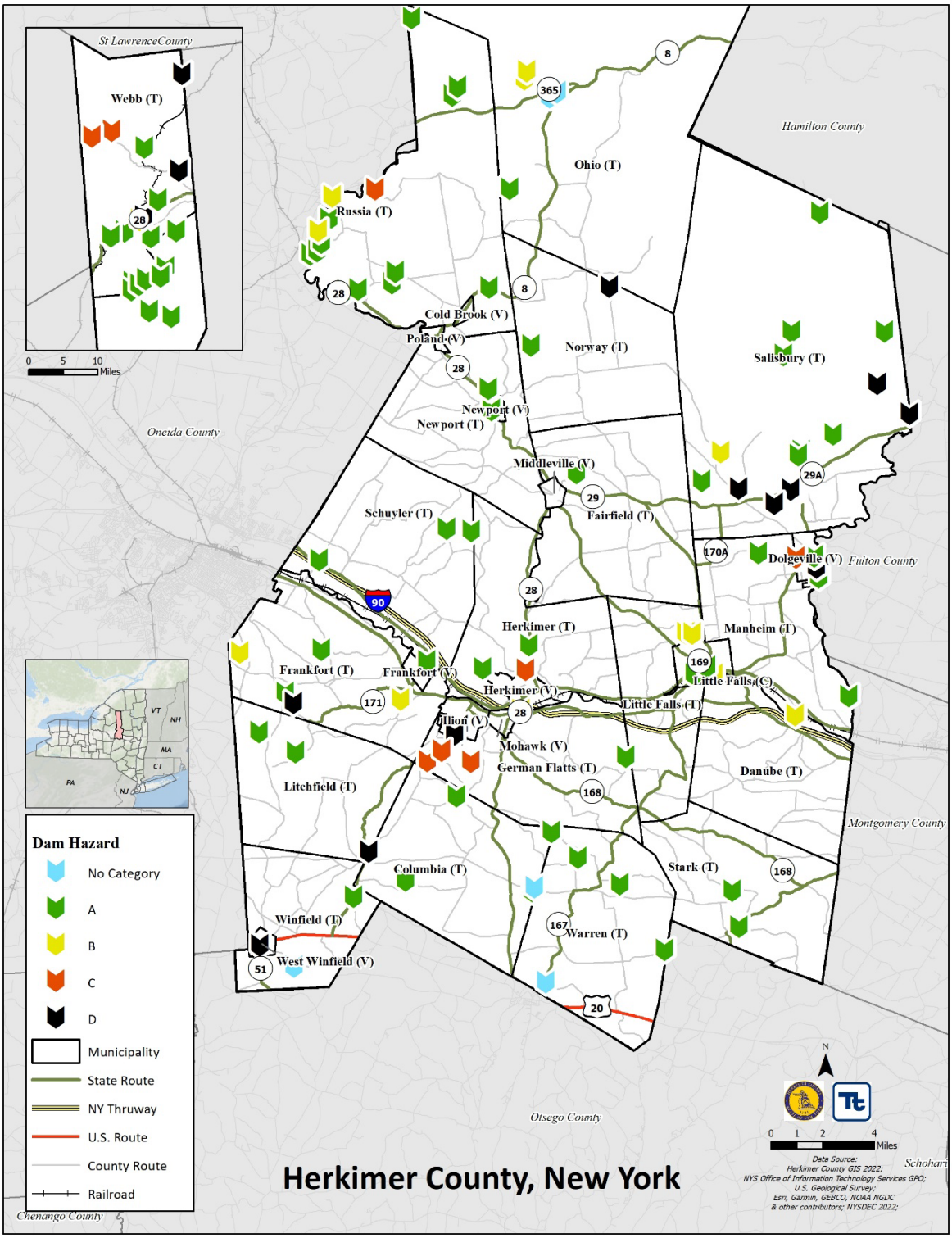
Dam Name	Classification	Municipality
Oliver Decker Farm Pond Dam	Low Hazard Dam	Not Found
John Miseneck Pond Dam	Low Hazard Dam	Not Found
Jackson Brothers Wildlife Marsh Dam	Low Hazard Dam	Not Found
Christian Lake Dam	Low Hazard Dam	Not Found
Thendara Dam	Low Hazard Dam	Town of Webb
Maple Lake Dam	Low Hazard Dam	Town of Russia
Dolgeville Reservoir Dam	Low Hazard Dam	Not Found
Bubb's Pond Dam	Low Hazard Dam	Not Found
Beaver Creek Dam	Low Hazard Dam	Not Found
Klondike Reservoir Dam	Low Hazard Dam	Not Found
Mang Brook Reservoir Dam	Low Hazard Dam	Not Found
Unpermitted Dam Salisbury	Low Hazard Dam	Town of Salisbury
Kehler Dam	Low Hazard Dam	Town of Salisbury
Van Hornesville Dam	Low Hazard Dam	Town of Stark
Richard Young Wildlife Pond Dam	Low Hazard Dam	Not Found
Newport Dam	Low Hazard Dam	Not Found
Newport Reservoir Dam	Low Hazard Dam	Not Found
Poland Reservoir Dam	Low Hazard Dam	Not Found
Chepatchet Mill Dam	Low Hazard Dam	Not Found
Millers Mills Dam	Low Hazard Dam	Not Found
LAKE EASKA DAM	Low Hazard Dam	Town of Webb
Sand Lake Dam	Low Hazard Dam	Not Found
Bisby Lake Dam #3	Low Hazard Dam	Not Found
Second Bisby Lake Dam	Low Hazard Dam	Not Found
Canachagala Outlet Dam	Low Hazard Dam	Not Found
Canachagala Inlet Dam	Low Hazard Dam	Not Found
North Lake A Dam (spillway)	Low Hazard Dam	Town of Ohio
Jerseyfield Lake Dam	Low Hazard Dam	Not Found
John V Owens Recreational Pond Dam	Low Hazard Dam	Not Found
Allen Bullet Pond Dam	Low Hazard Dam	Not Found
Power Canal Diversion Dam	Low Hazard Dam	Not Found
Rondaxe Lake Dam	Low Hazard Dam	Town of Webb
Woods Lake Dam	Low Hazard Dam	Not Found
Morrison's Hatchery Dam	Low Hazard Dam	Not Found
Glass Dam C	Low Hazard Dam	Not Found
Glass Dam D	Low Hazard Dam	Not Found
Glass Dam E	Low Hazard Dam	Not Found
Camp Ballou Dam	Low Hazard Dam	Not Found
Pape Swimming Pond Dam	Low Hazard Dam	Not Found

Dam Name	Classification	Municipality
John Wolanin Wildlife Marsh Pond Dam	Low Hazard Dam	Not Found
Clinton Etlmer Pond Dam	Low Hazard Dam	Not Found
Dolgeville Dam	Low Hazard Dam	Town of Manheim
Daniel Green Company Dam	Low Hazard Dam	Village of Dolgeville
George R Cogar Pond Dam	Low Hazard Dam	Not Found
Middle Falls Dam	Low Hazard Dam	Not Found
State Diverting Dams (north & South)	Low Hazard Dam	Not Found
Dolgeville Rod & Gun Club Pond Dam	Low Hazard Dam	Not Found
Gilbert Knitting Mills Dam	Low Hazard Dam	Not Found
Hodge Farm Pond Dam	Low Hazard Dam	Not Found
Lake Gay Dam	Low Hazard Dam	Not Found
Lake Charlotte Dam	Low Hazard Dam	Not Found
Lake Margarite Dam	Low Hazard Dam	Not Found
Herkimer Reservoir Dam	Low Hazard Dam	Town of Russia
Nelson Folts Pond Dam	Low Hazard Dam	Not Found
Gravesville Pond Dam	Low Hazard Dam	Town of Russia
Frankfort Recreational Dams #1 & #2	Low Hazard Dam	Not Found
George R Cogar Recreation Pond Dam	Low Hazard Dam	Not Found
Herkimer County Community College Pond Dam	Low Hazard Dam	Town of Herkimer
Lake Serene Dam	No Hazard Dam	Not Found
John Leitz Pond Dam	No Hazard Dam	Not Found
(138-0565)	No Hazard Dam	Not Found
Big Moose Lake Dam	No Hazard Dam	Not Found
Carl Gogol Farm Pond Dam	Hazard Classification Not Assigned	Not Found
Andrew Klisch Dam	Hazard Classification Not Assigned	Not Found
Station 245 Dam	Hazard Classification Not Assigned	Town of Winfield

Source: NYS DEC 2022

** Dam does not exist or has been removed*

Figure 5.4.1-1. Dams Located in Herkimer County

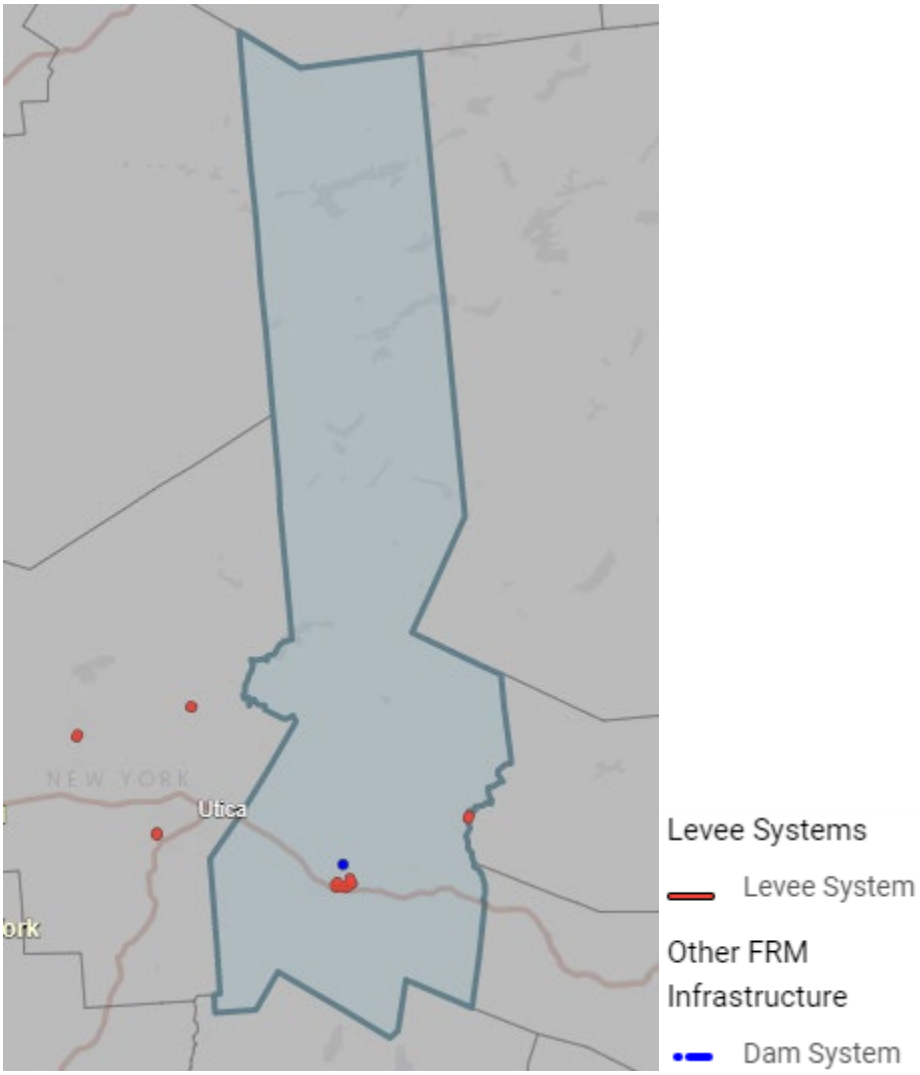


Levees

The USACE maintains the National Levee Database. According to this database, there are three levee systems located in Herkimer County.

- The Dolgeville Levee is 0.2 miles long on the East Canada Creek. The levee protects roughly 30 people and 9 buildings in Dolgeville. $3 million
- The Herkimer Mohawk River Left Bank is 2.8 miles long, located on the Mohawk River. The levee protects roughly 2,040 people and 720 buildings in Herkimer. $475 million.
- The Petrie Levee is a dam related system on Mirror Lake in Herkimer. The system does not protect any population or buildings (USACE 2023).

Figure 5.4.1-2. Locations of Levees in Herkimer County



Source: USACE 2023

Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Between 1954 and 2022, Herkimer County was not included in any disaster (DR) or emergency (EM) declarations for dam or levee failure-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2023). Detailed information about the declared disasters since 1954 is provided in Section 4 (County Profile).

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2012 and 2022, Herkimer County was not included in any dam or levee failure-related agricultural disaster declarations.

Previous Events

For this 2023 HMP update, there are no documented dam or levee failure events that impacted Herkimer County between 2017 and 2022.

Probability of Future Occurrences

Dam and levee failure events are infrequent and usually coincide with events that cause them, such as earthquakes, landslides, and excessive rainfall and snowmelt. As noted, dam failures typically occur in New York because of heavy rains or other precipitation. There is a "residual risk" associated with dams. Residual risk is the risk that remains after safeguards have been implemented. For dams, the residual risk is associated with events beyond those that the facility was designed to withstand. However, the probability of any type of dam failure is low in today's dam safety regulatory and oversight environment (New Jersey State HMP 2019).

No dam failure events have been recorded in Herkimer County. Based on historical occurrences, the probability of a dam or levee failure event occurring is considered rare (between 1 and 10% annual probability of occurrence.). Refer to Section 5.3 for additional information on the hazard ranking methodology and probability criteria.

Climate Change Projections

The climate of Herkimer County is already changing and will continue to change in the future. Climate change is beginning to affect both people and resources of the State and County and the impacts of climate change will continue. Impacts related to increasing temperatures are already being felt in the County. ClimAID: the Integrated Assessment for Effective Climate Change in New York State (ClimAID) was undertaken to provide decision-makers with information on the State's vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge.

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change. Herkimer County is part of Region 5 (see Figure 5.4.1-2. Climate Regions of New York State), East Hudson and Mohawk River Valleys (NYSERDA 2014).

Figure 5.4.1-2. Climate Regions of New York State

Source: NYSERDA 2014

Temperatures and precipitation amounts are expected to increase throughout the State as well as in Region 5.

Temperatures in New York State are warming, with an average rate of warming over the past century of 0.25° F per decade. Average annual temperatures are projected to increase across New York State by 2° F to 3.4° F by the 2020s, 4.1° F to 6.8° F by the 2050s, and 5.3° F to 10.1° F by the 2080s. By the end of the century, the greatest warming is projected to be in the northern section of the State.

Regional precipitation across New York State is projected to increase by approximately one to eight percent by the 2020s, three to 12-percent by the 2050s, and four to 15-percent by the 2080s. By the end of the century, the greatest increases in precipitation are projected to be in the northern areas of the State.

In Region 7, it is estimated that temperatures will increase by 3.7°F to 7.4°F by the 2050s and 4.2°F to 11.8°F by the 2080s (baseline of 39.9°F). Precipitation totals will increase between 2 and 15-percent by the 2050s and 3 to 17-percent by the 2080s (baseline of 40.8 inches) (NYSERDA 2014).

Climate change affects flooding more than other hazards because the frequency of extreme precipitation events in the Northeast has increased in recent years. Severe storms projected in the 1950s to occur only once in 100 years are now expected to occur once every 60 years. Other climate change influences include the following:

- Spring breakup, snowmelt, and winter rains
  - Warmer spring temperatures that lead to earlier and more rapid snow melt; more late-winter precipitation likely to fall as rain, rather than as snow.
- Cyclonic disturbances
  - Increasing frequency of severe cyclonic events, which may permit more northward tracking of hurricanes.
- Localized summer outburst events
  - Increase formation of conditions conducive to summer outbursts and flash flooding
- Human uses and development of land
  - Development leads to increased amounts of impervious surfaces such as roads, parking lots, and buildings and can increase rainwater runoff. Development in floodplains or wetlands can potentially result in an increased floodplain level (New York State 2019).

NYSERDA's middle range estimates for precipitation change increases in the region call for between two and seven percent increases above the 1971-2000 baseline by 2020, and between four and twelve percent increases by 2050. By 2100, middle range estimates call for increases by between five and twenty-one percent above the 1971-2000 baseline (NYSERDA 2014). Table 5.4.1-2 displays the projected seasonal precipitation change for the East Hudson and Mohawk River Valleys ClimAID Region (NYSERDA, 2011).

Table 5.4.1-2. Projected Seasonal Precipitation Change in Region 5, 2050s (% change)

Winter	Spring	Summer	Fall
+5 to +15	-5 to +10	-5 to +5	-5 to +10

Source: NYSERDA 2014

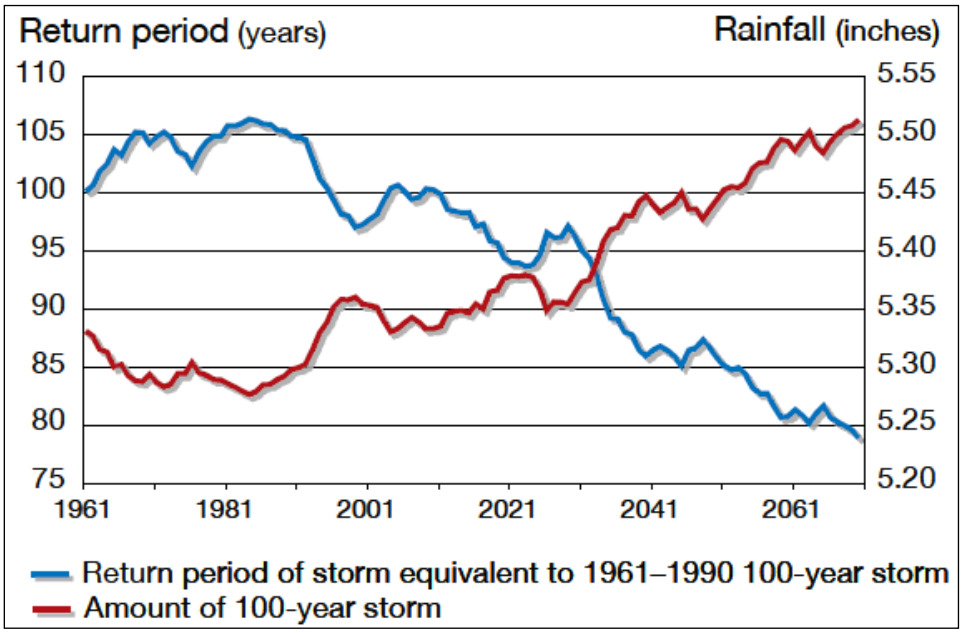
The projected increase in precipitation is expected to fall in heavy downpours and less in light rains. The increase in heavy downpours has the potential to affect drinking water; heighten the risk of riverine flooding; flood key rail lines, roadways and transportation hugs; and increase delays and hazards related to extreme weather events (NYSERDA 2011).

Increasing air temperatures intensify the water cycle by increasing evaporation and precipitation. This can cause an increase in rain totals during events with longer dry periods in between those events. These changes can have a variety of effects on the State's water resources (NYSERDA 2011). Table 5.4.1-3 displays the project rainfall and frequency of extreme storms in New York State. The

amount of rain fall in a 100-year event is projected to increase, while the number of years between such storms (return period) is projected to decrease. Rainstorms will become more severe and more frequent (NYSERDA 2011).

The projected increase in precipitation is expected to fall in heavy downpours and less in light rains. The increase in heavy downpours has the potential to affect drinking water; heighten the risk of riverine flooding; flood key rail lines, roadways, and transportation hugs; and increase delays and hazards related to extreme weather events (NYSERDA 2011).

Table 5.4.1-3. Projected Rainfall and Frequency of Extreme Storms



Source: NYSERDA 2011

Assumptions about a river's flow behavior, expressed as hydrographs are influences for dam design. Changes in weather patterns can significantly affect the hydrograph used for the design of a dam. If the hygrograph changes, the dam conceivably could lose some or all of its designed margin of safety, also known as freeboard. Loss of designed margin of safety increases possibility that floodwaters would overtop the dam or create unintended loads, which could lead to a dam failure.

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The dam failure hazard is of significance to Herkimer County because 112 dams are present across Herkimer County, 12 of which are classified as high hazard by NYS DEC. Dam failure events are frequently associated with other natural hazard events such as earthquakes, landslides, or severe weather, which limits their predictability and compounds the hazard.

Dam failure inundation maps and downstream hazard areas are considered sensitive information and those made available are included in Appendix J.

To assess Herkimer County's risk to dam failure, a qualitative assessment was conducted using available dam failure inundation area mapping for the following high hazard dams:

- North Lake B & C Dam
- South Lake Dam
- Woodhull Lake Dam

Due to the lack of available spatial exposure data within Herkimer County, the inundation areas for the high hazard dams within the county were analyzed using available information from EAPS for each dam. Due to this process, specific impacts to persons within inundation areas were not available. However, the impacted buildings per inundation area are detailed in Table 5.4.1-4 below.

Table 5.4.1-4. Dam Breach Impacts

Dam Name	Approximate # of Buildings in Inundation Area	Approximate RCV	Dam Breach Notes
Beaver Brook Site #1 Dam	Unknown	Unknown	Failure of the Beaver Brook Dam would impact the Village of Dolgeville heavily, loss of property and public infrastructure. Beaver Brook only retains water during periods of heavy rain and the impact would only be great if the reservoir is full.
Hinckley Dam	Unknown	Unknown	Dam breach would impact portions of the Villages of Poland, Newport, Middleville, and the entire Village of Herkimer. The County offices and jail would likely be flooded, and many major state and county roads would be impacted and cut off large portions of the county from emergency services. Loss of life, property and public and private infrastructure damage expected.
Ilion Reservoir #1 Dam	Unknown	Unknown	Impacts would be the area in the Town of German Flatts called South Ilion. Village of Ilion heavily impacted, damages to property and public infrastructure. Also potential for loss of life.
Ilion Reservoir #2 Dam	Unknown	Unknown	Impacts would be the area in the Town of German Flatts called South Ilion. Village of Ilion heavily impacted, damages to property and public infrastructure. Also potential for loss of life.

Dam Name	Approximate # of Buildings in Inundation Area	Approximate RCV	Dam Breach Notes
Ilion Reservoir #3 Dam	Unknown	Unknown	Impacts would be the area in the Town of German Flatts called South Ilion. Village of Ilion heavily impacted, damages to property and public infrastructure. Also potential for loss of life.
Mirror Lake Dam	Unknown	Unknown	This is part of an abandoned hydraulic canal. The feed to the lake was cut off over fifty years ago. Dam failure would impact the immediate area below the dam in the Village of Herkimer.
Moshier Dam	0	$0	This dam is downstream from Stillwater Reservoir Dam. There is no population in the area and the impact would only be damage to the Adirondack Forest Preserve. Loss of life could occur if hikers were in the area. Lewis County would be heavily impacted.
North Lake B & C Dam	3	$0.8 million	Dam breach would impact North Branch Black River and Black River from North Lake Reservoir downstream to the County Boundary. Several homes would be inundated along the breach corridor. Loss of life, property and infrastructure damage expected.
South Lake Dam	9 to 19	$2.4 to $9.1 million	Dam breach would impact South Branch Black River and Black River from North Lake Reservoir downstream to the County Boundary. Several homes would be inundated along the breach corridor. Loss of life, property and infrastructure damage expected.
Stillwater Reservoir Dam	Unknown	Unknown	Large reservoir located in the northern portion of Herkimer County. There is little to no population downstream of the dam. Moshier Dam and Lewis County would be heavily impacted from a dam failure at Stillwater.

Dam Name	Approximate # of Buildings in Inundation Area	Approximate RCV	Dam Breach Notes
Woodhull Lake Dam	9 to 22	$3.0 to $7.3 million	Dam breach would impact Woodhull Creek from Woodhull Lake Reservoir downstream to the County Boundary. Loss of life, property and infrastructure damage expected.

There are an estimated known 44 buildings plus unknown impacts from other high hazard dams located in the high hazard dam inundation areas with a value of approximately $17 million plus unknown building impacts in building and contents (based on replacement cost value).

Individuals outside of a high hazard dam inundation may also be impacted by the effects of a hazard event. Based on the spatial analysis, there are an estimated 4,238 people living in the 1-percent annual chance flood event hazard area (Table I-3). The Village of Ilion has the highest percentage of persons located in the 1-percent annual chance flood event hazard area at 35.3% of the total population of the village. The Village of Cold Brook and the Village of Dolgeville have over 10% of their populations located in the 1-percent annual chance flood event hazard area.

Dam failure inundation mapping was not available for the following high hazard dams in Herkimer County:

- Beaver Brook Site #1 Dam
- Hinckley Dam Ilion Reservoir #1 Dam
- Ilion Reservoir #2 Dam
- Ilion Reservoir #3 Dam
- Mirror Lake Dam
- Moshier Dam
- Stillwater Reservoir Dam

The New York Power Authority (NYPA) owns and operates the Gregory B. Jarvis Power Project at the Hinckley Dam. This hydroelectric facility is authorized under a Federal Energy Regulatory Commission (FERC) license. Herkimer County is identified as a stakeholder for the Gregory B. Jarvis Power Project Emergency Action Plan (EAP). NYPA hosts an annual Gregory B. Jarvis Power Project Coordination Meeting with stakeholders and conducts an annual EAP phone drill where the contacts on the notification flow chart are tested. NYPA also conducts a functional and tabletop exercise in accordance with FERC guidelines with stakeholders to test the Gregory B. Jarvis Power Project EAP.

As not all high hazard dams in Herkimer County had data available to support this vulnerability assessment, this assessment underrepresents the risks associated with dam failure in Herkimer County.

Impact on life, Health, and Safety

The impact of dam and levee failure on life, health, and safety is dependent on several factors such as the class of dam/levee, the area that the dam/levee is protecting, the location of the dam/levee, and the proximity of structures, infrastructure, and critical facilities to the dam or levee structure. The level of impact that a failure would have can be predicted based upon the hazard potential classification as rated by the United States Army Corps of Engineers (USACE n.d.). Table 5.4.1-5 outlines the recommended hazard classifications.

Table 5.4.1-5. United States Army Corps of Engineers Hazard Potential Classification

Hazard Category(a)	Direct Loss of Life (b)	Lifeline Losses (c)	Property Losses (d)	Environmental Losses (e)
Low	None (rural location, no permanent structures for human habitation)	No disruption of services (cosmetic or rapidly repairable damage)	Private agricultural lands, equipment, and isolated buildings	Minimal incremental damage
Significant	Rural location, only transient or day-use facilities	Disruption of essential facilities and access	Major public and private facilities	Major mitigation required
High	Certain (one or more) extensive residential, commercial, or industrial development	Disruption of essential facilities and access	Extensive public and private facilities	Extensive mitigation cost or impossible to mitigate

a. Categories are assigned to overall projects, not individual structures at a project.
b. Loss-of-life potential is based on inundation mapping of area downstream of the project. Analyses of loss-of-life potential should take into account the population at risk, time of flood wave travel, and warning time.
c. Lifeline losses include indirect threats to life caused by the interruption of lifeline services from project failure or operational disruption; for example, loss of critical medical facilities or access to them.
d. Property losses include damage to project facilities and downstream property and indirect impact from loss of project services, such as impact from loss of a dam and navigation pool, or impact from loss of water or power supply.
e. Environmental impact downstream caused by the incremental flood wave produced by the project failure, beyond what would normally be expected for the magnitude flood event under which the failure occurs.

Source: USACE n.d.

The entire population residing within a dam failure inundation zone is considered exposed and vulnerable to an event. The potential for loss of life is affected by the capacity and number of evacuation routes available to populations living within these areas. Those most at risk include the economically disadvantaged and the population over the age of 65. According to 2021 American Community Survey 5-year Estimates, there are 7,754 persons living below the poverty level and 12,538 persons over the age of 65 within Herkimer County. These populations are more at risk during a dam failure event because economically disadvantaged populations are likely to evaluate their risk and make the decision to evacuate based upon the net economic impact to their family, while elderly

populations are likely to seek or need medical attention. The availability of medical attention may be limited due to isolation during a flood event and other difficulties in evacuating. There is often limited warning time for a dam failure event. Populations without adequate warning of the event are highly vulnerable.

Dam failure can cause persons to become displaced if flooding of structures occurs. Dam failure may mimic flood events, depending on the size of the dam reservoir and breach. Understanding potential outcomes of flooding for each dam in Herkimer County would require intensive hydraulic modeling.

Impact on General Building Stock

Buildings located downstream of a dam are at risk to damages should there be a failure. Downstream inundation areas were not available to quantify any potential losses to structures. Properties located closest to the dam inundation area have the greatest potential to experience the largest, most destructive surge of water. The overall impact of flooding damages caused by dam failure will vary depending on the depth of flooding and velocity of the surge.

Dam failure can cause severe downstream flooding and may transport large volumes of sediment and debris, depending on the magnitude of the event. Widespread damage to buildings and infrastructure affected by an event would result in large costs to repair these locations. In addition to physical damage costs, businesses can be closed while flood waters retreat, and utilities are returned to a functioning state.

Impact on Critical Facilities and Community Lifelines

Dam failures may also impact critical facilities and infrastructure located in the downstream inundation zone. Consequentially, dam failure can cut evacuation routes, limit emergency access, and/or create isolation issues. Dam failure can cause severe downstream flooding and may transport large volumes of sediment and debris, depending on the magnitude of the event. Further, utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

Impact on the Economy

Severe flooding that follows an event like a dam failure can cause extensive structural damage and withhold essential services. The cost to recover from flood damages after a surge will vary depending on the hazard risk of each dam.

Severe flooding that follows an event like a dam failure can cause extensive damage to public utilities and disruptions to delivery of services. Loss of power and communications may occur and drinking water and wastewater treatment facilities can become temporarily out of operation. Debris from surrounding buildings can accumulate should the dam mimic major flood events, such as the 1-percent annual chance flood event that is discussed in Section 5.4.5 (Flood).

Impact on the Environment

The environmental impacts of a dam failure can include significant water-quality and debris-disposal issues or severe erosion that can impact local ecosystems. Flood waters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooded waterway. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals may get added to flood waters. Hazardous materials may be released and distributed widely across the floodplain. Water supply and wastewater treatment facilities could be offline for weeks. After the flood waters subside, contaminated and flood-damaged building materials and contents must be properly disposed of. Contaminated sediment must be removed from buildings, yards, and properties.

Future Changes That May Impact Vulnerability

Understanding future changes that impact vulnerability in the County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

As discussed and illustrated in Section 4 (County Profile), areas targeted for future growth and development have been identified across the County.

Any areas of growth could be potentially impacted by a dam failure event if the structures are located within the flood protection area and mitigation measures are not considered. Therefore, it is the intention of the County and all participating municipalities to discourage development in vulnerable areas or to encourage higher regulatory standards at the local level.

Any areas of growth could be potentially impacted by a dam or levee failure event if the structures are located within the flood protection area and mitigation measures are not considered. Therefore, it is the intention of the County and all participating municipalities to discourage development in vulnerable areas or to encourage higher regulatory standards at the local level. Due to the sensitive nature of dam locations and downstream inundation zones, an assessment to determine the proximity of these new development sites to potential dam inundation cannot be performed at this time.

Projected Changes in Population

Herkimer County has experienced population decline since 1970. According to the U.S. Census Bureau, the County's population has decreased 3.4-percent between 2010 and 2020 (U.S. Census

Bureau 2020). Even though the population has decreased, changes in population density should be evaluated as well. High population density can create issues for local residents during an evacuation.

Climate Change

As discussed above, most studies project that the State of New York will see an increase in average annual precipitation. An increase in annual precipitation amounts in the region, primarily in the form of heavy rainfalls, will have the potential to increase the potential for dam failure events. Increases in precipitation may stress the dam wall. Further, existing dams may not be able to retain and manage increases in water flow from more frequent, heavy rainfall events. Heavy rainfalls may result in more frequent overtopping of these dams and flooding of the County's assets in adjacent inundation areas. However, the probable maximum flood used to design each dam may be able to accommodate changes in climate.

Change of Vulnerability Since the 2017 HMP

Overall, the County's vulnerability has not significantly changed, and the County will continue to be exposed and vulnerable to dam failure events, especially those located within or near downstream inundation zones. Because of the sensitive nature of the dam failure inundation zones, potential losses have not been quantified and presented in this plan. To estimate potential losses to population, buildings, critical facilities and infrastructure, dam inundation areas and depths of flooding may be used to generate depth grids. Utilizing digitized inundation boundaries, in the future, Hazus may be used to estimate potential losses for the County and participating municipalities.

5.4.1 Disease Outbreak

Hazard Profile

Hazard Description

An outbreak or an epidemic occurs when new cases of a certain disease, in a given population, substantially exceed what is expected. An epidemic may be restricted to one locale, or it may be global, at which point it is called a pandemic. A pandemic is defined as a disease occurring over a wide geographic area and affecting a high proportion of the population. A pandemic can cause sudden, pervasive illness in all age groups on a local or global scale. A pandemic is a novel virus to which humans have no natural immunity that spreads from person to person. A pandemic will cause both widespread and sustained effects and is likely to stress the resources of both the State and Federal government (NJOEM 2019)

Most disease outbreaks occur due to respiratory viruses. A respiratory virus with pandemic potential is a highly contagious respiratory virus that spreads easily from person to person and for which there is little human immunity. This hazard includes pandemic influenza. This hazard strains the healthcare system, requires school closures, causes high rates of illness and absenteeism that undermine critical infrastructure across the city, and decreases community trust due to social distancing measures interfering with personal movement and being perceived as being ineffectual. Previous events that exemplify this hazard include the 1918 ("Spanish flu") and 2009 ("Swine flu") influenza pandemics and the 2003 SARS outbreak, which had pandemic potential (NYC Emergency Management 2019).

In addition to respiratory viruses, diseases with new or emerging features can challenge control. Emerging diseases are difficult to contain or treat and present significant challenges to risk communication since the mechanics of transmission, laboratory identification, and effective treatment protocols may be unknown (NYC Emergency Management 2019).

Of particular concern in Herkimer County are respiratory illnesses such as influenza, also known as the 'flu'. While flu symptoms are typically mild, vulnerable populations; older adults, younger children, pregnant persons, and people with pre-existing conditions are more likely to experience flu-related complications. Seasonal flu epidemics occur yearly, typically beginning at the end of October and continuing through the colder months (NYS DOH 2023).

West Nile Virus (WNV) disease is spread by the bite of a mosquito infected with the virus. Mosquitos become infected when they feed on infected birds (NYS DOH 2017). The West Nile Virus cases will increase in portions of the state during the late summer and early fall seasons.

Tick-borne diseases are bacterial illnesses that spread to humans through infected ticks. These types of diseases rely on ticks for transmission. Ticks become infected by micro-organisms when feeding on small, infected mammals (mice and voles). Different tick-borne diseases are caused by different micro-organisms, and it is possible to be infected with more than one tick-borne disease at a time. Anyone who is bitten by an infected tick may get a tick-borne disease. People who spend a lot of time outdoors have a greater risk of becoming infected. The three types of ticks in New York that may carry disease-causing micro-organisms are the Blacklegged Tick (Ixodes scapularis) (also known as Deer Tick), Lone Star Tick (*Amblyomma americanum*), and the American dog tick (*Dermacentor variabilis*) (New York State Department of Health 2019).

The Novel-Coronavirus, also known as 'COVID-19' is an infection disease caused by the SARS-CoV-2 virus. The virus can spread from an infected person's mouth or nose in small liquid particles through coughing, sneezing, speaking, singing, or breathing (World Health Organization 2022).

For the purposes of this hazard mitigation plan update, the following infectious diseases will be discussed in further detail: Influenza, West Nile Virus (WNV), Lyme Disease, and Coronavirus.

Influenza

Influenza (the flu) is a contagious virus that affects the nose, throat, lungs and other parts of the body. It can quickly spread from one person to another, causing mild to severe illness and can lead to death. Symptoms include fever, cough, sore throat, runny or stuffy nose, muscle or body aches, headache, and tiredness (New York State Department of Health 2021).

The risk of a global influenza pandemic has increased over the last several years. This disease can claim thousands of lives and adversely affect critical infrastructure and key resources. An influenza pandemic can reduce the health, safety, and welfare of the essential services workforce; immobilize core infrastructure, and induce fiscal instability.

Pandemic influenza differs from seasonal influenza (or 'the flu') because outbreaks of seasonal flu are caused by viruses already living amongst people. Pandemic influenza is a global outbreak of a new influenza A virus, which can infect people easily and spread from person to person in an efficient and sustained manner (Center for Disease Control and Prevention 2020). Additionally, the seasonal flu happens annually and usually peaks between December and February.

West Nile Virus

West Nile Virus (WNV) is the leading cause of mosquito-borne disease in the United States. West Nile Virus is most commonly spread to people who are bitten by an infected mosquito. WNV is usually diagnosed during mosquito season, starting in the summer months and continuing through the fall (CDC 2021). WNV was first found in New York State in 1999. Since 2000, 490 human cases and 37 deaths of WNV have been reported statewide (the data range is 2000-2017) (NYS DOH 2017). The symptoms of severe infection (West Nile encephalitis or meningitis) can include headache, high fever, neck stiffness, muscle weakness, stupor, disorientation, tremors, seizures, paralysis, and coma.

WNV can cause serious illness, and in some cases, death. Usually, symptoms occur from 3 to 14 days after being bitten by an infected mosquito (NYS DOH 2017).

Eastern Equine Encephalitis

Eastern Equine Encephalitis (EEE) is a virus disease of wild birds that is transmitted to horses and humans by mosquitoes. It is a rare but serious viral infection. EEE is most common in the eastern half of the U.S. and is spread by the bite of an infected mosquito. EEE can affect humans, horses, and some birds. Severe cases of EEE infection begin with the sudden onset of headache, high fever, chills, and vomiting that may progress into disorientation, seizures, encephalitis (inflammation of the brain), and coma. Approximately a third of patients who develop EEE die, and many of those who survive have mild to severe brain damage (NYS DOH 2022).

Lyme Disease

Lyme disease is the most common vector-borne disease in the United States. It is an illness caused by infection with the bacterium *Borrelia burgdorferi*, which is carried by ticks. Typical symptoms include fever, headache, fatigue, and skin rash. If left untreated, symptoms can be severe. Lyme disease is spread to people by the bite of an infected tick (CDC 2021). In New York, the commonly infected tick is the deer tick. Immature ticks become infected by feeding on infected white-footed mice and other small mammals. Deer ticks can also spread other tick-borne diseases. Anyone who is bitten by a tick carrying the bacteria can become infected (NYS DOH 2019).

Coronavirus

Coronavirus disease (COVID-19) is an infectious disease first identified in 2019. The virus rapidly spread into a global pandemic by spring of 2020. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illnesses (World Health Organization 2022). COVID-19 spreads when an infected person breathes out droplets and very small particles that contain the virus. These droplets and particles can be breathed in by other people or land on their eyes, noses, or mouth. In some circumstances, they may contaminate surfaces they touch (CDC 2022).

Reported illnesses have ranged from mild symptoms to severe illness and death. Reported symptoms include difficulty breathing and shortness of breath, fever or chills, cough, fatigue, muscle or body aches, loss of smell or taste, sore throat, congestion, and nausea or vomiting. Emergency symptoms that require immediate medical attention include trouble breathing, persistent pain or pressure in the chest, confusion, or inability to wake or stay awake, and bluish lips or face. Symptoms may appear 2-14 days after exposure to the virus (based on the incubation period of MERS-CoV viruses) (CDC 2021).

As of January 30, 2023, Herkimer County has reported 17,349 positive cases of COVID-19 and 219 deaths (New York Times 2023).

Location

Herkimer County's geographic and demographic characteristics make it particularly vulnerable to importation and spread of infectious diseases. In terms of pandemic influenza, all counties may experience pandemic influenza outbreak caused by factors such as population density and the nature of public meeting areas. Densely populated areas will spread diseases quicker than less densely populated areas. There are some densely populated municipalities in the County, leading to the spread of influenza and coronavirus more quickly than less densely populated communities.

Herkimer County Public Health (HCPH) is the lead agency for preparedness, response, recovery, and mitigation of events that affect community health or medical needs. The CEMP outlines the role of HCPH, including detection, activation, operations, and recovery. The Public Health Emergency Preparedness and Response Plan (PHEPRP), Appendix 11 of the CEMP, outlines the mitigation function. The plan specifies that HCPH will:

- Coordinate with Herkimer County Emergency Services to assess short and long-term mitigation measures to reduce the impact of the emergency/disaster on the County's critical infrastructure and key resources.
- Assess the emergency's impact on HCPH's ability to perform required services, the extent of potential damage to community health and medical infrastructure, and the impacts to the population.
- Develop an After Action Report (AAR) to identify actions taken, or how preventive measures and response measures could be improved in the next emergency.

Extent

The extent and location of disease outbreaks depend on the preferred habitat of the species, as well as the species' ease of movement and establishment. The magnitude of disease outbreaks species ranges from nuisance to widespread. The threat is typically intensified when the ecosystem or host species is already stressed, such as during periods of drought. The already weakened state of the ecosystem causes it to more easily be impacted by an infestation. The presence of disease-carrying mosquitoes and ticks has been reported throughout most of New York State and Herkimer County.

The exact size and extent of an infected population depend on how easily the illness is spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in more densely populated areas. The transmission rate of infectious diseases will depend on the mode of transmission of a given illness.

Influenza and Coronavirus

As noted above, the exact size and extent of an infected population depend on how easily the illness is spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in more densely populated

areas. The transmission rate of infectious diseases will depend on the mode of transmission of a given illness. The severity and length of the next pandemic cannot be predicted; however, experts expect that its effect on the United States could be severe.

Between 2019 and 2023, there were 2,640 confirmed cases of influenza in Herkimer County (NYS DOH 2023). Those most vulnerable to influenza include young children and the elderly, although anyone can become infected.

In 1999, The World Health Organization (WHO) published guidance for pandemic influenza and defined the six phases of a pandemic. The updated guidance was published in 2005 to redefine these phases, and in 2009 WHO published the *Pandemic Influenza Preparedness and Response,* this guidance significantly updates and replaces the guidance published in 2005 (World Health Organization 2009). The revised guidance retains the six-phase approach to facilitate the incorporation of new recommendations. Phases 1-3 and 5-6 have been grouped to include common action points. The WHO pandemic phases are outlined in Table 5.4.1 1 below.

Table 5.4.1-1. WHO Global Pandemic Phases

Phase	Description
Preparedness and Response– Global, Regional, National, Sub-National Level	
Phase 1	No animal influenza virus circulating among animals has been reported to cause infection in humans.
Phase 2	An animal influenza virus circulating in domesticated or wild animals is known to have caused infection in humans and is therefore considered a potential pandemic threat.
Phase 3	An animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks.
Containment	
Phase 4	Human-to-human transmission (H2H) of an animal or human-animal influenza reassortant virus able to sustain community-level outbreaks has been verified.
Response – Global Level	
Phase 5	The same identified virus has caused sustained community-level outbreaks in two or more countries in one WHO region.
Phase 6	In addition to the criteria defined in Phase 5, the same virus has caused sustained community-level outbreaks in at least one other country in another WHO region.
Post-Pandemic	
Post-Peak Period	Levels of pandemic influenza in most countries with adequate surveillance have dropped below peak levels.
Possible New Wave	Level of pandemic influenza activity in most countries with adequate surveillance rising again.
Post-Pandemic Period	Levels of influenza activity have returned to the levels seen for seasonal influenza in most countries with adequate surveillance

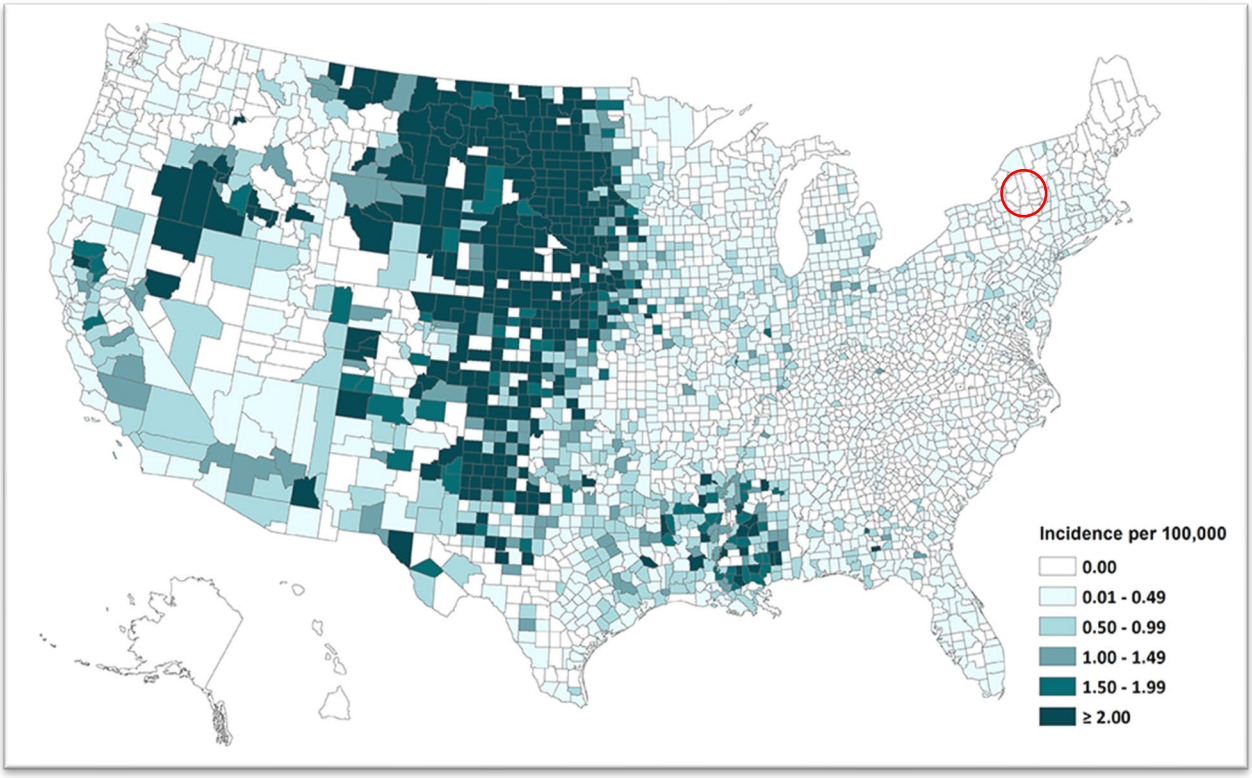
Source: WHO 2009

In New York State, activities to be undertaken during the pandemic period, use the World Health Organization's classification system. The Pandemic Influenza Preparedness and Response document provides guidance to government agencies, individuals, families and communities, and the health sectors at the local and global levels.

West Nile Virus

West Nile Virus (WNV) is the leading cause of mosquito-borne diseases in the continental United States. There are no vaccines to prevent or medications to treat WNV in people, and those infected rarely experience sickness or symptoms. About 1 in 5 infected people will develop a fever and other symptoms, and 1 in 150 infected people will develop a serious, sometimes fatal, illness (CDC 2022). Figure 5.4.1-1 shows the annual average WNV incidences in the United States. The figure shows that Herkimer County had between 0 incidents per 100,000 people based on statistics from 1999-2020 (CDC 2022).

Figure 5.4.1-1 Average Annual Incidence of West Nile Virus Neuroinvasive Disease Reported to CDC by County, 1999-2020



Source: *CDC 2022*
Note: *The red circle shows the approximate location of Herkimer County*

Eastern Equine Encephalitis

About 5-10 EEE human cases are reported each year in the U.S. Five cases of EEE in people in New York State have been reported since 1971. These cases were reported in 1971, 1983, 2009, 2010 and 2011 and occurred in Oswego and Onondaga counties. All five cases died. The risk of getting EEE is highest from late July through September. People at the greatest risk of developing severe disease are those over 50 years of age and younger than 15 years of age (NYS DOH 2022).

Lyme Disease

Lyme disease is the most reported vector borne illness in the U.S. Between 2000 and 2018, there was a total of 281 confirmed cases in Lyme disease in Herkimer County, including 48 cases in 2017, the highest number of reported cases of a given year (TickCheck 2023).

Previous Occurrences

FEMA Major Disasters and Emergency Declarations

Between 1954 and 2022, Herkimer County was included in three disaster (DR) or emergency (EM) declarations for disease outbreak-related events; one disaster declaration (DR) for Covid-19 and two emergency declarations (EM) for West Nile virus and Covid-19. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 4 (County Profile).

Table 5.4.1-2. FEMA DR and EM Declarations for Disease Outbreak Events in Herkimer County, 1954 to 2023

FEMA Declaration Number	Date(s) Of Event	Event Type	Details
EM-3155	May 22, 2000 – November 1, 2000	Other	West Nile Virus
DR-4480	January 20, 2020 – Ongoing	Biological	COVID-19 Pandemic
EM-3434	January 20, 2020 – Ongoing	Biological	COVID-19 Pandemic

Source: FEMA 2023

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2012 and 2022, Herkimer County was not included in any disease outbreak-related agricultural disaster declarations.

Previous Events

For this 2023 HMP update, known disease outbreak events that impacted Herkimer County between 2017 and 2022 are discussed below. For events prior to 2017, refer to Appendix E (Supplementary Data).

Table 5.4.1-3. Hazard Events in Herkimer County (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
2017	Influenza	N/A	N/A	554 cases of laboratory confirmed influenza were reported in Herkimer County.
2017	Lyme Disease	N/A	N/A	48 cases of Lyme disease were reported in Herkimer County.
2018	Influenza	N/A	N/A	748 cases of laboratory confirmed influenza were reported in Herkimer County.
2018	Lyme Disease	N/A	N/A	31 cases of Lyme disease were reported in Herkimer County.
2019-2020	Influenza	N/A	N/A	879 cases of influenza were reported in Herkimer County.
2020-2021	Influenza	N/A	N/A	83 cases of influenza were reported in Herkimer County.
2021-2022	Influenza	N/A	N/A	478 cases of influenza were reported in Herkimer County.
2022-2023	Influenza	N/A	N/A	1,200 cases of influenza were reported in Herkimer County.
2020-present	Coronavirus	DR-4480, EM-3434	Yes	As of January 30, 2023, Herkimer County has reported 17,349 positive cases of COVID-19 and 219 deaths. Since the beginning of the pandemic, at least 1 in 280 residents have died of Covid-19, a total of 219 reported deaths. 61 percent of the County is now fully vaccinated (86 percent of residents 65 years old and up). 34 percent have received a vaccine booster (65 percent of residents 65-year-old and up).

Sources: FEMA 2023; NYSDOH 2023; New York Times 2023; NYS DOH 2021
Notes: 2019 to present reports were not available for Lyme disease and West Nile Virus.

Probability of Future Occurrences

It is difficult to predict when the next disease outbreak will occur and how severe it will be because viruses are always changing. The United States and other countries are constantly preparing to respond to pandemics. The Department of Health and Human Services and others are developing supplies of vaccines and medicines. In addition, the United States has been working with the WHO and other countries to strengthen the detection of disease and response to outbreaks. Preparedness efforts are ongoing via the New York State Department of Health, and local health departments through community preparedness programs to empower local health departments

and their community partners to promote local readiness, foster community resilience, and to ensure comprehensive, coordinated, and effective responses

In Herkimer County, the probability for a future disease outbreak event is dependent on several factors. One factor that influences the spread of disease is population density. Populations that live close to one another are more likely to spread diseases. As population density increases in the County, so too will the probability of a disease outbreak event to occur. When there is a significant change in a circulating strain of a virus, more of the population is susceptible and the strain could rapidly spread from person to person (NYC Emergency Management 2019).

As for mosquito-borne and tick-borne diseases, as long as mosquitoes and ticks are found in Herkimer County, the risk of contracting WNV, Lyme disease, or other diseases carried by these insects exists. Instances of WNV have been generally decreasing throughout the northeast United States due to planning and eradication efforts. However, some scientists anticipate an increase in WNV and other mosquito-borne diseases due to changing climate conditions creating suitable habitats for mosquitoes (CDC 2013). Disease-carrying ticks will continue to inhabit Herkimer County and the threat of Lyme disease and other tick-borne diseases will continue. Similar to mosquitoes, there are eradication efforts in place to control the tick population and new methods of control are being developed (Steere, Coburn and Glickstein 2004). Therefore, based on all available information and available data regarding mosquito and tick populations, it is anticipated that mosquito- and tick-borne diseases will continue to be a threat to Herkimer County.

Based on historical occurrences, the probability of a disease outbreak event occurring is considered frequent (100% annual probability of occurrence). Refer to Section 5.3 for additional information on the hazard ranking methodology and probability criteria.

Climate Change Projections

Climate change is beginning to affect both people and resources in New York State, and these impacts are projected to increase. The impacts related to increasing temperatures and sea level rise are already causing complications in the state. *ClimAID: The Integrated Assessment for Effective Climate Change in New York State (ClimAID)* was undertaken to provide decision-makers with information on the state's vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge (NYSERDA 2011/2014).

Temperatures in New York State are warming, with an average rate of warming over the past century of 0.25° F per decade. Average annual temperatures are projected to increase across New York State by 2–3.4 °F by the 2020s, 4.1–6.8 °F by the 2050s, and 5.3–10.1 °F by the 2080s. By the end of the century, the greatest warming is projected to be in the northern section of the state (NYSERDA 2011/2014).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change. Herkimer County is part of Region 5 (East Hudson and Mohawk River Valleys). In Region 5, it is estimated that temperatures will increase by 4.5°F to 6.2°F by the 2050s and 5.6°F to 9.7°F by the 2080s (baseline of 47.6°F, middle range projection). Precipitation totals are estimated to increase between 4 to 12 percent by the 2050s and 5 to 15 percent by the 2080s (baseline of 38.6 inches, middle-range projection). Table 5.4.1-4. displays the projected seasonal precipitation change for the region (NYSERDA 2011/2014).

Table 5.4.1-4. Projected Seasonal Precipitation Change in Region 5, 2050s (% change)

Winter	Spring	Summer	Fall
+5 to +15	-5 to +10	-5 to +5	-5 to +10

Source: NYSERDA 2011/2014

Warmer temperatures and changing rainfall patterns provide an environment where mosquitos can remain active longer, greatly increasing the risk for animals and humans. Lyme disease could also expand throughout the United States as temperatures warm, allowing ticks to move into new areas of the country. The climate changes can also allow tropical and subtropical insects to move from regions where diseases thrive into new places (Natural Resource Defense Council 2015).

An increase in temperature and humidity may also lead to a larger number of influenza outbreaks. Studies have shown that warmer winters led to an increase in influenza cases. During warm winters, fewer people contract influenza which causes a large number in population to remain vulnerable into the next season. This causes an early and strong occurrence of the virus (Towers, et al. 2013).

Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable to the identified hazard. The following discusses Herkimer County's vulnerability, in a qualitative nature, to the disease outbreak hazard.

Impact on life, Health, and Safety

The entire population of Herkimer County (60,139) is vulnerable to the disease outbreak hazard. Due to a lack of quantifiable loss information, a qualitative assessment was conducted to evaluate the assets exposed to this hazard and the potential impacts associated with this hazard. Healthcare providers and first responders have an increased risk of exposure due to their frequent contact with infected populations. Areas with a higher population density also have an increased risk of exposure or transmission of disease to the closer proximity of the population to potentially infected people.

Most recently with COVID-19, the Centers for Disease Control and Prevention have indicated that persons over 65 years and older, persons living in a nursing home or long-term care facility, and persons with underlying medical conditions such as diabetes, severe obesity, serious heart

conditions, etc. are at a higher risk of getting severely ill (CDC 2021). According to the 2022 U. S. Census Population Estimates, 22 percent of the County population are persons over 65 years old in. This age group would be considered at risk for getting severely ill from the COVID-19 virus.

Impact on General Building Stock

No structures are anticipated to be directly affected by disease outbreaks.

Impact on Critical Facilities and Community Lifelines

No critical facilities are anticipated to be affected by disease outbreaks. Hospitals and medical facilities will likely see an increase in patients which may cause an interruption of services, but it is unlikely that there will be damage to the facilities. Large rates of infection may increase the rate of hospitalization which may overwhelm hospitals and medical facilities and lead to decreased services for those seeking medical attention. The recent coronavirus pandemic has led to overwhelmed hospitals and medical facilities in numerous locations across New York State, including Herkimer County.

Impact on the Economy

The impact disease outbreaks have on the economy and estimated dollar losses are difficult to measure and quantify. Costs associated with the activities and programs implemented to conduct surveillance and address disease outbreaks have not been quantified in the available documentation. Instead, activities and programs implemented by the County to address this hazard are described below, all of which could impact the local economy.

Smaller-scale disease outbreaks can also cause negative economic impacts, though the extent of the impact is variable. For example, an outbreak of mosquito or tick-borne diseases can impact Herkimer County's local economies associated with tourism and the use of parks and waterbodies.

Impact on the Environment

Disease outbreaks may have an impact on the environment if the outbreaks are caused by invasive species. Invasive species tend to be competitive with native species and their habitat and can be the major transmitters of disease like Zika, dengue, and yellow fever (Placer Mosquito and Vector Control District 2019). For more information on invasive species in Herkimer County, refer to Section 5.4.6.

Secondary impacts from mitigating disease outbreaks could also have an impact on the environment. Pesticides used to control disease carrying insects like mosquitos have been reviewed by the EPA and the New York Department of Environmental Conservation. If these sprays are applied in large concentrations, they could potentially leach into waterways and harm nearby terrestrial species. As a result, pesticides must be registered before they can be sold, distributed, or used in the state (New York Department of Environmental Conservation 2020).

Future Changes That May Impact Vulnerability

Understanding future changes that impact vulnerability in the County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

As discussed in Section 4 (County Profile), areas targeted for future growth and development have been identified across the County. Any areas of growth could be potentially impacted by the disease outbreak hazard because the entire planning area is exposed and vulnerable. Additional development of structures in areas with high population density are at an increased risk. Please refer to the specific areas of development indicated in tabular form and/or on the hazard maps included in the jurisdictional annexes in Volume II, Section 9 of this plan.

Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 6.8 percent since 2010. The County's population is anticipated to decrease over the next decade by 6.6 percent by 2030). Changes in the density of population could influence the number of persons exposed to disease outbreaks. Higher density jurisdictions are not only at risk of greater exposure to disease outbreak, but density may also reduce available basic services provided by critical facilities such as hospitals and emergency facilities for persons that are not affected by a disease. Refer to Section 4 (County Profile), which includes a discussion on population trends for the County.

Climate Change

As discussed earlier in this section, the relationship between climate change and increase in infectious diseases is difficult to predict with certainty, however there may be linkages between the two. Changes in the environment may create a more livable habitat for vectors carrying disease as suggested by the Centers for Disease Control and Prevention (CDC 2021). Localized changes in climate and human interaction may also be a factor in the spread of disease.

Change of Vulnerability Since the 2017 HMP

Disease outbreak was identified as a hazard of concern in the 2017 HMP (Epidemic). Updated data regarding the common types of disease outbreak events, including COVID-19, are included to provide a better understanding of the potential impacts caused by the disease outbreak hazard. Overall, the vulnerability to the disease outbreak hazard remains unchanged from 2017.

5.4.1. Drought

Hazard Profile

Hazard Description

Drought is a period characterized by long durations of below-normal precipitation. Drought is a temporary irregularity and differs from aridity since the latter is restricted to low-rainfall regions and is a permanent feature of climate. Drought conditions occur in virtually all climatic zones, yet its characteristics vary significantly from one region to another, since it is relative to the normal precipitation in that region. Drought can affect agriculture, water supply, aquatic ecology, wildlife, and plant life.

There are four different ways that drought can be defined or grouped:

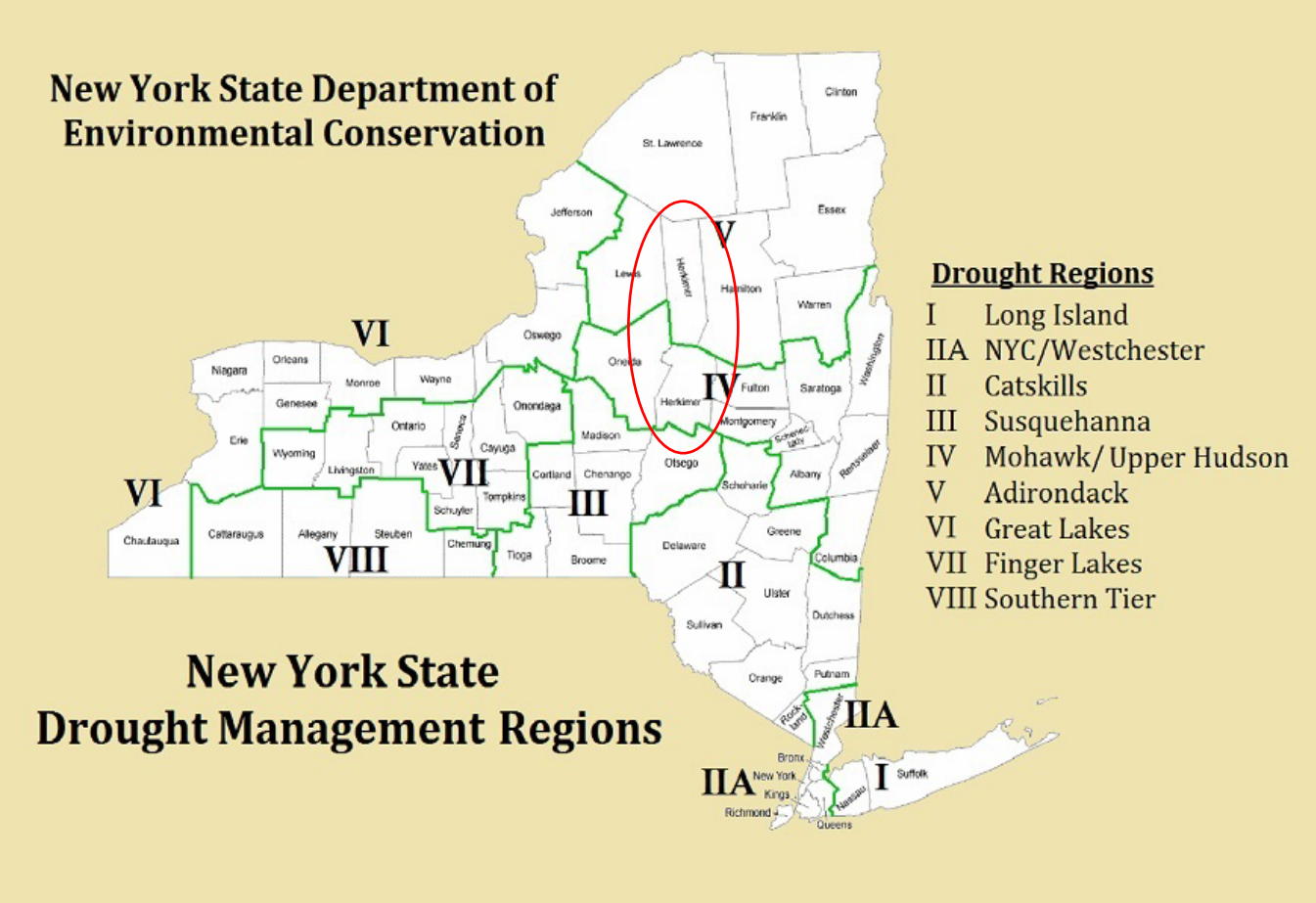
- ***Meteorological*** drought is a measure of the departure of precipitation from normal. It is defined solely by the relative degree of dryness. Due to climatic differences, what might be considered a drought in one location of the country may not be a drought in another location.
- ***Agricultural*** drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits, reduced groundwater or reservoir levels, and other parameters. It occurs when there is not enough water available for a particular crop to grow at a particular time. Agricultural drought is defined in terms of soil moisture deficiencies relative to water demands of plant life, primarily crops.
- ***Hydrological*** drought is associated with the effects of periods of precipitation shortfalls (including snowfall) on surface or subsurface water supply. It occurs when these water supplies are below normal. It is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- ***Socioeconomic*** drought is associated with the supply and demand of an economic good with elements of meteorological, hydrological, and agricultural drought. This differs from the aforementioned types of drought because its occurrence depends on the time and space processes of supply and demand to identify or classify droughts. The supply of many economic goods depends on the weather (for example water, forage, food grains, fish, and hydroelectric power). Socioeconomic drought occurs when the demand for an economic good exceeds the supply as a result of a weather-related shortfall in the water supply (NDMC 2013).

Location

New York State is divided into nine drought management regions based roughly on drainage basins and county lines. NYSDEC monitors precipitation, lake and reservoir levels, stream flow, and groundwater levels every month within each region, and more frequently during periods of drought.

NYSDEC uses these data to assess the condition within each region, which can range from "normal" to "drought disaster" (NYSDEC 2022). Herkimer County is identified as NYSDEC Drought Management Regions IV, the Mohawk/Upper Hudson and Region V, Adirondack (Figure 5.4.1-1).

Figure 5.4.1-1. NYSDEC Drought Management Regions of New York State



Source: NYSDEC 2022
Note: The red oval indicates the approximate location of Herkimer County.

When a drought occurs, the agricultural industry is most at risk in terms of economic impact and damage. According to the 2017 Census of Agriculture, Herkimer County is home to 596 farms, covering 117,780 acres. Only 0.1 percent of that land is irrigated (USDA 2017).

Extent

The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts (NOAA 2022). The NYSDEC and the New York State Drought Management Task Force identify droughts in the following four stages:

- ***Normal*** is considered the standard moisture soil levels found throughout New York State

- ***Drought Watch*** is the first stage of drought. This stage is declared by the NYSDEC and is intended to give advance notice of a developing drought. At this stage, the general public is urged to conserve water. Public water purveyors and industries are urged to update and begin to implement individual drought contingency plans.
- ***Drought Warning*** is the second stage of drought. This stage is also declared by the NYSDEC and is a notice of impending and imminent severe drought conditions. A warning declaration includes stepping up public awareness and increasing voluntary conservation. Public water supply purveyors and industries are urged to continue to implement local drought contingency plans. Federal, state, and local water resources agencies are notified to prepare for emergency response measures.
- ***Drought Emergency*** is the third stage of drought. This stage is declared by the NYSDHSES, based upon the recommendation of the Task Force. It is a notice of existing severe and persistent drought conditions. An emergency declaration is a notice for local water resources agencies to mandate conservation and implement other emergency response measures. A continuing and worsening drought emergency may result in the New York State governor declaring a drought disaster. It is a notice of the most severe and persistent drought conditions. At this stage, a significant proportion of communities in the impacted area likely are unable to respond adequately (NYSDEC n.d.).

New York State applies two methodologies to identify the different drought stages. The most commonly used indicator is the Palmer Drought Severity Index (PDSI), which is primarily based on soil conditions. Soil with decreased moisture content is the first indicator of an overall moisture deficit. The second methodology applied in New York State, created by the NYSDEC, is known as the State Drought Index (SDI) (NYSDEC n.d.).

Table 5.4.1-1 lists the Palmer Drought Severity Index (PDSI) classifications. According to the National Integrated Drought Information System (NIDIS), the PDSI was developed in 1965, and indicates prolonged and abnormal moisture deficiency or excess. It uses temperature and precipitation data to calculate water supply and demand, incorporates soil moisture, and is considered most effective for assessing moisture conditions in unirrigated cropland. The PDSI primarily indicates long-term drought and has been used extensively as a signal to initiate drought relief (NIDIS 2015).

Table 5.4.1-1. PDSI Classifications

Palmer Classifications	
4.0 or more	Extremely wet
3.0 to 3.99	Very wet
2.0 to 2.99	Moderately wet
1.0 to 1.99	Slightly wet
0.5 to 0.99	Incipient wet spell
0.49 to -0.49	Near normal
-0.5 to -0.99	Incipient dry spell
-1.0 to -1.99	Mild drought

Palmer Classifications	
-2.0 to -2.99	Moderate drought
-3.0 to -3.99	Severe drought
-4.0 or less	Extreme drought

Source: NDMC 2013

The SDI evaluates drought conditions more comprehensively by determining whether numerous indicators reach dire thresholds. It compares the following four parameters to historical or "normal" values to evaluate drought conditions: stream flows, precipitation, lake and reservoir storage levels, and groundwater levels. The State's Drought Management Task Force uses those factors along with water use, duration of the dry period, and season to assess drought within different areas of the State. The data acquired are compared to critical threshold values to indicate a normal or changeable drought condition. The indicators are weighted regionally to reflect the different circumstances within each drought management region (NYS DHSES 2014; NYSDEC 2022). Table 5.4.1-2 lists the SDI index range within the Normal stage and the three drought stages.

Table 5.4.1-2. State Drought Index Range of Values

Drought Stage	Drought Index Range
Normal	100 to 150
Watch	75 to 100
Warning	50 to 70
Emergency	0 to 50

Source: NYS DHSES 2014

Previous Occurrences

FEMA Major Disasters and Emergency Declarations

Between 1954 and 2022, Herkimer County was not included in any disaster (DR) or emergency (EM) declarations for drought-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2023). Detailed information about the declared disasters since 1954 is provided in Section 4 (County Profile).

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2017 and 2022, Herkimer County was not included in any drought-related agricultural disaster declarations.

Previous Events

For this 2023 HMP update, known drought events that impacted Herkimer County between 2017 and 2023 are discussed below. For events prior to 2017, refer to Appendix E (Supplementary Data).

Table 5.4.1-3. Drought Events in Herkimer County (2017 to 2023)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
May 10, 2016 – February 27, 2017	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions varied between D0 – D1 drought in Herkimer County from May 10, 2016, to February 27, 2017. A survey of more than 200 New York farmers found that more than 70-percent of unirrigated, rain-fed field crops and pasture acreage had losses between 30-percent and 90-percent according to a report published by the Cornell Institute for Climate Smart Solutions. All of New York State was placed under a drought watch.
September 26 – October 30, 2017	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions were at D0 status in Herkimer County from September 26-October 30, 2017.
June 19 – November 5, 2018	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions varied between D0 – D1 drought in Herkimer County from June 19 to November 5, 2018. According to NYS DEC, bear encounters were elevated in the region as normal bear food sources were limited.
August 27 – September 2, 2019	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions briefly reached D0 drought in Herkimer County from August 27 – September 2, 2019
May 19, 2020 – August 2, 2021	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions varied between D0 – D2 drought in Herkimer County from May 19, 2020 – August 2, 2021. D2 status was maintained in the County from October 6 through November 16, 2020. Precipitation was 50 to 75 percent of normal from August to October. Fall leaf changes were more colorful and brighter due to drought conditions.
October 12 – November 1, 2021	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions briefly reached D0 drought in Herkimer County from October 12 – November 1, 2021.
August 30 – September 26, 2021	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions briefly reached D0 drought in Herkimer County from August 30 – September 26, 2021.

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
July-August, 2022	Dry season	Unknown	Unknown.	A dry season in 2022 caused the Town of Stark's 3 wells to become stressed; the Town had to rotate between the wells to maintain water supply.

Sources: FEMA 2023; NOAA NCEI 2023; NDMC 2023; U.S. Drought Monitor 2023

Probability of Future Occurrences

Based upon risk factors for and past occurrences, it is likely that droughts will occur across New York State and Herkimer County in the future. In addition, as temperatures increase (see climate change impacts), the probability for future droughts will likely increase as well. Therefore, it is likely that droughts will occur in the State and County of varied severity in the future.

It is estimated that Herkimer County will continue to experience direct and indirect impacts of drought and its impacts on occasion, with the secondary effects causing potential disruption or damage to agricultural activities and creating shortages in water supply within communities.

Based on historical occurrences, the probability of a drought event occurring is considered occasional (Between 10 and 100% annual probability of occurrence). Refer to Section 5.3 for additional information on the hazard ranking methodology and probability criteria.

Climate Change Projections

According to the 2019 New York State HMP update, rising summer temperatures, along with little change in summer rainfall, are projected to increase frequency of short-term droughts. This scenario will lead to impacts on the natural and managed ecosystems across New York State. Water management and hydrology are also affected (NYS DHSES 2019).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change, Herkimer County is part of Region 5 (East Hudson and Mohawk River Valleys). In Region 5, it is estimated that temperatures will increase by 4.5°F to 6.2°F by the 2050s and 5.6°F to 9.7°F by the 2080s (baseline of 47.6°F, middle range projection). Average annual temperatures are projected to increase across New York State by 4.1° F to 6.8° F by the 2050s and 5.3° F to 10.1° F by the 2080s with an average rate of warming over the past century of 0.25° F per decade. By the end of the century, the greatest warming is projected to be in the northern section of the State.

Extreme events are also projected to increase, as illustrated in Table 5.4.1-4 below (NYSERDA 2014). With the increase in temperatures, heat waves will become more frequent and intense. Heat waves, defined as three or more consecutive days with maximum temperatures at or above 90 ˚F. Summer droughts are projected to increase under these conditions, affecting water supply, agriculture, ecosystems, and energy projects (NYSERDA 2014).

Table 5.4.1-4. Extreme Event Projections for Region 5

Event Type (2050s)	Low Estimate (10th Percentile)	Middle Range (25th to 75th Percentile)	High Estimate (90th Percentile)
Days over 90 °F (8 days)	22	27 to 41	50
# Of Heat Waves (0.7 heat waves)	3	4 to 6	7
Duration of Heat Wave (4 days)	5	5 to 6	6
Days below 32 °F (133 days)	98	104 to 119	125
Days over 1" Rainfall (5 days)	10	11 to 12	13
Days over 2" Rainfall (0.6 days)	1	1 to 2	2

Source: NYSERDA 2014

Precipitation totals will increase between 0 and 10 percent by the 2050s and 0 to 15 percent by the 2080s (baseline of 37.0 inches, mid-range projection). Table 5.4.1-5 displays the projected seasonal precipitation change for the Region 5 (NYSERDA 2014).

Table 5.4.1-5. Projected Seasonal Precipitation Change in Region 5, 2050s (% change)

Winter	Spring	Summer	Fall
+5 to +15	-5 to +10	-5 to +5	-5 to +10

Source: NYSERDA 2014

By the end of the 21st century, the number of droughts is likely to increase, as the effect of higher temperatures on evaporation is likely to outweigh the increase in precipitation. Droughts in the northeast U.S. have been associated with local and remote modes of multi-year ocean-atmosphere variability that are unpredictable and may change with climate change. Changes in distribution of precipitation throughout the year and in timing of snowmelt could increase frequency of droughts (NYSERDA 2011).

Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable within the identified hazard area. Regarding the drought hazard, all of Herkimer County has been identified as the hazard area. Therefore, all assets within the County (population, structures, critical facilities, and lifelines), as described in the County Profile (Section 4), are vulnerable to a drought. The following factors are addressed in subsequent text that evaluates and estimates potential impacts of the drought hazard on the County:

- Impact on: (1) life, health, and safety of residents; (2) general building stock; (3) critical facilities; (4) economy; and (5) environment
- Cascading Impacts on Other Hazards
- Future changes that may impact vulnerability
- Change of vulnerability since the 2017 HMP

Impact on life, Health, and Safety

The entire population of Herkimer County is vulnerable to drought events. According to the 2020 U.S. Census, the County had a population of 60,139. Drought conditions can affect people's health and safety, including health problems related to low water flows and poor water quality, and health problems related to dust. Droughts also can lead to loss of human life (NDMC 2013). Other possible impacts on health from drought include increased recreational risks; effects on air quality; diminished living conditions related to energy, air quality, and sanitation and hygiene; compromised food and nutrition; and increased incidence of illness and disease. Health implications of drought are numerous. Some drought-related health effects are short-term while others can be long-term (CDC 2012).

As previously stated, drought conditions can cause shortages of water for human consumption. Droughts can also lead to reduced local firefighting capabilities. The drought hazard is a concern for Herkimer County because rural populations within the County rely upon private water supply from local groundwater resources.

Impact on General Building Stock

A drought event is not expected to directly affect any structures. However, droughts contribute to conditions conducive to wildfires and reduce fire-fighting capabilities. Risk to life and property is greatest within those areas where forested areas adjoin urbanized areas (high-density residential, commercial, and industrial) or wildland urban interface (WUI). Therefore, all assets within and adjacent to the WUI zone—including population, structures, critical facilities, lifelines, and businesses—are considered vulnerable to wildfire. Refer to Section 5.4.8 for more information on wildfire risk.

Impact on Critical Facilities and Community Lifelines

Water supply facilities may be affected by short supplies of water. As mentioned, drought events generally do not impact buildings; however, droughts can impact agriculture-related facilities and critical facilities associated with potable water supplies. Also, those critical facilities in and adjacent to the WUI zone are considered vulnerable to wildfire. Refer to Section 5.4.8 for more information on wildfire risk.

Impact on the Economy

Drought causes many economic impacts on agriculture and related sectors (forestry, fisheries, and waterborne activities). In addition to losses in yields in crop and livestock production, drought is associated with increased insect infestations, plant diseases, and wind erosion. Drought can lead to other losses because so many sectors are affected—losses that include reduced income for farmers and reduced business for retailers and others who provide goods and services to farmers. This leads to unemployment, increased credit risk for financial institutions, capital shortfalls, and loss of tax revenue. Prices for food, energy, and other products may also increase as supplies decrease (NYS

DHSES 2014). As noted in the 2019 New York State HMP, economic impacts that could occur from drought include the following:

- Decreased land values
- Loss to industries directly dependent on agricultural production (e.g., machinery and
- Fertilizer manufacturers, food processors, dairies, etc.)
- Unemployment from drought-related declines in production
- Strain on financial institutions (foreclosures, more credit risk, capital shortfalls)
- Revenue losses to Federal, State, and Local governments (from reduced tax base)
- Reduction of economic development
- Fewer agricultural producers (due to bankruptcies, new occupations)
- Rural population loss (NYS DHSES 2019).

When a drought occurs, the agricultural industry is most at risk for economic impact and damage. During droughts, crops do not mature, which results in smaller crop yield, undernourishment of wildlife and livestock, decreases in land values, and ultimately financial loss to the farmer (FEMA 1997).

Based on the 2017 Census of Agriculture, 596 farms were present in Herkimer County, encompassing 117,780 acres of total farmland. The average farm size was 198 acres. Herkimer County farms had a total market value of products sold of $58 million, averaging $97,277 per farm (USDA 2017). Table 5.4.1-6 lists the acreage of agricultural land exposed to the drought hazard.

Table 5.4.1-6. Agricultural Land in Herkimer County in 2017

Number of Farms	Land in Farms (acres)	Total Cropland (acres)	Total Pastureland (acres)	Acres Irrigated
596	117,780	69,490	15,311	182

Source: USDA 2017

In 2017, the top three agricultural products sold in Herkimer County were livestock, poultry, and products at $44.4 million; milk from cows at $38.8 million; and other crops and hay at $6.7 million (USDA 2017).

If the average production (dollar value) per crop type could be identified on a per acre basis, loss estimates could be developed based on assumed percent damage that could result from a drought. If a drought event impacted 40 percent of the agricultural products sold from Herkimer County farms, based on 2017 market values, this would be a loss of $23.2 million. This figure does not include how the tourism industry and local jobs are impacted.

Impact on the Environment

Drought can impact the environment because it can trigger wildfires, increase insect infestations, and exacerbate the spread of disease (NOAA 2000). Droughts will also impact water resources that

are relied upon by aquatic and terrestrial species. Ecologically sensitive areas, such as wetlands, can be particularly vulnerable to drought periods because they are dependent on steady water levels and soil moisture availability to sustain growth. As a result, these types of habitats can be negatively impacted after long periods of dryness.

Future Changes That May Impact Vulnerability

Understanding future changes that impact vulnerability in the county can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in the population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Section 4 identifies areas targeted for future growth and development across the County. Any areas of growth located in the County could be susceptible to drought. Specific areas of recent and new development are indicated in tabular form and/or on the hazard maps included in Volume II, Section 9 (Jurisdictional Annexes) of this plan.

Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 6.8 percent since 2010. The County's population is anticipated to decrease over the next decade by 6.6 percent decrease by 2030). Changes in the density of the population can impact the number of persons exposed to drought and the draw upon water resources.

Climate Change

As discussed above, most studies project that the State of New York and Herkimer County will see an increase in average annual temperatures. Additionally, the State is projected to experience more frequent droughts.

Droughts can cause deficits in surface and groundwater used for drinking water. The New York State Water Resources Institute at Cornell University conducted a vulnerability assessment of drinking water supplies and climate change. To assess water supplies in New York State, it was assumed that long-term average supply will remain the same, but the duration and/or frequency of dry periods may increase. Both types of water supplies, surface water and groundwater, were divided into three categories: sensitive to short droughts (two to three months), sensitive to moderate and longer droughts (greater than six months), and relatively sensitive to any droughts. Major reservoir systems are presumed to have moderate sensitivity to drought because there is a likelihood of decreases in

summer and fall water availability (NYSERDA 2011). The greatest likelihood of future water shortages is likely to occur on small water systems.

Change of Vulnerability Since the 2017 HMP

Herkimer County continues to be vulnerable to the drought hazard. Updated population statistics were used in the current risk assessment. Further, exposure for both the population and critical facilities was analyzed. These updated datasets provide a more accurate exposure analysis to the drought hazard.

5.4.1 Extreme Temperature

Hazard Profile

Hazard Description

Extreme temperature includes both heat and cold events, which can have a significant impact to human health, commercial/agricultural businesses, and primary and secondary effects on infrastructure (such as burst pipes and power failure). What constitutes "extreme cold" or "extreme heat" can vary across different areas of the country, based on the population's experience.

Extreme Cold

Extreme cold events occur when temperatures drop well below normal in an area. For example, near-freezing temperatures are considered "extreme cold" in regions relatively unaccustomed to winter weather. Conversely, "extreme cold" might be used to describe temperatures below 0° F in regions that are subjected to temperatures below freezing on more of a regular basis. For the purposes of this HMP, extreme cold temperatures are characterized when the ambient air temperature drops to approximately 0 degrees Fahrenheit (°F) or below (National Weather Service n.d.). Extensive exposure to extreme cold temperatures can cause frostbite or hypothermia and can become life-threatening. Extreme cold also can cause emergencies in susceptible populations, such as those without shelter, those who are stranded, or those who live in a home that is poorly insulated or without heat (such as mobile homes). Infants and the elderly are most susceptible to the effects of extreme changes in temperatures and are particularly at risk, but anyone can be affected (Center for Disease Control and Prevention [CDC] 2012).

In New York State, extreme cold days are defined to reflect the State's regional climate variations. Extreme cold days in the State are individual days with minimum temperatures at or below 32° F or individual days with minimum temperatures at or below 0°F (NYSERDA 2014).

Several health hazards are related to extreme cold temperatures and include wind chill, frostbite, and hypothermia.

- *Wind chill* is not the actual temperature but rather how wind and cold feel on exposed skin. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature.
- *Frostbite* is damage to body tissue caused by extreme cold. A wind chill of -20°F will cause frostbite in just 30 minutes. Frostbite can cause a loss of feeling and a white or pale appearance in extremities.
- *Hypothermia* is a condition brought on when the body temperature drops to less than 95°F, and it can be deadly. Warning signs of hypothermia include uncontrollable shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness, and apparent exhaustion.

Extreme Heat

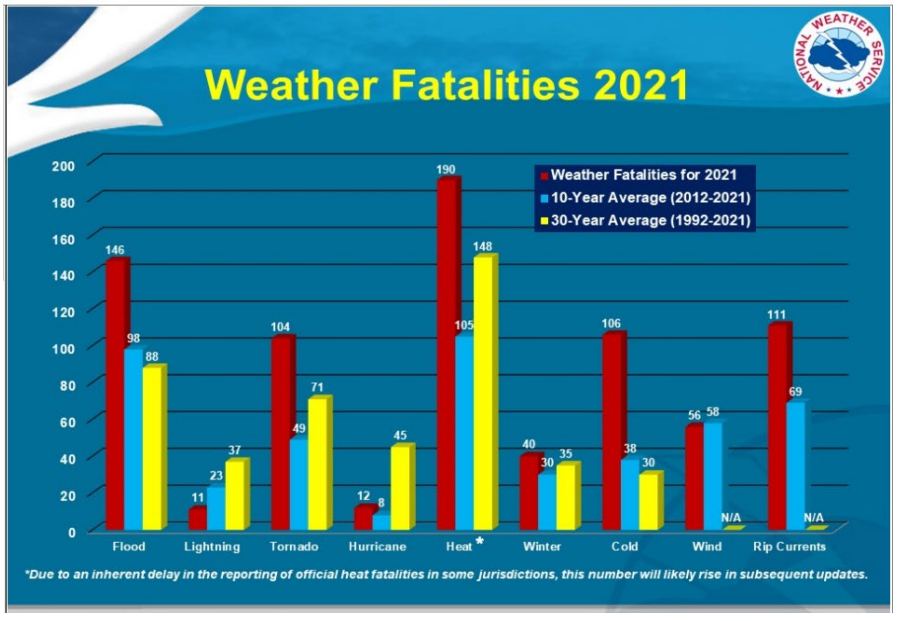
Extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for a region and that last for several weeks (Center for Disease Control and Prevention [CDC] 2012). Humid or muggy conditions occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. A heat wave is a period of abnormally and uncomfortably hot and unusually humid weather. A heat wave will typically last two or more days (NOAA 2009).

In New York State, high temperatures and heat waves are defined in several ways to reflect the diversity of conditions experienced across the State. Extreme hot days in New York State are defined as individual days with maximum temperatures at or above 90° F or 95°F. Heat waves are defined as three consecutive days with maximum temperatures above 90° F (NYSERDA 2014).

Depending on severity, duration, and location; extreme heat events can create or provoke secondary hazards including, but not limited to, dust storms, droughts, wildfires, water shortages, and power outages. These secondary hazards could result in a broad and far-reaching set of impacts throughout a local area or an entire region. Impacts could include significant loss of life and illness; economic costs in transportation, agriculture, production, energy, and infrastructure; and losses of ecosystems, wildlife habitats, and water resources (NYS DHSES 2019).

Extreme heat is the number one weather-related cause of death in the U.S. On average, nearly 150 people die each year in the United States from excessive heat (NWS 2021). Figure 5.4.1-1 shows the number of weather fatalities based on a 10-year average and a 30-year average. Heat caused the highest average of weather-related fatalities between 2012 and 2021.

Figure 5.4.1-1. Average Number of Weather-Related Fatalities in the U.S.

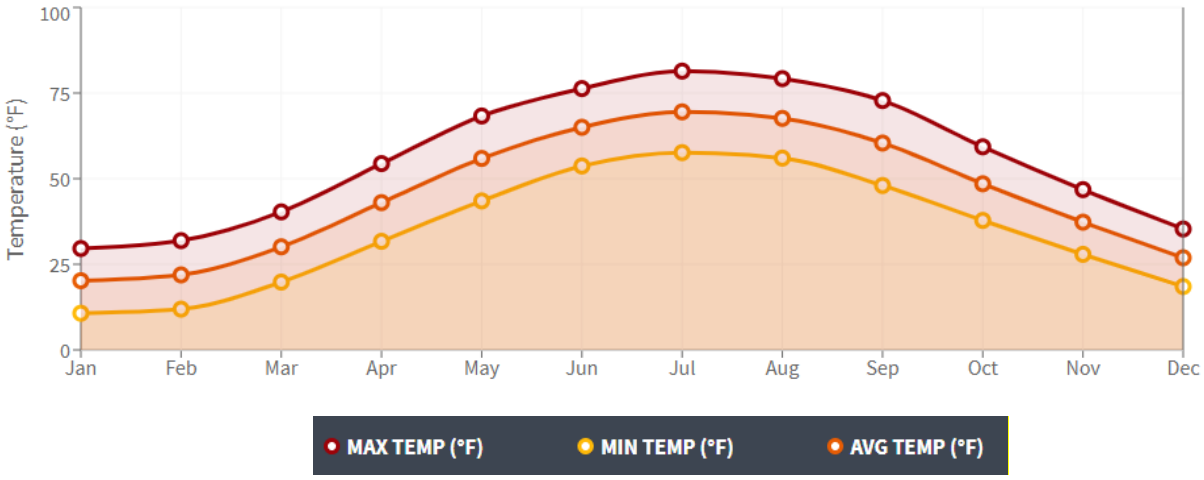


Source: NWS 2021

Location

Varying land elevations, character of the landscape, and proximity to large bodies of water play a significant role in the state's temperatures. Herkimer County is susceptible to both extreme cold and extreme heat temperature events. Figure 5.4.1-2Figure 5.4.1-2 shows the average low and high temperatures each month at the Little Falls City station located in Herkimer County.

Figure 5.4.1-2. Average Temperatures at Little Falls City



Source: NOAA NCEI 2023

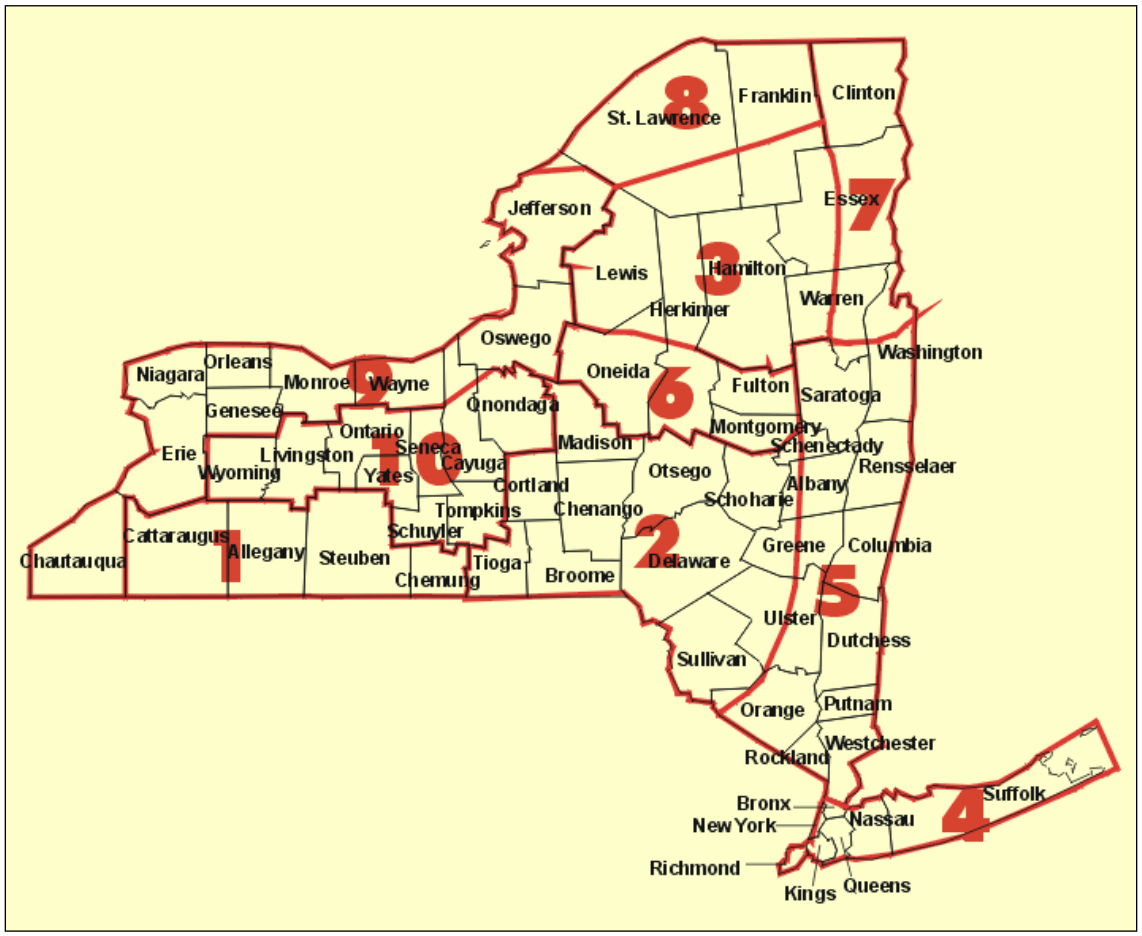
Extensive periods of extreme cold temperatures are a result from movement of great high-pressure systems into and through the eastern United States. Under higher-than-normal atmospheric pressures when arctic air masses are present, extreme winter temperatures hover over New York. New York State's location in the northeast makes it highly susceptible to extreme cold that can cause impact to human life and property (NYS DHSES 2019). Extreme cold temperatures occur throughout most of the winter season and generally accompany most winter storm events throughout the state. The NYSC Office of Cornell University indicates that cold temperatures prevail over the state whenever arctic air masses, under high barometric pressure, flow southward from central Canada or from Hudson Bay (Cornell University n.d.).

Excessive heat can occur anywhere, and occurrences of excessive heat are generally widespread and will cover an entire county. However, there can be spot locations that are somewhat cooler (e.g., a shady park near a stream) or hotter (e.g., urban areas because of their built environment holds the heat) (NYS DHSES 2019). Extreme heat temperatures of varying degrees exist throughout the state for most of the summer season, except for areas with high altitudes (Cornell University n.d.).

New York State is divided into 10 climate divisions: Western Plateau, Eastern Plateau (Catskill Mountains), Northern Plateau (Adirondack Mountains), Coastal, Hudson Valley, Mohawk Valley, Champlain Valley, St. Lawrence Valley, Great Lakes, and Central Lakes. According to NCDC, "Climatic divisions are regions within each state that have been determined to be reasonably climatically

homogeneous" (NOAA 2012). Herkimer County is located within two divisions. The northern portion of the County is located in the Northern Plateau (Division 3). The southern portion of the County is located in the Mohawk Valley (Division 6). Figure 5.4.1-3 depicts the climate divisions in New York State.

Figure 5.4.1-3. New York State Climate Divisions



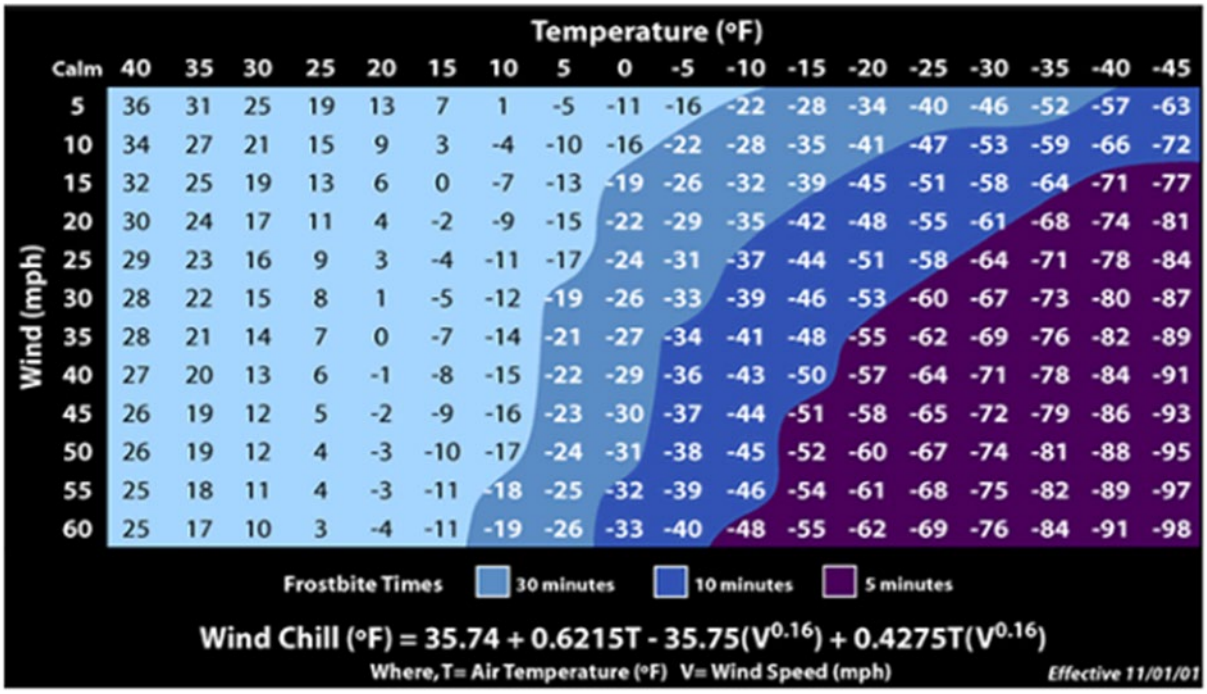
Source: *NOAA 2012*
Notes: *(1) Western Plateau; (2) Eastern Plateau (Catskill Mountains); (3) Northern Plateau (Adirondack Mountains); (4) Coastal; (5) Hudson Valley; (6) Mohawk Valley; (7) Champlain Valley; (8) St. Lawrence Valley; (9) Great Lakes; and (10) Central Lakes*

Extent

Extreme Cold

The extent (severity or magnitude) of extreme cold temperatures is generally measured through the Wind Chill Temperature (WCT) Index. The index uses advances in science, technology, and computer modeling to provide an accurate, understandable, and useful formula for calculating the dangers from wind chill. For details regarding the WCT, refer to: Winter (weather.gov). The WCT is presented in Figure 5.4.1-4.

Figure 5.4.1-4. Wind Chill Index

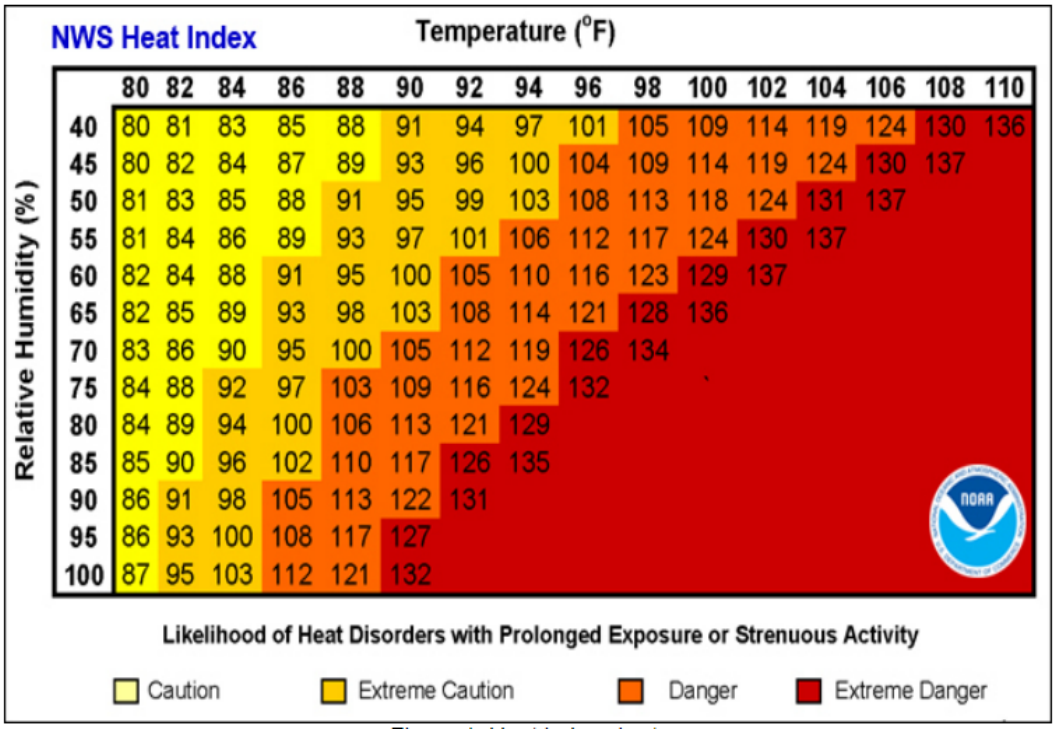


Source: NWS 2001

Extreme Heat

The extent of extreme heat temperatures is generally measured through the Heat Index, identified in Figure 5.4.1-5. Created by the NWS, the Heat Index is a chart that accurately measures apparent temperature of the air as it increases with the relative humidity. The temperature and relative humidity are needed to determine the Heat Index. Once both values have been identified, the Heat Index is the corresponding number of both values (as seen in Figure 5.4.1-5). This index provides a measure of how temperatures feel; however, the values are devised for shady, light wind conditions. Figure 5.4.1-5 shows the heat index value for shaded areas. Exposure to full sun can increase the index by up to 15 degrees (NYSDHSES n.d.).

Figure 5.4.1-5. NWS Heat Index Chart – Shaded Areas



Source: NWS

Table 5.4.1-1. Adverse Effects of Prolonged Exposure to Direct Sunlight Table 5.4.1-1 describes the adverse effects of prolonged exposure to direct sunlight on an individual.

Table 5.4.1-1. Adverse Effects of Prolonged Exposure to Direct Sunlight

Category	Heat Index	Effects on the Body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

Source: NWS

The National Weather Service (NWS) provides alerts when Heat Indices approach hazardous levels. Table 5.4.1-2 explains these alerts. In the event of an extreme heat advisory, the NWS does the following:

- Includes Heat Index values and city forecasts
- Issues special weather statements including who is most at risk, safety rules for reducing risk, and the extent of the hazard and Heat Index values

- Provides assistance to state and local health officials in preparing Civil Emergency Messages in severe heat waves (NYSDHSES n.d.).

Table 5.4.1-2. National Weather Service Alerts

Alert	Criteria
Heat Advisory	Issued 12 hours of the onset of the following conditions: maximum daytime heat index values are to reach between 100°F to 104°F for at least 2 consecutive hours
Excessive Heat Watch	Issued when conditions are favorable for excessive heat in the next 24 to 72 hours
Excessive Heat Warning	Issued within 12 hours of the onset of the following conditions: maximum heat index temperature is expected to be 105°F or higher for at least 2 days and nighttime air temperatures will not drop below 75°F

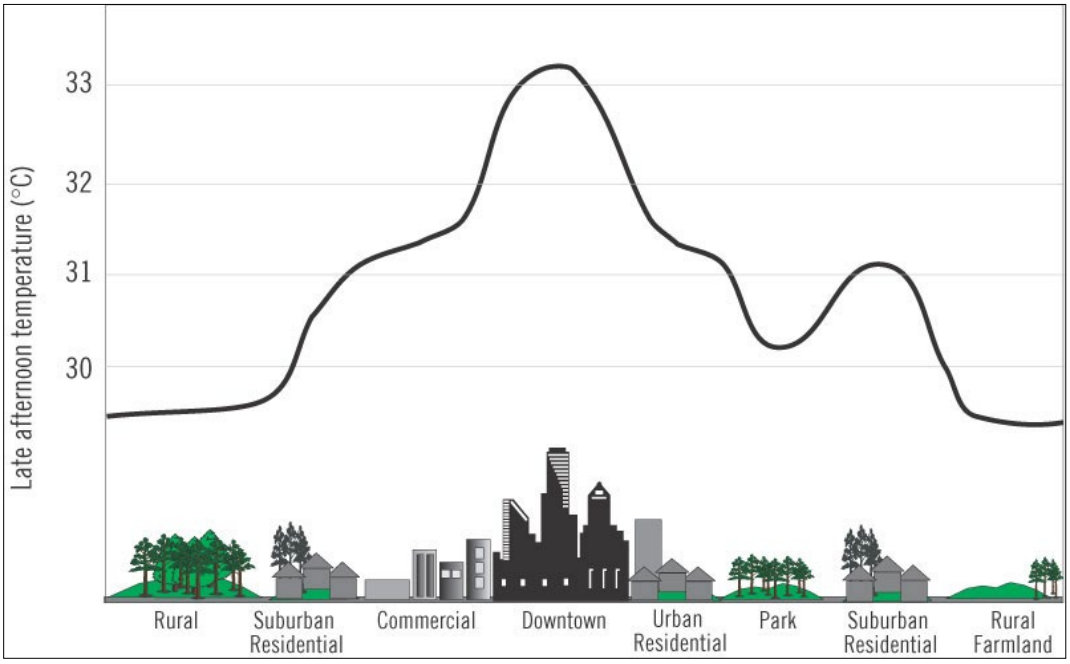
Source: NYSDHSES n.d.

Urbanized areas and urbanization create an exacerbated type of risk during an extreme heat event, compared to rural and suburban areas. As these urban areas develop and change, so does the landscape. Buildings, roads, and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist are now impermeable and dry. These changes cause urban areas to become warmer than the surrounding areas. This forms an 'island' of higher temperatures (EPA 2022). The centralized developed areas of the County that may be subject to urban heat island effect are focused in the southeastern areas of the County, though urban heat island can occur anywhere with extensive developed surfaces.

The term 'heat island' describes built-up areas that are hotter than nearby rural areas. The annual mean air temperature of a city with more than 1 million people can be between 1.8 °F and 5.4°F warmer than its surrounding areas. In the evening, the difference in air temperatures can be as high as 22°F. Heat islands occur on the surface and in the atmosphere. On a hot, sunny day, the sun can heat dry, exposed urban surfaces to temperatures 50°F to 90°F hotter than the air. Heat islands can affect communities by increasing peak energy demand during the summer; thereby escalating air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and death, and water quality degradation (EPA 2022).

Figure 5.4.1-6 below illustrates an urban heat island profile. The graphic demonstrates that heat islands are typically most intense over dense urban areas. Further, vegetation and parks within a downtown area may help reduce heat islands (U.S. EPA 2019).

Figure 5.4.1-6. Urban Heat Island Profile



Source: EPA 2019
°C degrees Celsius

Previous Occurrences

FEMA Major Disasters and Emergency Declarations

Between 1954 and 2022, Herkimer County was not included in any disaster (DR) or emergency (EM) declarations for extreme temperature-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2023). Detailed information about the declared disasters since 1954 is provided in Section 4 (County Profile).

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2012 and 2022, Herkimer County was included in four extreme temperature-related agricultural disaster declarations.

- 2012: S3249 for frosts and freezes
- 2012: S3427 for drought and excessive heat
- 2014: S3696 for freeze
- 2015: S3886 for frost, freeze, and excessive snow

Previous Events

For this 2023 HMP update, known extreme temperature events that impacted Herkimer County between 2017 and 2022 are discussed below. For events prior to 2017, refer to Appendix (Supplementary Data).

Table 5.4.1-3. Extreme Temperature Events in Herkimer County (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
March 11, 2017	Cold/Wind Chill	N/A	N/A	A cold Arctic airmass combined with blustery northwest winds gusting to near 40 mph combined to create very cold wind chills on the morning of Saturday, March 11. Wind chill values were as low as -22F at Big Moose, NY. The frigid wind chills persisted from the early morning into the early afternoon.
December 27-29, 2017	Extreme Cold/Wind Chill	N/A	N/A	A frigid Arctic air mass poured into the region Wednesday, December 27th along with gusty northwesterly winds. Despite gusty winds, low temperatures fell to as low as zero to 23 degrees below zero over the high terrain of eastern New York on Wednesday night. This resulted in wind chill values as low as 35 degrees below zero late Wednesday night into early Thursday morning. Bitterly cold wind chills continued through Thursday and into Friday morning.
December 31, 2017	Cold/Wind Chill	N/A	N/A	A bitterly cold air mass in place allowed temperatures to plummet several degrees below zero on New Years Eve into New Years Day. Temperatures ranged from zero degrees in Dutchess county to 28 degrees below zero in the high terrain of Hamilton county, New York. These cold temperatures resulted in dangerous wind chills ranging from one below to 31 degrees below zero during the early morning hours of New Years day.
January 1-2, 2018	Extreme Cold/Wind Chill	N/A	N/A	A frigid airmass combined with northwesterly winds up to 15 miles per hour resulted in dangerously cold wind chills on the first and second days of 2018. Wind chills fell as low as 15 to 35 below zero in many locations across the region on New Year's morning.
January 5-7, 2018	Extreme Cold/Wind Chill	N/A	N/A	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. The interaction between the cold upper trough and the relatively warmer Atlantic waters resulted in tremendous intensification of a surface low pressure system that tracked from around Miami, FL to just offshore of Cape Cod on January 3 and 4.

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
				A good deal of moisture wrapped into this system and was lifted across much of the East Coast, resulting in a broad area of moderate to heavy snowfall. A heavy band of snow impacted portions of the Taconics from the late morning through the afternoon hours of January 4, resulting in snowfall rates up to 3 per hour and total snowfall amounts mainly in the 7 to 15 inch range. To the west of the heavy snowband across the Hudson, Mohawk, and Schoharie Valleys, a widespread 3 to 7 inches of snowfall occurred. Gusty northerly winds occurred with this system as well, with gusts of 30-45 mph recorded. The winds and falling snow contributed to reduced visibility and blowing and drifting of snow. The snowfall tapered off in the evening of January 4. 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. One confirmed fatality from hypothermia resulted from the stretch of cold weather as a 46-year old woman was found dead in front of her home in Glens Falls. Many warming shelters were opened across the state.
January 13-14, 2018	Cold/Wind Chill	N/A	N/A	Tropical moisture was lifted over a sharp cold front as it moved into eastern New York in the evening of Friday, January 12, causing rain to turn to sleet and snow and become heavy from Friday evening into Saturday morning. Despite warm temperatures in the 50s during the day, snowfall accumulated 6 to 12 inches over northern Herkimer County as temperatures fell into the 20s and 30s.||Temperatures continued to plummet behind the cold front, with frigid wind chills as low as -25F by the morning of Sunday, January 14.
June 18, 2018	Heat	N/A	N/A	A hot and humid airmass was in place across the region with temperatures in the 90s and dew points in the 60s and 70s. This resulted in heat index values reaching 100 to 110 degrees during the afternoon hours in valley areas. ||This hot and humid air mass also provided an unstable environment for strong to severe thunderstorms to form ahead of a

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
				cold front passage during the afternoon and evening hours of June 18th. The storms caused numerous trees and power lines to be knocked down, resulting in over 10,000 customers without power. A vacant historic building in Poughkeepsie, New York partially collapsed onto an occupied building, trapping and injuring one woman.
June 30, 2018	Heat	N/A	N/A	A hot and humid airmass invaded eastern New York beginning on June 30th. It would be the beginning of a heat wave that would last through the Independence Day holiday, and marked the first of several days of 90 degree heat. Combined with dewpoints in the mid-70s, heat indices reached around 100 degrees. The impending heat wave prompted the opening of numerous cooling centers throughout the region.
July 1-5, 2018	Excessive Heat	N/A	N/A	A hot and humid airmass brought excessively high heat indices to eastern New York from the beginning of July through the Independence Day holiday. Temperatures soared as high as 99 degrees on July 1st, the hottest day of the stretch. Combined with dewpoints in the mid-70s, heat indices reached near 110 degrees in the warmest valleys. July 5th marked the sixth consecutive day reaching a temperature of 90 degrees at Albany and Glens Falls, and a seventh consecutive day at Poughkeepsie. In addition to the hot daytime temperatures, overnight low temperatures only falling into the 70s was common, which exacerbated heat-related problems. The extensive heat prompted the opening of many cooling centers across the region.
July 16, 2018	Heat	N/A	N/A	It was hot and humid on July 16th as temperatures soared into the low to mid-90s with dewpoints in the upper 60s to low 70s in the Hudson and Mohawk Valleys. This resulted in heat indices reaching the mid to upper 90s. Isolated, slow-moving thunderstorms developed during the afternoon in the hot air, one of which resulted in wind damage and flash flooding in Ulster County.
August 28-29, 2018	Heat	N/A	N/A	Hazy, hot and humid conditions enveloped the region from Tuesday, August 28th through Wednesday, August 29th. This prompted a heat advisory to be issued both days for all locations below 1000 feet. Maximum heat index values ranged from the low 90's to the low 100's.
September 3-5, 2018	Heat	N/A	N/A	A late-season heat wave impacted eastern New York during the first week of September. A

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
				persistent warm and moist airmass characterized by daytime highs in the 90s and dewpoints in the 70s resulted in heat index values reaching 95-105 degrees during the afternoon hours. Daily record high temperatures were set or tied at Albany on the 5th and 6th, and a daily record high minimum temperature was set on the 3rd. This heat wave coincided with the first week of school for many, and the heat prompted some schools to dismiss classes early and postpone or cancel sports practices.
November 22, 2018	Cold/Wind Chill	N/A	N/A	A frigid airmass arrived in the wake of an Arctic cold front on the 22nd, resulting in one of the coldest Thanksgivings on record for eastern New York. Wind chill values fell to -15 to -20 degrees Fahrenheit during the morning of the 22nd, while high temperatures only reached the single digits and teens.
January 10-11, 2019	Cold/Wind Chill	N/A	N/A	A mix of rain and freezing rain developed in the early morning hours of January 9th ahead of an occluded front. The mixed precipitation quickly changed to snow over the higher terrain as the front passed and cold air was drawn into eastern New York. Upslope snow continued over higher elevations through the day and into the night before ending on the morning of the 10th. Total accumulation over the southern Adirondacks and northern Taconics mainly ranged from two to six inches, with a few isolated higher amounts over northern Herkimer County. The air continued to become colder during the night of the 10th into the early morning of the 11th as strong westerly winds developed. This led to wind chill values falling to 20 to 25 degrees below zero over northern Herkimer County during the morning of the 11th.
January 20-22, 2019	Extreme Cold/Wind Chill	N/A	N/A	The largest snowstorm to date in the 2018-19 winter occurred on January 19th and 20th across eastern New York. Low pressure formed over the lower Mississippi Valley and lifted northeast across the Tennessee Valley during the night of the 19th before moving along the Mason-Dixon line on the 20th. Strong rising motion occurred as southerly winds aloft transported moist air northward, which was lifted over the cold airmass in place over eastern New York. Snowfall broke out during the afternoon of the 19th, continuing heavy at times into the

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
				evening and overnight hours before ending during the morning of the 20th. The strong southerly flow brought above-freezing air aloft into the region, causing the snow to turn to sleet as far north as the Capital District and northern Catskills for a time before turning back to snow. Further south, the air aloft was warm enough to turn the precipitation to freezing rain with ice accretion of one to three tenths of an inch over portions of the southeast Catskills, Mid-Hudson Valley, and southern Taconics. Snowfall totals were heaviest from the central Mohawk Valley into the southern Adirondacks and Lake George-Saratoga region where 1.5 to 2 foot totals were common. Three to six inches of snow and sleet along with some ice occurred over the Mid- Hudson Valley, while the remainder of the region saw between 6 and 18 inches.||The snowfall resulted in the cancellation of many weekend activities along with all flights from Albany International Airport scheduled to leave the morning and afternoon of the 20th. The governor of New York banned buses and tractor trailers from nearly the entire New York State Thruway and most interstate highways during the storm. States of emergency were declared for Albany and Saratoga Counties. Also, around 200 customers lost power due to the freezing rain in Ulster and Dutchess Counties. Frigid temperatures followed the snow for Monday and Tuesday, January 21st-22nd, with wind chills falling to -20 to -40F across most of the region. The cold weather prompted the closing of schools and the opening of warming shelters across the region.
January 30-31, 2019	Extreme Cold/Wind Chill	N/A	N/A	An arctic cold front tracked through eastern New York during the afternoon of the 30th, accompanied by a heavy snow squall. Frigid air poured in behind this front along with strong westerly winds. Wind chills the morning of the 31st fell to 15 to 35 degrees below zero. The wind chills prompted many schools to close or delay opening, and there were several reports of water main breaks due to the cold.||In addition to the frigid temperatures, a heavy band of lake effect snow developed off of Lake Ontario and impacted far northern portions of Herkimer County from the evening of the 30th through the late

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
				evening of the 31st. Snowfall amounts of 8 to 12 inches occurred in this band.
February 1, 2019	Cold/Wind Chill	N/A	N/A	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 26, 2019	Cold/Wind Chill	N/A	N/A	In the wake of a strong low pressure system, cold air quickly filtered into the western Adirondacks. This resulted in wind chill values as low as 20 below zero across Northern Herkimer and Hamilton counties.
July 19-20, 2019	Excessive Heat	N/A	N/A	A heat wave gripped eastern New York from July 19th through the 21st. Temperatures soared into the low to mid-90s with dewpoints in the low to mid-70s. This resulted in heat index values in the 100 to 110 range in the warmest spots of the Hudson Valley. Saturday, July 20th was the hottest day for most areas. Due to the excessive heat, area cities extended hours for pools and cooling centers, and Saturday's races at the Saratoga Race Course were cancelled due to the heat for the first time since August 2006. The hot and humid airmass provided fuel for thunderstorms that formed along the Lake Ontario shoreline during the late afternoon of the 20th. Two clusters of storms moved from the Mohawk Valley through the Capital District and into the Taconics during the evening, resulting in several reports of wind damage. The storms knocked out power to over 1,700 customers in Schenectady and Saratoga Counties.
December 18-19, 2019	Cold/Wind Chill	N/A	N/A	In the wake of an arctic frontal boundary, dangerously cold air filtered into the region. This arctic air combined with northerly winds, resulted in wind chills ranging from 10 degrees to 25 degrees below zero. The coldest wind chills occurred in the southern Adirondacks.
January 17, 2020	Cold/Wind Chill	N/A	N/A	Strong northwesterly winds developed in the wake of a strengthening low pressure system offshore of Cape Cod during the late morning to early evening of January 16th. Winds gusting as high as 47 miles per hour brought down a few large branches. The winds brought in a frigid airmass, with wind chills in the southern Adirondacks falling as low as 25 below zero during the early morning of the 17th.

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
July 9, 2020	Heat	N/A	N/A	A hot and humid airmass was in place over the Hudson and Mohawk Valleys on July 9th. Heat indices ranged from 90 to 100 degrees Fahrenheit over most of the area.
July 19, 2020	Heat	N/A	N/A	Temperatures soared into the 90s throughout much of eastern New York on July 19th, reaching as high as the mid to upper 90s in the Hudson and Mohawk Valleys. The combination of the heat and a humid airmass brought heat indices into the 95 to 105 degree range. The heat prompted the opening of cooling centers and pools, but with reduced capacity due to the ongoing coronavirus pandemic. In addition, a line of thunderstorms moved in from the west during the evening, resulting in a few reports of wind damage in the Schoharie and Mid-Hudson Valleys. Heat indices exceeded 95 degrees again in some of the lower elevations of the Hudson Valley again on July 20th, but were not quite as high as the previous day.
July 27, 2020	Heat	N/A	N/A	Another hot and humid airmass impacted portions of eastern New York on July 27th and 28th. Heat indices reached 95 to 105 degrees on the 27th in the Hudson and Mohawk Valleys. In addition, a severe thunderstorm caused an isolated wind damage report during the evening. Some areas saw relief from the heat on the 28th, but heat indices exceeded 95 degrees again for portions of the Mid-Hudson Valley. At Poughkeepsie, there were 17 days where the temperature reached 90 degrees during the month of July, tying a record. With an average temperature of 77.8 degrees, July 2020 was the hottest month on record.
August 10-11, 2020	Heat	N/A	N/A	A hot and humid airmass was in place across the region. This resulted in scattered thunderstorms during the afternoon and evening of August 10th. Some of these storms became severe, with one storm producing an EF1 tornado in Washington County. The storms also produced flash flooding in Ulster County. Heat indices reached the 95 to 100 degree range across the advisory area on Monday, August 10th with heat indices of the same magnitude subdued further south during the afternoon hours of August 11th.
January 29-30, 2021	Cold/Wind Chill	N/A	N/A	A combination of an arctic airmass and winds resulted in low wind chills across much of eastern New York the night of January 29th into January 30th, 2021. Low temperatures ranged from 18 degrees below zero in the southern Adirondacks up

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
				to 11 degrees above zero in the mid-Hudson Valley. Wind chill values ranged from 25 degrees below zero up to 8 degrees above zero.
March 2, 2021	Cold/Wind Chill	N/A	N/A	A strong cold front moved across the region on Monday, March 1 advecting in a much colder air mass along with a prolonged period of strong to locally damaging winds which continued into the early part of Tuesday, March 2. Wind gusts between 40 and 60 mph were common across the region, which led to reports of downed trees and power lines, resulting in scattered power outages. The more concentrated areas without power included around the Capital District and into Ulster County in the mid-Hudson Valley. As colder air moved into the region, a few snow showers and squalls passed across the region during the evening hours of March 1. At the Albany International Airport, visibility dropped to one quarter of a mile with a peak wind gust of 46 mph within a snow squall, which lasted for about 17 minutes. Colder air continued to filter into the region during the overnight and early morning hours of March 2 with low temperatures mainly in the single digits and teens, but below zero in the typical colder spots in the higher elevations. This, combined with continued gusty winds, led to wind chill values falling to between 15 and 24 degrees below zero in some areas. Key Impacts included tree damage, power outages, road closures, transportation delays.
June 29, 2021	Heat	N/A	N/A	A hot and humid airmass developed over eastern New York on the 27th and persisted through the 30th. Heat indices of 95 to 105 degrees were common, with the highest values on the 28th and 29th. The high reached the 90s for all four days at Poughkeepsie, and three days at Albany and Glens Falls.
August 11-13, 2021	Heat	N/A	N/A	A dome of high pressure settled across eastern New York from Wednesday, August 11 to Friday, August 13 bringing high heat and humidity each day, mainly during the afternoon hours. Heat indices reached 95 to 104 degrees across parts of the area each of these days with areas along the Hudson River from Albany and points southward reaching 105 to 110 on Thursday, August 12. The Hudson

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
				Valley Regional Airport recorded an official heat wave with high temperatures all three days in the low to mid-90s.
August 26, 2021	Heat	N/A	N/A	A hot and humid air mass developed ahead of an approaching cold front across eastern New York on Thursday, August 26, 2021. Heat indices reached 95 to 101 degrees across most areas outside of the higher elevations during the afternoon hours.||The cold front slowly dropped southward during the day on Friday, August 27, 2021, but heat indices still reached 95 to 100 degrees across portions of the mid-Hudson Valley during the afternoon prior to the frontal passage.
January 11, 2022	Cold/Wind Chill	N/A	N/A	The passage of an arctic cold front, arrival of arctic high pressure, gusty winds and very cold air led to wind chill values between -15 and -30 degrees Fahrenheit across portions of eastern New York during the overnight and early morning hours on Tuesday, January 11. In preparation for the arrival of cold air, a Code Blue was put in effect for the Capital Region which allowed for emergency overnight shelters to be open for anyone needing assistance.
January 14-15, 2022	Extreme Cold/Wind Chill	N/A	N/A	An Arctic high pressure system brought dangerously cold temperatures to eastern New York on January 14 and 15. Wind chills fell to -10 to -35 degrees over most areas on the morning of the 15th.
January 20-21, 2022	Cold/Wind Chill	N/A	N/A	In the wake of a strong cold front, Arctic air invaded the area. This combined with increased winds resulted in below zero wind chills across eastern New York January 20-21. Wind chills got as low as -15F to -25F.
January 29-30, 2022	Cold/Wind Chill	N/A	N/A	In the wake of a strong cold front, Arctic air invaded the area. This combined with increased winds resulted in below zero wind chills across eastern New York January 29-30. Wind chills got as low as -15F to -25F.
August 6-8, 2022	Heat	N/A	N/A	A dome of high pressure brought a stretch of hot and humid weather resulting in multiple days of heat indices between 95F and 104F degrees across eastern New York between August 4-9, 2022. ||On August 4, record high temperatures were set at both Albany and Poughkeepsie, each reaching 99F degrees. Albany and Poughkeepsie also set a new record for the hottest 8-day start to August on record.||The stretch of hot weather led to the

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
				opening of multiple cooling centers across the region.

Sources: NOAA NCEI 2023, FEMA 2023
Notes: 2022 results do not include November or December 2022 due to data limitations

Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of extreme temperature events for the County. Information from NOAA-NCEI storm events database, the 2019 State of New York HMP, the 2017 Herkimer County HMP, and FEMA were used to identify the number of extreme temperature events that occurred between 1950 and 2022. Table 5.4.1-4 presents the probability of future events for the extreme temperature event in the County.

Table 5.4.1-4. Probability of Future Hazard Name Events in Herkimer County

Hazard Type	Number of Occurrences Between 1950 and 2022	Percent Chance of Occurring in Any Given Year (1950-2022)	Number of Occurrences Between 1996 and 2022	Percent Chance of Occurring in Any Given Year (1996-2022)
Cold/Wind Chill	40	55.56	40	100%
Excessive Heat	3	4.17	3	11.54%
Extreme Cold/Wind Chill	14	19.44	14	53.85%
Heat	26	36.11	26	100%
Total	**83**	**100**	**83**	**100%**

Sources: NOAA NCEI 2023; FEMA 2023
Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected drought events since 1968. Due to limitations in data, not all extreme temperature events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated

A total of 83 extreme temperature events were recorded in Herkimer County. Based on historical occurrences, the probability of an extreme temperature event occurring is considered occasional (between 10 and 100% annual probability of occurrence). Refer to Section 5.3 for additional information on the hazard ranking methodology and probability criteria.

Climate Change Projections

Climate change is beginning to affect both people and resources in New York State, and these impacts are projected to continue growing. Impacts related to increasing temperatures and heavier precipitation are already being felt in the state. ClimAID: the Integrated Assessment for Effective Climate Change in New York State (ClimAID) was undertaken to provide decision makers with

information on the state's vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge. (NYSERDA 2014)

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change, Herkimer County is part of Region 5 (East Hudson and Mohawk River Valleys). In Region 5, it is estimated that temperatures will increase by 4.5°F to 6.2°F by the 2050s and 5.6°F to 9.7°F by the 2080s (baseline of 47.6°F, middle range projection). Average annual temperatures are projected to increase across New York State by 4.1° F to 6.8° F by the 2050s and 5.3° F to 10.1° F by the 2080s with an average rate of warming over the past century of 0.25° F per decade. By the end of the century, the greatest warming is projected to be in the northern section of the State.

Extreme events are also projected to increase, as illustrated in Table 5.4.1-5 below (NYSERDA 2014).

Table 5.4.1-5. Extreme Event Projections for Region 5

Event Type (2050s)	Low Estimate (10th Percentile)	Middle Range (25th to 75th Percentile)	High Estimate (90th Percentile)
Days over 90 °F (8 days)	22	27 to 41	50
# Of Heat Waves (0.7 heat waves)	3	4 to 6	7
Duration of Heat Wave (4 days)	5	5 to 6	6
Days below 32 °F (133 days)	98	104 to 119	125
Days over 1" Rainfall (5 days)	10	11 to 12	13
Days over 2" Rainfall (0.6 days)	1	1 to 2	2

Source: NYSERDA 2014

Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable in the hazard area identified. The entire County has been identified as exposed for the extreme temperature events. Therefore, all assets in the County (population, structures, critical facilities, and lifelines), as described in the County Profile (Section 4), are exposed and potentially vulnerable. The following text evaluates and estimates the potential impact of extreme temperatures on Herkimer County, including:

- Impact on Life, Health, and Safety
- Impact on General Building Stock
- Impact on Critical Facilities and Community Lifelines
- Impact on Economy
- Impact on the Environment
- Future Changes That May Impact Vulnerability
- Change of Vulnerability Since the 2017 HMP

Impact on life, Health, and Safety

Extreme temperature events have potential health impacts including injury and death. According to the Centers for Disease Control and Prevention, populations most at risk to extreme cold and heat events include the following: (1) the elderly, who are less able to withstand temperatures extremes because of their age, health conditions, and limited mobility to access shelters; (2) infants and children up to 4 years of age; (3) individuals who are physically ill (such as with heart disease or high blood pressure), (4) low-income persons who cannot afford proper heating and cooling; and (5) members of the general public who may overexert during work or exercise during extreme heat events or experience hypothermia during extreme cold events (CDC 2006).

According to NOAA's 2001 Winter Storms The Deceptive Killers, approximately 50 percent of the deaths related to extreme cold temperatures happen to people over 60 years old, more than 75 percent of those deaths are male, and about 20 percent occur in the home (NYS DHSES 2014).

The entire population of Herkimer County is exposed to extreme temperature events. According to the 2020 U.S. Census, the County had a population of 60,139. Refer to Section 4 (County Profile) for a summary of population statistics for the County.

Impact on General Building Stock

Extreme heat generally does not affect buildings; however, losses may be associated with overheating of heating, ventilation, and air conditioning (HVAC) systems. Extreme cold temperature events can damage buildings through freezing and bursting pipes and freeze/thaw cycles. Additionally, manufactured homes (mobile homes) and antiquated or poorly constructed facilities may have inadequate capabilities to withstand extreme temperatures.

All of the building stock in the County is exposed to the extreme temperature hazard; however, direct impacts are expected to be minimal. Refer to Section 4 (County Profile), which summarizes the building inventory in Herkimer County.

Impact on Critical Facilities and Community Lifelines

Similar to the general building stock, all critical facilities in the County are exposed to the extreme temperature hazard; however, direct impacts are expected to be minimal. Impacts to critical facilities are the same as were described for general building stock. Additionally, it is essential that critical facilities remain operational during natural hazard events. Extreme heat events can sometimes cause short periods of utility failures, commonly referred to as “brown-outs,” created by increased usage from air conditioners, appliances, and similar equipment. Similarly, heavy snowfall and ice storms, associated with extreme cold temperature events, can interrupt power as well. Backup power is recommended for critical facilities and infrastructure.

Impact on the Economy

Extreme temperature events also have impacts on the economy, including loss of business function and damage and loss of inventory. Business owners may be faced with increased financial burdens due to unexpected repairs caused to the building (pipes bursting), higher than normal utility bills, or business interruption caused by power failure (loss of electricity and telecommunications).

The agricultural industry is most at risk in terms of economic impact and damage caused by extreme temperature events. Extreme heat events can result in drought and dry conditions and directly affect livestock and crop production.

Based on the 2017 Census of Agriculture, 596 farms were present in Herkimer County, encompassing 117,780 acres of total farmland. The average farm size was 198 acres. Herkimer County farms had a total market value of products sold of $58 million, averaging $97,277 per farm (USDA 2017). Table 5.4.1-6 lists the acreage of agricultural land exposed to extreme temperature hazards.

Table 5.4.1-6. Agricultural Land in Herkimer County in 2017

Number of Farms	Land in Farms (acres)	Total Cropland (acres)	Total Pastureland (acres)	Acres Irrigated
596	117,780	69,490	15,311	182

Source: USDA 2017

In 2017, the top three agricultural products sold in Herkimer County were livestock, poultry, and products at $44.4 million; milk from cows at $38.8 million; and other crops and hay at $6.7 million (USDA 2017).

If an extreme temperature event impacted 40 percent of the agricultural products sold from Herkimer County farms, based on 2017 market values, this would be a loss of $23.2 million. This figure does not include how the tourism industry and local jobs are impacted.

Impact on the Environment

Extreme temperature events can have a major impact on the environment. For example, freezing and warming weather patterns create changes in natural processes. An excess amount of snowfall and earlier warming periods may affect natural processes such as flow within water resources (USGS 2020). Extreme heat events can have particularly negative impacts on aquatic systems, contributing to fish kills, aquatic plant die offs, and increased likelihood of harmful algal blooms.

Future Changes That May Impact Vulnerability

Understanding future changes that impact vulnerability in the County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The county considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development

- Projected changes in the population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

The ability of new development to withstand extreme temperature impacts can be enhanced through land use practices and consistent enforcement of codes and regulations for new construction. New development will change the landscape where buildings, roads, and other infrastructure potentially replace open land and vegetation. Transformation of pervious surfaces (including vegetation) to impervious surfaces causes an island of higher temperatures. Specific areas of recent and new development are indicated in tabular form and/or on the hazard maps included in the jurisdictional annexes in Volume II, Section 9 (Jurisdictional Annexes) of this plan.

Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 6.8 percent since 2010. The County's population is anticipated to decrease over the next decade by 6.6 percent decrease by 2030). A decrease in the population throughout Herkimer County may decrease the County's risk to extreme temperature events, however based on projections by the Cornell Program on Demographics the elderly population (age 65 and over) is expected to increase from 21.7 percent to 27.9 percent of the county population. This could indicate an increased risk to extreme temperature events. Refer to section 4 (County Profile), which includes a more thorough discussion about population trends for the County.

Climate Change

As discussed above, most studies project that the State of New York will see an increase in average annual temperatures and precipitation. As the climate warms, extreme cold events might decrease in frequency, while extreme heat events might increase in frequency; the shift in temperatures could also result in hotter extreme heat events. With increased temperatures, vulnerable populations could face increased vulnerability to extreme heat and its associated illnesses, such as heatstroke and cardiovascular and kidney disease. Additionally, as temperatures rise, more buildings, facilities, and infrastructure systems may exceed their ability to cope with the heat.

Change of Vulnerability Since the 2017 HMP

Overall, the entire County remains vulnerable to extreme temperatures. As existing development and infrastructure continue to age, they can be at increased risk to failed utility systems (e.g., HVAC) if they are not properly maintained. Similarly, an increase in the elderly population remaining in the County increases the vulnerable population.

5.4.5 Flood

The following section provides the hazard profile (hazard description, location, extent, previous occurrences and losses, probability of future occurrences, and impact of climate change) and vulnerability assessment for the flood hazard in Herkimer County.

Hazard Profile

Hazard Description

A flood is an overflow of water from oceans, rivers, groundwater, or rainfall that submerges areas that are usually dry. This natural phenomenon can be exacerbated by features of the built environment. Flooding in New York State can occur anytime of the year; typically, flooding occurs during prolonged rainfalls over several days, intense rainfalls over a short period of time, or when an ice or debris jam causes a river or stream to overflow onto the surrounding area (New York State 2019).

Flooding events are a common occurrence in Herkimer County, with the most common types being riverine, ice jam, stormwater/urban, and saturated ground failure. Herkimer County's history of flooding and flood impacts are described in FEMA's Flood Insurance Study dated December 13, 2019. Historically, the county has experienced riverine flooding caused by precipitation due to tropical storms tracking northward along the Atlantic coastline, regional thunderstorm activity, as well as flooding due to ice dams and blockages. Significant flood reduction measures have been implemented in the Village of Herkimer designed to minimize the possibility of damage to the village from flooding on the Mohawk River, West Canada Creek Reach 1, Bellinger Brook, and Hydraulic Canal. In the Village of Dolgeville, there have been several flood protection measures taken and ice jams are dynamited by the Village of Dolgeville in an effort to prevent ice blockages and the associated flooding. In the Town of Newport, the three large dams within the study reach of West Canada Creek Reach primarily serve the purposes of hydroelectric generation and water supply impoundment. However, Hinckley Reservoir is seasonally regulated and has significant flood control capability if the reservoir is at its lowest regulated level.

Figure 5.4.5-1. Flood Damages in the Village of Dolgeville, October 2022

(Source: J. Raymond)

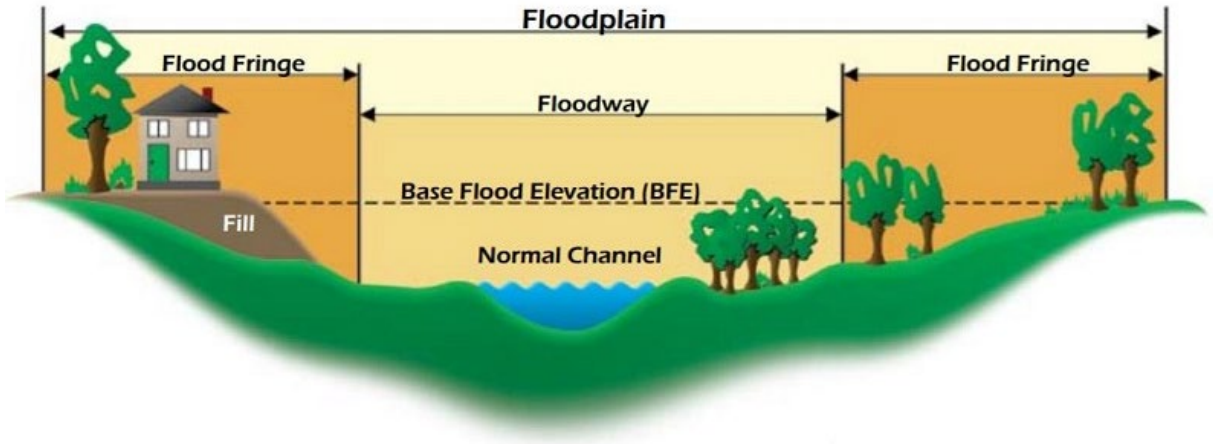
Riverine

Riverine flooding, or fluvial flooding, is when streams and rivers exceed the capacity of their natural or constructed channels to accommodate water flow and water overflows the banks, spilling out into adjacent low-lying, dry land (FEMA 2019). This occurs when the flow of a river exceeds the bank sides and causes damage or obstruction to a nearby floodplain.

Riverine flooding can turn into a flash flood if the river is at or above its flood stage and if the soil is saturated. A flash flood is a rapid inundation of low-lying areas caused by heavy rain associated with severe thunderstorms, tropical systems, or melting water from ice or snow. Flash flooding also occurs far away from water bodies when a large volume of water cannot be absorbed by the soil or storm water systems and travels overland unimpeded (Herkimer County 2017).

Riverine flooding occurs along the floodplains of rivers, streams, lakes, and other watercourses. A floodplain is defined as the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that becomes inundated with water during a flood. In Herkimer County, floodplains line the rivers, streams, and lakes of the County. The boundaries of the floodplains are altered as a result of changes in land use, the amount of impervious surface, placement of obstructing structures in floodways, changes in precipitation and runoff patterns, improvements in technology for measuring topographic features, and utilization of different hydrologic modeling techniques. Figure 5.4.5-2 depicts the flood hazard area, the flood fringe, and the floodway areas of a floodplain.

Figure 5.4.5-2. Characteristics of a Floodplain



Source: FEMA 2022

Ice Jam

An ice jam occurs when pieces of floating ice are carried with a stream's current and accumulate behind any obstruction to the stream flow. Obstructions may include river bends, mouths of tributaries, points where the river slope decreases, as well as dams and bridges. The water held back

by this obstruction can cause flooding upstream, and if the obstruction suddenly breaks, flash flooding can occur as well (NOAA 2023).

The formation of ice jams depends on the weather and physical condition of the river and stream channels. Ice jams are common in locations where the channel slope changes from relatively steep to mild and where a tributary stream enters a large river. Ice jams and resulting floods can occur during different times of the year: fall freeze-up from the formation of frazil ice; mid-winter periods when stream channels freeze solid, forming anchor ice; and spring breakup when rising water levels from snowmelt or rainfall break existing ice cover into pieces that accumulate at bridges or other types of obstructions (FEMA 2018).

There are two main types of ice jams: freeze-up and breakup. Freeze-up jams occur when floating ice may slow or stop due to a change in water slope as it reaches an obstruction to movement. Breakup jams occur during periods of thaw, generally in late winter and early spring. The ice cover breakup is usually associated with a rapid increase in runoff and corresponding river discharge due to a heavy rainfall, snowmelt, or warmer temperatures (FEMA 2018).

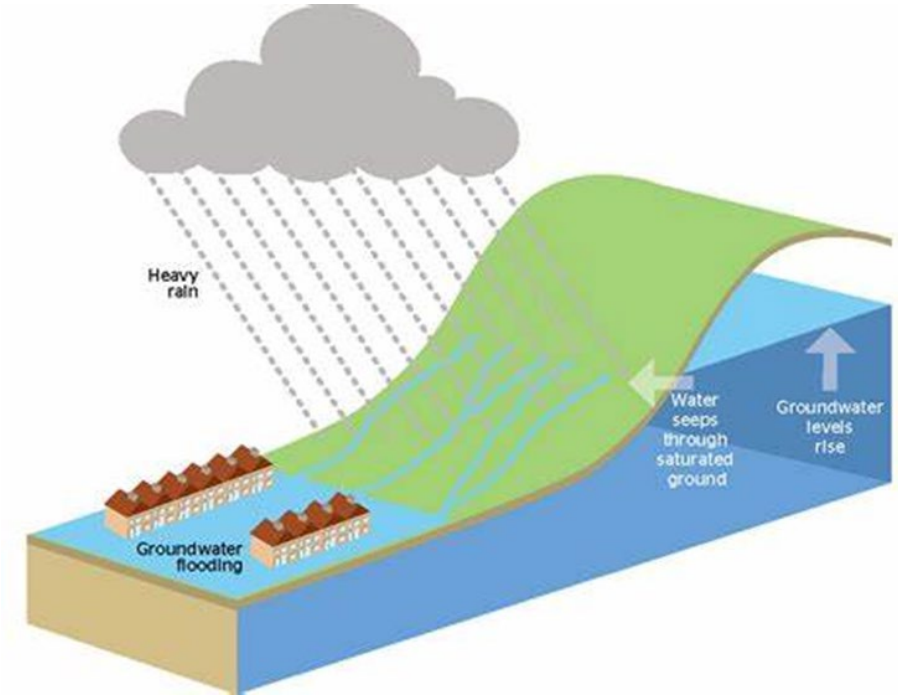
Stormwater/Urban

Local (urban) drainage systems collect groundwater from heavy rainfall in developed areas. Water that does not evaporate or become absorbed by the ground is carried by conduits to waterways such as creeks, rivers, or the ocean. These systems have two purposes: 1) to control storm water runoff during periods of heavy rainfall; and 2) to minimize disruption of activity from more frequently occurring, less significant storms. Flooding occurs when runoff exceeds system capacity, or because systems are blocked from lack of maintenance. Flooding which results from poorly designed or blocked drainage systems is categorized as urban/stormwater flooding (NOAA 2022). About 20 to 25% of flood-related economic losses occur in areas not designated as being in a "floodplain" because of ineffective local drainage (Herkimer County 2017).

Saturated Ground Failure

High groundwater flooding occurs when heavy precipitation causes the water table to rise. As rainwater from high ground accumulates in low-lying areas, the water table rises to the surface, causing the ground to be completely saturated. When the water table rises through a slope, there may be a point at which the water table is above the ground level (see Figure 5.4.5-3). If this happens, the water will flow over the surface as it cannot seep into the ground – this is groundwater flooding. High groundwater flooding is not common in Herkimer County however, the geography of the County increases the possibility of this type of flooding to occur (Herkimer County 2017).

Figure 5.4.5-3. Groundwater Flooding Diagram



Source: Flood Guidance UK 2017

Location

Herkimer County's topographic, climatological, and meteorological features create an environment conducive to year-round flooding. Warm weather flooding is caused by severe thunderstorms bringing heavy rainfall that leads to flash floods and riverine or overbank flooding. In cold weather, ice jams and fast-melting snow overwhelm waterways. Bank erosion and sediment deposits exacerbate flooding by blocking and re-directing the natural flow of waterways.

Herkimer County has experienced many flood events. Historical data, federal disaster declarations, and an analysis of impacts and consequences reveal that flooding is the costliest, and one of the most frequently occurring, natural hazards. Northern Herkimer County is located at higher elevations within Adirondack Park. The topography of the southern region slopes north toward the Mohawk River. Drainage basins from higher elevations merge into lakes, streams, brooks, and creeks that drain into the river. Figure 5.4.5-4 visualizes the FEMA designated flood hazard areas for Herkimer County.

The community is at risk, in part, from the way the built environment was developed. Communities that are now built to capacity were founded near waterways for access to transportation and a water supply. Historic poorly designed and constructed development, combined with today's climate change phenomenon, increases flood risk. The region has conducted numerous studies to document flood problems. This plan integrates previously identified data.

Extent

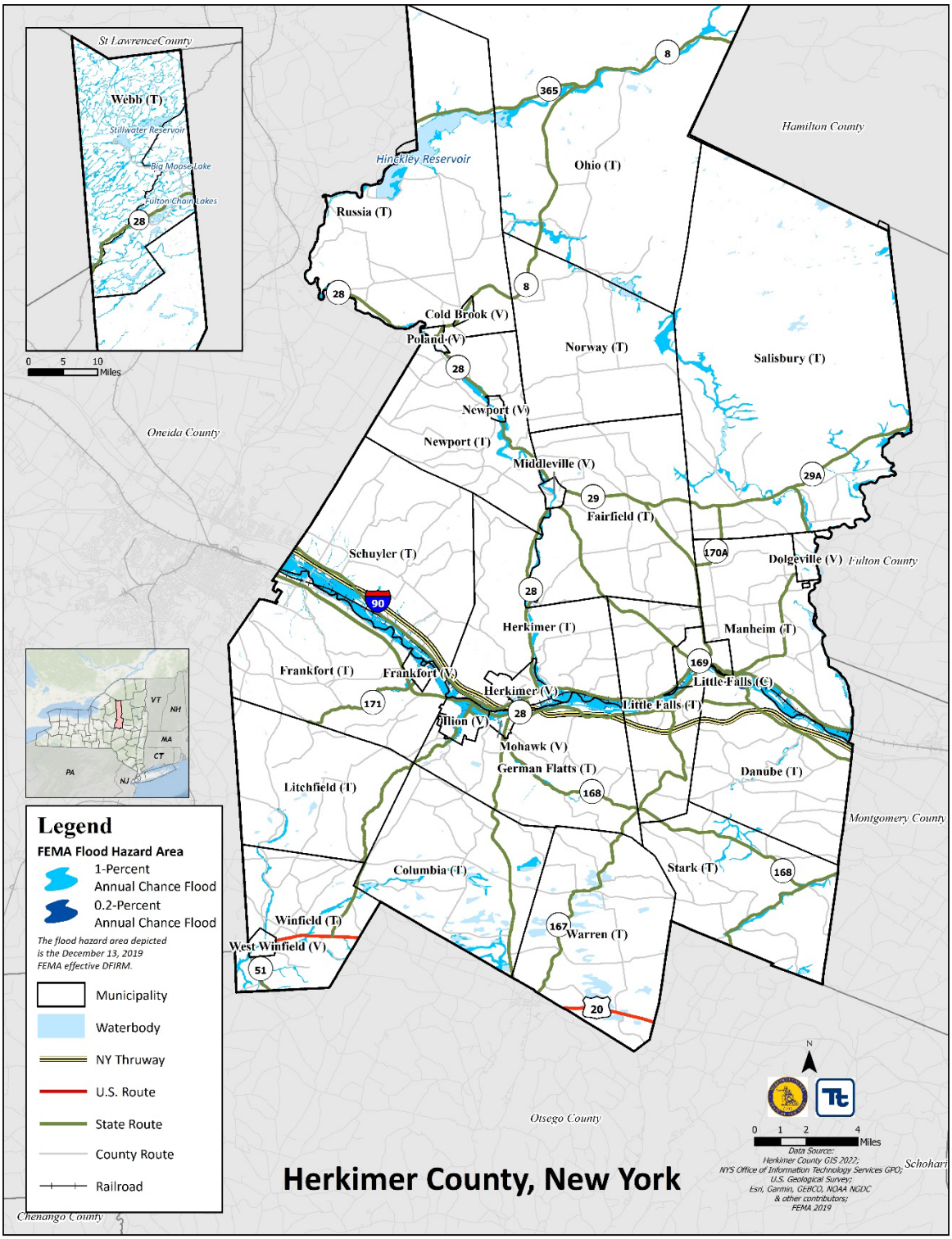
The strength or magnitude of a flood varies based meteorological, environmental, and geological factors, including latitude, altitude, topography, and atmospheric conditions. Flood is also affected by seasonal variation, storm characteristics, warning time, speed of onset, and duration. Most floods are preceded by a warning period that allows emergency managers to communicate the need to prepare for the event. A flood may last from minutes to days (Herkimer County 2017).

The December 2019 FEMA Flood Insurance Study (FIS) shows that the region is prone to intense cloudburst rainfall. Floods result from storms covering both large and small areas with intense rainfall. Riverine floods generally occur from May through August; flooding from ice blockages occurs during the winter months. The upland areas are characterized by dissected topographic relief with steep stream slopes. Flood prone communities in Herkimer County experience floods characterized by rapid water rise, high maximum discharge, short duration, and low volume of total runoff (FEMA 2019).

Warnings issued through official sources, such as the National Weather Service (NWS) and the Storm Prediction Center, provide the most reliable and timely preparedness information, but the exact flood location and depth depends on the amount, duration, and location of rainfall. Many floods, especially flash floods, occur outside of FEMA-designated flood zones.

The region is subject thunderstorms with heavy precipitation from May through July, during the spring and early summer. Severe winter storms associated with cold weather months affect the area between October and May. Ice jam flood occurs between December and April. Local officials use several tools to predict flood conditions and develop timely warnings. One such tool is a series of stream gauges on county creeks and rivers. Monitored by the Advanced Hydrological Prediction Center, the USGS, the U.S. Army Corps of Engineers, and the NWS, the region's 13 gauges track the rise and fall of water level and, if necessary, estimate the time required to evacuate (FEMA 2019) (Herkimer County 2017).

Figure 5.4.5-4. Flood Hazard Areas in Herkimer County



Previous Occurrences

The National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center's (NCDC) Storm Events Database documented 236 flood events occurring locally between 1950 and 2022. Between January 1, 2017, and June 30, 2022, there were 25 "flash flood" events and 27 "flood" events. The number and types of events are described in Table 5.4.5-1 (NOAA 2022).

FEMA Major Disasters and Emergency Declarations

Between 1954 and 2022, Herkimer County was included in 1 disaster (DR) or emergency (EM) declarations for flood-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 4 (County Profile).

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2012 and 2022, Herkimer County was included in 1 flood-related agricultural disaster declarations.

Previous Events

For this 2023 HMP update, known flood events that impacted Herkimer County between 2017 and 2022 are discussed below. For events prior to 2017, refer to Appendix E (Supplementary Data).

Table 5.4.5-1. Hazard Events in Herkimer County (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
July 1, 2017	Flash Flood	N/A	N/A	Storms resulted in torrential rainfall and flash flooding in portions of Herkimer, Fulton, Herkimer, Washington, and Rensselaer Counties. It was the second straight day of heavy rainfall for some of these areas. In Herkimer County, a mudslide closed a state highway, and people had to be evacuated due to rising water. A person was trapped in their house in the Town of Schuyler due to flooding off Route 5S. That route was closed in the Village of Frankfort, along with Route 171 and West Main Street. Route 5 was closed from the Town of Schuyler to Little Falls with portions of the roadway under water. The Walmart in Herkimer had to be evacuated due to flooding concerns. Overall, the County had approximately $1.5 million in property damage from this event.
January 12, 2018	Flood	N/A	N/A	The combination of warm temperatures and heavy rainfall caused river ice to dislodge and jam in

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
				spots. Flooding occurred due to a combination of ice jam movement and heavy rainfall. Several roads were closed or damaged and a water rescue had to be performed. After the strong cold front passed, many ice jams and their flooding froze back in place, resulting in road closures continuing for several days.
April 15, 2019	Flood / Flash Flooding	USDA, S4623	Yes	Excessive rain, flash flooding, and flooding
August 17, 2019	Flash Flood	N/A	N/A	Strong storms caused many trees and power lines to be downed and about 5,000 power outages. Trailing storms also led to reports of flooding.
October 31 – November 2, 2019	Flash Flood	FEMA, DR-4472-NY	Yes	A large swath of rainfall totaling 2-5 inches, with isolated areas as high as 7 inches, occurred over the Mohawk Valley and southern Adirondacks, resulting in reports of flash flooding. In Herkimer County, heavy rain washed out a bridge in the Town of Fairfield, closed roadways, evacuations were needed, and swift water rescues occurred.
February 18, 2022	Flood	N/A	N/A	A storm system pushed across the region. The warm and rainy weather ahead of the cold front resulted in some snow melt as well as some ice to break up on area rivers and streams. As the colder weather returned, localized ice jams formed, some of which led to flooding. The County had approximately $35,000 in property damage from this event.

Sources: NOAA 2022, USDA FSA 2022, FEMA 2022, New York State 2019, Herkimer County 2017

Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and flood events as reported by NWS. Due to changes in the data collection and periods of record availability depending on the event type, not all flood events occurring between 1950 and 2022 are accounted for in the tally of occurrences. As a result, the probability of future occurrences may be underestimated.

Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of flood events for the County. Information from NOAA-NCEI storm events database, the 2019 State of New York HMP, and the 2017 Herkimer County HMP, were used to identify the number of flood events that occurred between 1950 and 2022. Table 5.4.5-2 presents the probability of future events for flooding in Herkimer County.

Table 5.4.5-2. Probability of Future Flood Events in Herkimer County

Hazard Type	Number of Occurrences Between 1950 and 2022	Percent Chance of Occurring in Any Given Year
Flash Flood	52	71.2%
Flood	54	73.9%

Hazard Type	Number of Occurrences Between 1950 and 2022	Percent Chance of Occurring in Any Given Year
TOTAL	106	100%

Sources: NOAA 2022, New York State 2019, Herkimer County 2017

Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and flood events as reported by NWS. Due to changes in the data collection and periods of record availability depending on the event type, not all flood events occurring between 1950 and 2022 are accounted for in the tally of occurrences. As a result, the probability of future occurrences may be underestimated.

Based on the County's history of flooding, Herkimer County could experience at least one flood event each year. In Section 5.3, the identified hazards of concern for Herkimer County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Partnership, the probability of occurrence for flood in the County is considered 'frequent'.

Climate Change Projections

Climate change is beginning to affect both people and resources in Herkimer County, and these impacts are projected to continue growing. The Integrated Assessment for Effective Climate Change in New York State (ClimAID) was undertaken to provide decision-makers with information on the state's vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge (NYSERDA 2011).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change. Herkimer County is part of Region 5. In Region 5, it is estimated that temperatures will increase by 3.0 °F to 5.5 °F by the 2050s and 4.0 °F to 8.0 °F by the 2080s (baseline of 50.0 °F, mid-range projection). Precipitation totals will increase between 0 and 5 percent by the 2050s and 5 to 10 percent by the 2080s (baseline of 38.0 inches, mid-range projection). Table 5.4.5-3 displays the projected seasonal precipitation change for ClimAID Region 5 (NYSERDA 2014).

Table 5.4.5-3. Projected Seasonal Precipitation Change in Region 5, 2050s (% change)

Winter	Spring	Summer	Fall
+5 to +15	-5 to +10	-5 to +5	-5 to +10

Source: NYSERDA 2014

The projected increase in precipitation is expected to fall in heavy downpours and less in light rains. Downpours are very likely to increase in frequency and intensity, a change which has the potential to affect drinking water; heighten the risk of riverine flooding; flood key rail lines, roadways, and transportation hubs; and increase delays and hazards related to extreme weather events (NYSERDA 2011). Less frequent rainfall during the summer months may impact the ability of water supply systems. Increasing water temperatures in rivers and streams will affect aquatic health and reduce the capacity of streams to assimilate effluent wastewater treatment plants (NYSERDA 2011).

Climate change affects flooding more than other hazards because the frequency of extreme precipitation events in the Northeast has increased in recent years. Severe storms projected in the

1950s to occur only once in 100 years are now expected to occur once every 60 years. Other climate change influences include the following:

- Spring breakup, snowmelt, and winter rains
  - Warmer spring temperatures that lead to earlier and more rapid snow melt; more late-winter precipitation likely to fall as rain, rather than as snow
- Cyclonic disturbances
  - Increasing frequency of severe cyclonic events, which may permit more northward tracking of hurricanes
- Localized summer outburst events
  - Increase formation of conditions conducive to summer outbursts and flash flooding
- Human uses and development of land
  - Development leads to increased amounts of impervious surfaces such as roads, parking lots, and buildings and can increase rainwater runoff. Development in floodplains or wetlands can potentially result in an increased floodplain level.

(Herkimer County 2017) (New York State 2019)

Vulnerability Assessment

To assess Herkimer County's risk to the flood hazard, a spatial analysis was conducted using the FEMA DFIRMs dated 2019. The 1-percent annual chance flood event was further examined to estimate potential loss using the FEMA Hazus model. These results are summarized below. Refer to Section 5.1 (Methodology and Tools) for additional details on the methodology used to assess flood risk.

Impact on life, Health, and Safety

The impact of flooding on life, health, and safety is dependent upon several factors including the severity of the event and whether or not adequate warning time is provided to residents. Exposure represents the population living in or near floodplain areas that could be impacted should a flood event occur. Additionally, exposure should not be limited to only those who reside in a defined hazard zone, but everyone who may be affected by the effects of a hazard event (e.g., people are at risk while traveling in flooded areas, or their access to emergency services is compromised during an event). The degree of that impact will vary and is not strictly measurable. The impacts from each flood hazard of concern is described below.

Riverine Flooding

To estimate population exposure to the 1-percent- and 0.2-percent annual chance flood events, the digitized flood boundaries were used. Based on the spatial analysis, there are an estimated 4,238 residents living in the 1-percent annual chance floodplain, or 7.0-percent of the County's total population. There are an estimated 5,701 residents living in the 0.2-percent annual chance floodplain, or 9.5-percent of the County's total population. Table *5.4.5-4* summarizes the population exposed to the flood hazard by jurisdiction.

***Table** 5.4.5-4. **Estimated Number of Persons in** Herkimer County Living in the 1-percent and 0.2-percent Annual Chance Flood Event Hazard Areas*

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Flood Hazard Areas			
		Number of Persons Located in the 1-percent Area	Percent of Total	Number of Persons Located in the 0.2-percent Area	Percent of Total
Cold Brook (V)	250	27	10.9%	27	10.9%
Columbia (T)	1,569	27	1.7%	27	1.7%
Danube (T)	953	12	1.3%	20	2.0%
Dolgeville (V)	2,042	289	14.2%	297	14.6%
Fairfield (T)	1,197	4	0.3%	4	0.3%
Frankfort (T)	4,691	76	1.6%	81	1.7%
Frankfort (V)	2,320	85	3.6%	163	7.0%
German Flatts (T)	2,202	42	1.9%	55	2.5%
Herkimer (T)	2,332	43	1.8%	43	1.9%
Herkimer (V)	7,234	197	2.7%	1,292	17.9%
Ilion (V)	7,646	2,701	35.3%	2,916	38.1%
Litchfield (T)	1,444	39	2.7%	39	2.7%
Little Falls (C)	4,605	12	0.3%	16	0.3%
Little Falls (T)	1,497	7	0.4%	7	0.5%
Manheim (T)	1,040	13	1.3%	14	1.4%
Middleville (V)	407	31	7.7%	31	7.7%
Mohawk (V)	2,415	102	4.2%	135	5.6%
Newport (T)	1,321	68	5.2%	68	5.2%
Newport (V)	543	45	8.3%	45	8.3%
Norway (T)	740	0	0.0%	0	0.0%
Ohio (T)	962	52	5.4%	52	5.4%
Poland (V)	464	7	1.4%	7	1.4%
Russia (T)	1,702	34	2.0%	34	2.0%
Salisbury (T)	1,830	32	1.7%	32	1.7%
Schuyler (T)	3,296	24	0.7%	24	0.7%
Stark (T)	714	57	8.0%	57	8.0%
Warren (T)	1,029	0	0.0%	0	0.0%
Webb (T)	1,797	174	9.7%	174	9.7%
West Winfield (V)	733	17	2.3%	17	2.3%
Winfield (T)	1,164	22	1.9%	22	1.9%
Herkimer County (Total)	**60,139**	**4,238**	**7.0%**	**5,701**	**9.5%**

Sources: U.S. Census Bureau 2010, 2020; Herkimer County, NY 2019
Note: C = City; T = Town; V = Village; % = Percent

In addition, displaced populations were estimated for the 1-percent annual chance flood event. It is important to note that the impacts to the households in the FEMA flood hazard area are assessed using the riverine flood model in Hazus. Using 2010 U.S. Census data, Hazus estimates 389 people may seek short-term sheltering. These statistics, by jurisdiction, are presented in Table 5.4.5-5

Table 5.4.5-5. ***Estimated Population Seeking Short-Term Shelter from the 1-percent Annual Chance*** Flood Event

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	1-Percent Annual Chance Flood Event	
		Displaced Population	Persons Seeking Short-Term Sheltering
Cold Brook (V)	250	34	10
Columbia (T)	1,569	18	2
Danube (T)	953	10	2
Dolgeville (V)	2,042	314	41
Fairfield (T)	1,197	2	0
Frankfort (T)	4,691	61	18
Frankfort (V)	2,320	91	12
German Flatts (T)	2,202	43	10
Herkimer (T)	2,332	36	9
Herkimer (V)	7,234	127	20
Ilion (V)	7,646	2,660	136
Litchfield (T)	1,444	43	4
Little Falls (C)	4,605	10	4
Little Falls (T)	1,497	6	2
Manheim (T)	1,040	17	0
Middleville (V)	407	39	3
Mohawk (V)	2,415	122	18
Newport (T)	1,321	63	7
Newport (V)	543	78	9
Norway (T)	740	0	0
Ohio (T)	962	54	4
Poland (V)	464	3	2
Russia (T)	1,702	43	5
Salisbury (T)	1,830	26	9
Schuyler (T)	3,296	30	16
Stark (T)	714	51	5
Warren (T)	1,029	0	0
Webb (T)	1,797	168	24
West Winfield (V)	733	27	11
Winfield (T)	1,164	17	5
Herkimer County (Total)	**60,139**	**4,193**	**389**

Sources: U.S. Census Bureau 2010, FEMA 2019
Note: C = City; T = Town; V = Village; % = Percent

Cascading impacts may also include exposure to pathogens such as mold. After flood events, excess moisture and standing water contribute to the growth of mold in buildings. Mold may present

a health risk to building occupants, especially those with already compromised immune systems such as infants, children, the elderly and pregnant women. The degree of impact will vary and is not strictly measurable. Mold spores can grow in as short a period as 24-48 hours in wet and damaged areas of buildings that have not been properly cleaned. Very small mold spores can easily be inhaled, creating the potential for allergic reactions, asthma episodes, and other respiratory problems. Buildings should be properly cleaned and dried out to safely prevent mold growth (CDC 2020).

Molds and mildews are not the only public health risk associated with flooding. Floodwaters can be contaminated by pollutants such as sewage, human and animal feces, pesticides, fertilizers, oil, asbestos, and rusting building materials. Common public health risks associated with flood events also include:

- Unsafe food
- Contaminated drinking and washing water and poor sanitation
- Mosquitos and animals
- Carbon monoxide poisoning
- Secondary hazards associated with re-entering/cleaning flooded structures
- Mental stress and fatigue

Current loss estimation models such as Hazus are not equipped to measure public health impacts. The best level of mitigation for these impacts is to be aware that they can occur, educate the public on prevention, and be prepared to deal with these vulnerabilities in responding to flood events.

Flash Flooding

Flash flooding events can displace populations along steep topography particularly in cases when flood waters surge into residential properties or alter the terrain into unsafe conditions requiring evacuation. Information regarding the Herkimer County vulnerability to flash flooding is not available at this time.

Stormwater and Urban Flooding

Urban and stormwater flooding impacts are generally limited to roadways with underlying culverts. In various communities, poor drainage and rainstorms lead to localized flooding on various streets and in residential developments. This type of flooding could cause persons to become isolated or displaced from their homes.

Ice Jam Flooding

According to the historical records in Herkimer County, there have been a number of ice jam flooding events. Ice jam flooding causes riverine flood events on Bellinger Brook; East Canada, Fulmer, Moyer, Steele, and West Canada Creeks; and the Mohawk River. Ice jam and/or riverine flooding affect most municipalities. The Mohawk River Basin and its sub-basins are susceptible to repetitive flooding from

riverine/flash floods, severe storm system overload, snowmelt, and ice jams. (Herkimer County, NY 2017) The impacts of these events include road closure and detours as well as impacts to infrastructure.

Dam Failure Flooding

Dam failure will have similar impacts to flood events on persons within the County. See Section 5.4.1 for further details regarding the dam failure hazard.

Impact on General Building Stock

After considering the population exposed and potentially vulnerable to the flood hazard, the built environment was evaluated. Exposure includes those buildings located in the flood hazard areas. Potential damage is the modeled loss that could occur to the exposed inventory, including structural and content replacement cost values.

Riverine Flooding

Table 5.4.5-6 summarizes the number of structures located in the 1-percent and 0.2-percent annual chance flood events by jurisdiction. In summary, there are 2,116 buildings located in the 1-percent annual chance flood boundary with an estimated $938 million of replacement cost value (i.e., building and content replacement costs). In total, this represents approximately 6.9-percent of the County's total general building stock inventory. There are 2,664 buildings located in the 0.2-percent annual chance flood boundary with an estimated $1.2 billion of building stock and contents exposed. This represents approximately 9.9-percent of the County's total general building stock inventory.

The Hazus flood model estimated potential damages to the buildings in Herkimer County at the structure level using the custom structure inventory developed for this HMP and the depth grid generated using the effective DFIRM data. The potential damage estimated by Hazus to the general building stock inventory associated with the 1-percent annual chance flood is approximately $104 million or 0.9-percent of the total building stock improvement value. The Town of Webb has the greatest amount of estimated building loss—approximately $33.4 million (i.e., 2.4-percent of the total replacement cost value). Refer to Table 5.4.5-7 for the estimated losses by jurisdiction.

Table 5.4.5-6. Estimated General Building Stock Located in the 1- and 0.2-Percent Annual Chance Flood Event

Jurisdiction	Total Number of Buildings	Total Replacement Cost Value (RCV)	Number of Buildings Located in the 1-percent Annual Chance Flood Area	% Total	Total Replacement Cost of Buildings in 1-percent Annual Chance Flood Area	% Total	Number of Buildings Located in the 0.2-percent Annual Chance Flood Area	% Total	Total Replacement Cost of Buildings in the 0.2-percent Annual Chance Flood Area	% Total
Cold Brook (V)	132	$31,447,000	15	11.2%	$3,916,047	12.5%	15	11.2%	$3,916,047	12.5%
Columbia (T)	714	$233,619,000	15	2.1%	$4,176,933	1.8%	15	2.1%	$4,176,933	1.8%
Danube (T)	491	$138,056,000	13	2.7%	$14,412,379	10.4%	17	3.4%	$15,419,275	11.2%
Dolgeville (V)	836	$380,709,000	121	14.4%	$51,841,822	13.6%	125	15.0%	$55,007,948	14.4%
Fairfield (T)	552	$167,531,000	2	0.3%	$560,634	0.3%	2	0.3%	$560,634	0.3%
Frankfort (T)	2,063	$809,592,000	35	1.7%	$15,051,472	1.9%	37	1.8%	$15,891,540	2.0%
Frankfort (V)	971	$419,877,000	37	3.8%	$19,556,104	4.7%	73	7.5%	$37,369,170	8.9%
German Flatts (T)	1,074	$329,725,000	20	1.9%	$6,733,783	2.0%	26	2.4%	$9,377,846	2.8%
Herkimer (T)	1,098	$449,516,000	21	2.0%	$6,461,595	1.4%	22	2.0%	$6,556,488	1.5%
Herkimer (V)	2,653	$1,713,408,000	66	2.5%	$44,347,526	2.6%	469	17.7%	$231,631,665	13.5%
Ilion (V)	2,779	$1,278,193,000	842	30.3%	$451,049,805	35.3%	915	32.9%	$489,743,018	38.3%
Litchfield (T)	757	$274,972,000	16	2.2%	$6,053,950	2.2%	16	2.2%	$6,053,950	2.2%
Little Falls (C)	1,848	$1,054,936,000	7	0.4%	$15,576,516	1.5%	10	0.5%	$28,257,770	2.7%
Little Falls (T)	690	$248,266,000	5	0.8%	$1,831,229	0.7%	6	0.8%	$2,177,472	0.9%
Manheim (T)	657	$217,981,000	13	2.0%	$4,061,585	1.9%	14	2.1%	$4,346,770	2.0%
Middleville (V)	250	$105,595,000	22	9.0%	$16,776,300	15.9%	22	9.0%	$16,776,300	15.9%
Mohawk (V)	1,092	$433,485,000	46	4.2%	$16,986,780	3.9%	62	5.6%	$22,651,734	5.2%
Newport (T)	526	$180,332,000	25	4.7%	$7,594,861	4.2%	25	4.7%	$7,594,861	4.2%
Newport (V)	263	$98,222,000	24	9.3%	$9,608,471	9.8%	24	9.3%	$9,608,471	9.8%
Norway (T)	404	$134,191,000	0	0.0%	$1,276	0.0%	0	0.0%	$1,276	0.0%
Ohio (T)	1,039	$272,235,000	86	8.3%	$33,569,754	12.3%	86	8.3%	$33,569,754	12.3%
Poland (V)	210	$100,894,000	3	1.5%	$704,462	0.7%	3	1.5%	$704,462	0.7%

Jurisdiction	Total Number of Buildings	Total Replacement Cost Value (RCV)	Number of Buildings Located in the 1-percent Annual Chance Flood Area	% Total	Total Replacement Cost of Buildings in 1-percent Annual Chance Flood Area	% Total	Number of Buildings Located in the 0.2-percent Annual Chance Flood Area	% Total	Total Replacement Cost of Buildings in the 0.2-percent Annual Chance Flood Area	% Total
Russia (T)	1,106	$318,980,000	33	3.0%	$9,284,659	2.9%	33	3.0%	$9,284,659	2.9%
Salisbury (T)	990	$258,689,000	15	1.5%	$3,844,403	1.5%	15	1.5%	$3,844,403	1.5%
Schuyler (T)	1,542	$467,196,000	12	0.8%	$4,414,304	0.9%	12	0.8%	$4,461,715	1.0%
Stark (T)	351	$82,011,000	28	8.1%	$5,974,220	7.3%	28	8.1%	$5,974,220	7.3%
Warren (T)	461	$230,094,000	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Webb (T)	4,220	$1,396,251,000	571	13.5%	$174,151,203	12.5%	571	13.5%	$174,151,203	12.5%
West Winfield (V)	389	$194,977,000	10	2.5%	$4,611,365	2.4%	10	2.5%	$4,611,365	2.4%
Winfield (T)	497	$195,070,000	10	2.0%	$4,414,058	2.3%	10	2.0%	$4,414,058	2.3%
Herkimer County (Total)	**30,655**	**$12,216,050,000**	**2,116**	**6.9%**	**$937,567,498**	**7.7%**	**2,664**	**8.7%**	**$1,208,135,009**	**9.9%**

Source: Census 2010, 2020; FEMA 2019

Note: C = City; T = Town; V = Village; % = Percent

***Table** 5.4.5-7. **Estimated General Building Stock Potential Loss to the** 1-Percent Annual Chance Flood Event*

Jurisdiction	Total Replacement Cost Value (RCV)	All Occupancies		Residential		Commercial		Agricultural, Industrial, Religious, Education and Government	
		Estimated Loss	Percent of Total RCV	Estimated Loss	Percent of Total RCV	Estimated Loss	Percent of Total RCV	Estimated Loss	Percent of Total RCV
Cold Brook (V)	$31,447,000	$204,873	0.7%	$126,867	0	$48,000	0	$30,006	0.1%
Columbia (T)	$233,619,000	$797,915	0.3%	$470,219	0.2%	$55,000	0.0%	$272,696	0.1%
Danube (T)	$138,056,000	$1,878,001	1.4%	$124,001	0.1%	$729,000	0.5%	$1,025,000	0.7%
Dolgeville (V)	$380,709,000	$5,641,776	1.5%	$1,975,816	0.5%	$1,965,959	0.5%	$1,700,000	0.4%
Fairfield (T)	$167,531,000	$30,860	0.0%	$30,011	0.0%	$3	0.0%	$846	0.0%
Frankfort (T)	$809,592,000	$1,737,544	0.2%	$1,306,348	0.2%	$49,033	0.0%	$382,164	0.0%
Frankfort (V)	$419,877,000	$2,328,070	0.6%	$1,699,266	0.4%	$246,428	0.1%	$382,376	0.1%
German Flatts (T)	$329,725,000	$436,560	0.1%	$244,207	0.1%	$24,334	0.0%	$168,019	0.1%
Herkimer (T)	$449,516,000	$1,408,250	0.3%	$1,088,144	0.2%	$315,701	0.1%	$4,405	0.0%
Herkimer (V)	$1,713,408,000	$295,977	0.0%	$148,978	0.0%	$31,013	0.0%	$115,987	0.0%
Ilion (V)	$1,278,193,000	$33,850,465	2.6%	$19,490,521	1.5%	$5,625,619	0.4%	$8,734,324	0.7%
Litchfield (T)	$274,972,000	$639,975	0.2%	$356,622	0.1%	$0	0.0%	$283,354	0.1%
Little Falls (C)	$1,054,936,000	$552,792	0.1%	$128,242	0.0%	$143,943	0.0%	$280,607	0.0%
Little Falls (T)	$248,266,000	$148,209	0.1%	$17,023	0.0%	$79,112	0.0%	$52,074	0.0%
Manheim (T)	$217,981,000	$303,895	0.1%	$301,895	0.1%	$1,000	0.0%	$1,000	0.0%
Middleville (V)	$105,595,000	$2,395,871	2.3%	$1,354,948	1.3%	$1,040,906	1.0%	$17	0.0%
Mohawk (V)	$433,485,000	$288,311	0.1%	$217,559	0.1%	$64,746	0.0%	$6,006	0.0%
Newport (T)	$180,332,000	$1,056,430	0.6%	$962,011	0.5%	$69,783	0.0%	$24,637	0.0%
Newport (V)	$98,222,000	$1,760,156	1.8%	$558,561	0.6%	$549,816	0.6%	$651,779	0.7%
Norway (T)	$134,191,000	$131	0.0%	$131	0.0%	$0	0.0%	$0	0.0%
Ohio (T)	$272,235,000	$11,082,686	4.1%	$4,938,798	1.8%	$1,468,005	0.5%	$4,675,883	1.7%
Poland (V)	$100,894,000	$2,322	0.0%	$1,663	0.0%	$659	0.0%	$0	0.0%
Russia (T)	$318,980,000	$601,017	0.2%	$559,888	0.2%	$9,054	0.0%	$32,075	0.0%

Jurisdiction	Total Replacement Cost Value (RCV)	All Occupancies		Residential		Commercial		Agricultural, Industrial, Religious, Education and Government	
		Estimated Loss	Percent of Total RCV	Estimated Loss	Percent of Total RCV	Estimated Loss	Percent of Total RCV	Estimated Loss	Percent of Total RCV
Salisbury (T)	$258,689,000	$282,926	0.1%	$246,033	0.1%	$4,932	0.0%	$31,961	0.0%
Schuyler (T)	$467,196,000	$489,456	0.1%	$366,422	0.1%	$121,034	0.0%	$2,000	0.0%
Stark (T)	$82,011,000	$1,964,029	2.4%	$1,907,899	2.3%	$0	0.0%	$56,129	0.1%
Warren (T)	$230,094,000	$261	0.0%	$261	0.0%	$0	0.0%	$0	0.0%
Webb (T)	$1,396,251,000	$33,431,452	2.4%	$30,287,467	2.2%	$2,015,985	0.1%	$1,128,000	0.1%
West Winfield (V)	$194,977,000	$285,986	0.1%	$113,986	0.1%	$54,000	0.0%	$118,000	0.1%
Winfield (T)	$195,070,000	$278,386	0.1%	$140,661	0.1%	$43,871	0.0%	$93,853	0.0%
Herkimer County (Total)	**$12,216,050,000**	**$104,174,584**	**0.9%**	**$69,164,449**	**0.6%**	**$14,756,937**	**0.1%**	**$20,253,198**	**0.2%**

Sources: Hazus v5.1; Census 2010; FEMA 2019

Note: C = City; T = Town; V = Village; % = Percent

NFIP Statistics

FEMA provided a list of properties with NFIP policies, past claims, and multiple claims. According to FEMA, a repetitive loss (RL) property is a NFIP-insured structure that has had at least two paid flood losses of more than $1,000 in any 10-year period since 1978. A severe repetitive loss (SRL) property is a NFIP-insured structure that has had four or more separate claim payments made under a standard flood insurance policy, with the amount of each claim exceeding $5,000 and with the cumulative amount of such claims payments exceeding $20,000; or at least two separate claims payments made under a standard flood insurance policy with the cumulative amount of such claim payments exceed the fair market value of the insured building on the day before each loss (FEMA 2018).

Table 5.4.5-8 summarizes the NFIP policies, claims, and repetitive loss statistics for Herkimer County. The majority of the RL and SRL properties are single-family residences. This information is current as of January 26, 2023.

Table 5.4.5-8. *NFIP Policies, Claims, and Repetitive Loss Statistics*

Municipality	Number of Policies	Total Claims	Total Paid Claims	Number of NFIP Repetitive Loss Properties	Number of FMA Repetitive Loss Properties	Number of NFIP Severe Repetitive Loss Properties	Number of FMA Severe Repetitive Loss Properties
Cold Brook, Village of	4	1	$1,511	0	0	0	0
Columbia, Town of	1	0	$-	0	0	0	0
Danube, Town of	2	2	$10,372	0	0	0	0
Dolgeville, Village of	19	57	$660,375	5	1	1	1
Fairfield, Town of	1	0	$-	0	0	0	0
Frankfort, Town of	4	3	$6,460	0	0	0	0
Frankfort, Village of	18	8	$23,205	1	0	0	0
German Flatts, Town of	7	12	$90,140	0	0	0	0
Herkimer, Town of	4	7	$28,081	0	0	0	0
Herkimer, Village of	24	13	$160,524	0	0	0	0
Ilion, Village of	158	177	$1,289,447	24	0	0	0
Litchfield, Town of	5	5	$14,183	1	0	0	0
Little Falls, City of	16	18	$548,518	3	0	0	0
Little Falls, Town of	1	4	$14,372	0	0	0	0
Manheim, Town of	3	8	$143,842	1	0	0	0
Middleville, Village of	5	12	$377,114	4	1	1	1
Mohawk, Town of	0	1	$455	5	1	0	1
Mohawk, Village of	11	34	$865,284	1	0	0	0
Newport, Town of	5	4	$212,001	2	0	0	0
Newport, Village of	6	11	$126,599	0	0	0	0
Ohio, Town of	1	2	$29,449	0	0	0	0
Otsego, Town of	0	1	$865	0	0	0	0
Poland, Village of	1	2	$63,905	2	0	0	0

Municipality	Number of Policies	Total Claims	Total Paid Claims	Number of NFIP Repetitive Loss Properties	Number of FMA Repetitive Loss Properties	Number of NFIP Severe Repetitive Loss Properties	Number of FMA Severe Repetitive Loss Properties
Richfield, Town of	0	3	$83,093	0	0	0	0
Russell Gardens, Village of	0	1	$-	0	0	0	0
Russia, Town of	5	8	$670,086	2	0	0	0
Salisbury, Town of	7	4	$349,450	0	0	0	0
Schuyler, Town of	4	3	$36,402	0	0	0	0
Stark, Town of	9	11	$126,638	0	0	0	0
Webb, Town of	42	0	$-	0	0	0	0
West Winfield, Village of	0	1	$6,567	0	0	0	0
Winfield, Town of	1	1	$60,692	0	0	0	0
Unknown	42	0	$-	N/A	N/A	N/A	N/A
Herkimer County (Total)	51	414	$5,999,632	**51**	**3**	**2**	**3**

Source: RL and SRL: FEMA Region 2, 2023; Claims and policies: HUDEX,1/26 2023
NOTE: Occupancy type of structures was not provided by FEMA.

Flash Flooding

Flash floods occur within a few minutes or hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice jam. Flash floods can roll boulders, tear out trees, trigger mud slides, destroy buildings and bridges, and scour out new channels. Because flash floods typically occur along rivers, coastlines, and low-lying, all structures located in and around these are susceptible to damages from flash floods. Secondary impacts of flash floods can also damage buildings and infrastructure outside the floodplain (Wyoming 2021) (NWS, Flash floods and floods…the Awesome Power! 2021) (Melina and Rowan 2010).

Stormwater and Urban Flooding

The impacts to the general building stock as a result of stormwater and urban flooding is similar to the impacts of other types of flooding as described above. Stormwater flooding can damage public and private properties, destroy stormwater infrastructure, and impact roadways and utilities (NOAA, Understanding Stormwater Inundation 2021). Stormwater and urban flooding can occur in areas outside of the floodplain, so public and private properties not in the floodplain area also vulnerable to stormwater and urban flooding.

Ice Jam Flooding

The water ice jams hold back can lead to riverine or flash flooding upstream from the ice jam. If the ice jam breaks, flash flooding can occur downstream (NOAA, Ice Jams & Flooding 2015). Structures located near rivers and streams are most at risk of flooding from ice jams (Consortium 2021).

Dam Failure Flooding

The dams located in Herkimer County can have a varying impact on the general building stock. Communities that contain high hazard dams are more at risk for building stock destruction from flooding. The amount of flooding that these structures can experience depends on many factors including the reservoir size, and the time of day and season the breach occurs. Structures that are at a lower elevation from the reservoir will be most vulnerable to flooding from dam failure.

Impact on Critical Facilities and Community Lifelines

It is important to determine the critical facilities and infrastructure that may be at risk to flooding, and who may be impacted should damage occur. Critical services during and after a flood event may not be available if critical facilities are directly damaged or transportation routes to access these critical facilities are impacted. Roads that are blocked or damaged can isolate residents and can prevent access throughout Herkimer County to many service providers needing to reach vulnerable populations or to make repairs.

Critical facility exposure to the flood hazard was examined. Table 5.4.5-9 lists the critical facilities and number of lifelines, within the 1-percent and 0.2-percent annual chance flood boundaries. Of the 106 critical facilities located in the 1-percent annual chance flood event boundary, the greatest number are safety and security; and transportation facilities. here are 108 critical facilities located

in the 0.2-percent annual chance flood event boundary. A majority of the critical facilities located in the 1-percent and 0.2-percent annual chance flood event boundaries are in the Village of Ilion and Town of Webb, as shown in Table 5.4.5-9 and Table Table 5.4.5-10.

In cases where short-term functionality is impacted by flooding, other facilities of neighboring municipalities may need to increase support response functions during a disaster event. Mitigation planning should consider means to reduce flood impacts to critical facilities and ensure sufficient emergency and school services remain when a significant event occurs.

Table** 5.4.5-9 **Critical Facilities and Lifelines Located in the 1-Percent and 0.2-Percent Annual Chance Event Floodplain

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the 1-percent Annual Chance Flood Event Hazard Area	Number of Lifelines Located in the 0.2-percent Annual Chance Flood Event Hazard Area
Communications	29	3	3
Energy	33	1	1
Food, Water, Shelter	33	3	3
Hazardous Materials	22	1	2
Health and Medical	27	3	3
Safety and Security	248	40	40
Transportation	125	55	56
Herkimer County (Total)	**517**	**106**	**108**

Source: FEMA 2019; Herkimer County GIS 2022

***Table** 5.4.5-10**. Critical Facilities and Lifeline Facilities Located in the 1-Percent Annual** Chance Flood Event Hazard Area by Jurisdiction*

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the 1-Percent Annual Chance Flood Event Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Cold Brook (V)	2	2	2	100.0%	2	100.0%
Columbia (T)	9	9	1	11.1%	1	11.1%
Danube (T)	10	10	3	30.0%	3	30.0%
Dolgeville (V)	18	18	0	0.0%	0	0.0%
Fairfield (T)	9	9	0	0.0%	0	0.0%
Frankfort (T)	34	34	4	11.8%	4	11.8%
Frankfort (V)	15	14	1	6.7%	1	7.1%
German Flatts (T)	17	17	2	11.8%	2	11.8%
Herkimer (T)	16	16	1	6.3%	1	6.3%
Herkimer (V)	49	45	5	10.2%	5	11.1%
Ilion (V)	21	21	12	57.1%	12	57.1%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the 1-Percent Annual Chance Flood Event Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Litchfield (T)	7	7	1	14.3%	1	14.3%
Little Falls (C)	32	29	4	12.5%	4	13.8%
Little Falls (T)	11	11	0	0.0%	0	0.0%
Manheim (T)	14	14	3	21.4%	3	21.4%
Middleville (V)	8	8	1	12.5%	1	12.5%
Mohawk (V)	13	11	4	30.8%	4	36.4%
Newport (T)	12	12	1	8.3%	1	8.3%
Newport (V)	8	8	3	37.5%	3	37.5%
Norway (T)	10	10	0	0.0%	0	0.0%
Ohio (T)	24	24	9	37.5%	9	37.5%
Poland (V)	12	12	1	8.3%	1	8.3%
Russia (T)	31	31	5	16.1%	5	16.1%
Salisbury (T)	21	21	5	23.8%	5	23.8%
Schuyler (T)	21	21	6	28.6%	6	28.6%
Stark (T)	18	18	9	50.0%	9	50.0%
Warren (T)	11	11	0	0.0%	0	0.0%
Webb (T)	52	52	16	30.8%	16	30.8%
West Winfield (V)	13	11	1	7.7%	1	9.1%
Winfield (T)	11	11	6	54.5%	6	54.5%
Herkimer County (Total)	**529**	**517**	**106**	**20.0%**	**106**	**20.5%**

Source: FEMA 2019, Herkimer County, NY 2022

Note: C = City; T = Town; V = Village; % = Percent

Table 5.4.5-11. Critical Facilities and Lifeline Facilities Located in the 0.2-Percent Annual Chance Flood Event Hazard Area by Jurisdiction

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the 0.2-Percent Annual Chance Flood Event Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Cold Brook (V)	2	2	2	100.0%	2	100.0%
Columbia (T)	9	9	1	11.1%	1	11.1%
Danube (T)	10	10	3	30.0%	3	30.0%
Dolgeville (V)	18	18	0	0.0%	0	0.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the 0.2-Percent Annual Chance Flood Event Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Fairfield (T)	9	9	0	0.0%	4	44.4%
Frankfort (T)	34	34	4	11.8%	1	2.9%
Frankfort (V)	15	14	1	6.7%	0	0.0%
German Flatts (T)	17	17	3	17.6%	3	17.6%
Herkimer (T)	16	16	1	6.3%	1	6.3%
Herkimer (V)	49	45	6	12.2%	6	13.3%
Ilion (V)	21	21	12	57.1%	12	57.1%
Litchfield (T)	7	7	1	14.3%	1	14.3%
Little Falls (C)	32	29	4	12.5%	4	13.8%
Little Falls (T)	11	11	0	0.0%	0	0.0%
Manheim (T)	14	14	3	21.4%	3	21.4%
Middleville (V)	8	8	1	12.5%	1	12.5%
Mohawk (V)	13	11	4	30.8%	4	36.4%
Newport (T)	12	12	1	8.3%	1	8.3%
Newport (V)	8	8	3	37.5%	3	37.5%
Norway (T)	10	10	0	0.0%	0	0.0%
Ohio (T)	24	24	9	37.5%	9	37.5%
Poland (V)	12	12	1	8.3%	1	8.3%
Russia (T)	31	31	5	16.1%	5	16.1%
Salisbury (T)	21	21	5	23.8%	5	23.8%
Schuyler (T)	21	21	6	28.6%	6	28.6%
Stark (T)	18	18	9	50.0%	9	50.0%
Warren (T)	11	11	0	0.0%	0	0.0%
Webb (T)	52	52	16	30.8%	16	30.8%
West Winfield (V)	13	11	1	7.7%	1	9.1%
Winfield (T)	11	11	6	54.5%	6	54.5%
Herkimer County (Total)	**529**	**517**	**108**	**20.4%**	**108**	**20.9%**

Source: FEMA 2019, Herkimer County, NY 2022
Note: C = City; T = Town; V = Village; % = Percent

Flash Flooding

Information regarding the vulnerability to flash flooding is not available at this time.

Stormwater and Urban Flooding

Information regarding the vulnerability to stormwater and urban flooding is not available at this time.

Ice Jam Flooding

Similar to the impacts on general building stock, damage to critical facilities will vary for communities depending on the location of the ice jam and proximity of critical facilities to the ice jams. Major roadways can also be impacted because of inundation or debris carried by flooding, leading to road closures and disruption in services provided by or to critical facilities. Because ice jams occur in the colder months, recovery and repairs to damaged areas can take longer due to colder conditions.

Dam Failure Flooding

Similar to the impacts on the general building stock, damage to critical facilities will vary for communities depending on the distribution of their dams and proximity of critical facilities to these dams and their downstream inundation area. Major roadways within Herkimer County may also be impacted by dam failure because of standing floodwaters or debris carried by the flooding. Roadblocks in transportation corridors can create disruption in the services provided to or by critical facilities. This puts communities in the County at greater risk if proper warning time is not provided to the community if a dam failure were to occur.

Impact on the Economy

Flood events can significantly impact the local and regional economy. This includes but is not limited to general building stock damages and associated tax loss, impacts to utilities and infrastructure, business interruption, impacts on tourism, and impacts on the tax base to Herkimer County. In areas that are directly flooded, renovations of commercial and industrial buildings may be necessary, disrupting associated services. Refer to the 'Impact on General Building Stock' subsection earlier which discusses direct impacts to buildings in Herkimer County. Other economic components such as loss of facility use, functional downtime and socio-economic factors are less measurable with a high degree of certainty.

Riverine Flooding

Flooding can cause extensive damage to public utilities and disruptions to delivery of services. Loss of power and communications may occur, and drinking water and wastewater treatment facilities may be temporarily out of operation.

Debris management may also be a large expense after a flood event. Hazus estimates the amount of debris generated from the 1-percent annual chance event. The model breaks down debris into three categories: (1) finishes (dry wall, insulation, etc.); (2) structural (wood, brick, etc.) and (3) foundations (concrete slab and block, rebar, etc.). The distinction is made because of the different types of equipment needed to handle the debris. Table 5.3.2-35 summarizes the debris Hazus estimates for these events. As a result of the 1-percent annual chance event, Hazus estimates approximately 10,424 tons of debris will be generated in total.

Table 5.4.5-12 ***Estimated Debris Generated from the 1-percent Annual Chance Flood Event***

Jurisdiction	1-Percent Annual Chance Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Cold Brook (V)	15	9	2	4
Columbia (T)	86	30	29	27
Danube (T)	19	8	6	5
Dolgeville (V)	330	141	111	78
Fairfield (T)	4	3	1	1
Frankfort (T)	185	66	69	50
Frankfort (V)	249	122	72	54
German Flatts (T)	24	16	4	5
Herkimer (T)	137	48	47	42
Herkimer (V)	15	9	3	3
Ilion (V)	1,987	1,631	216	140
Litchfield (T)	23	14	4	5
Little Falls (C)	32	11	13	8
Little Falls (T)	1	0	0	0
Manheim (T)	35	14	11	10
Middleville (V)	156	60	52	44
Mohawk (V)	29	19	5	5
Newport (T)	127	42	47	38
Newport (V)	93	37	30	26
Norway (T)	0	0	0	0
Ohio (T)	1,716	287	793	637
Poland (V)	0	0	0	0
Russia (T)	51	26	11	13
Salisbury (T)	45	17	14	14
Schuyler (T)	45	17	14	13
Stark (T)	363	91	144	129
Warren (T)	0	0	0	0
Webb (T)	4,624	1,595	1,694	1,335
West Winfield (V)	10	7	1	2
Winfield (T)	24	11	7	6
Herkimer County (Total)	**10,424**	**4,331**	**3,400**	**2,694**

Sources: Hazus v5.1; Census 2010; FEMA 2019
Note: C = City; T = Town; V = Village

Flash Flooding

The economic impacts of flash floods are similar to the impacts of riverine floods; however, flash floods occur with little to no warning which prevents businesses and homeowners to prepare for flooding. Impacts of a flash flood can include damaged or closed roadways, utility failures, and structural damages. Overall economic impacts include loss of business function; damaged roads, bridges, buildings, and cars; utility interruptions; and expended resources to assist with recovery efforts (Wyoming 2021) (eSchoolToday 2021).

Stormwater and Urban Flooding

The economic impacts of stormwater and urban floods are similar to the impacts of riverine floods. In addition to damaging businesses and homes, this type of flooding can also lead to drinking water contamination, destroy septic system drainfields, impair tourism and recreational businesses, and disrupt critical infrastructure systems (Council 1999) (Environment 2021).

Ice Jam Flooding

Flooding from ice jams can have detrimental impacts on property and infrastructure, including damages to homes, bridges, roads, and businesses. Similar to other types of flooding, ice jam flooding can close roadways and cause power outages, limiting operations of businesses in the impacted areas. A significant ice jam flood event could cause millions of dollars in damages (Das, Reed and Lindenschmidt 2018).

Dam Failure Flooding

Dam failures have historically occurred in Herkimer County and can impact the local and regional economy. A failure of one of the 36 high hazard dams in the County could cause significant impacts. When Hurricane Floyd passed through Herkimer County in 1999, the Cortlandt Lake Dam failed due to the amount of rain and erosion (NPDP 2021). An event like Hurricane Floyd could lead to more failures, leaving the County or dam owners responsible for repairing damages and cleanup.

Impact on the Environment

Flood extents for the 1- and 0.2-percent annual flood events will continue to evolve alongside natural occurrences such as sea level rise, climate change, and/or severity of storms. Further, residents living in and around areas of wildfire may be at increased risk of flooding in the future due to changes in the natural landscape.

Riverine Flooding

Flood events will inevitably impact Herkimer County's natural and local environment. Severe flooding not only influences the habitat of these natural land areas, but it can also be disruptive to species that reside in these natural habitats.

Flash Flooding

Like riverine flooding, flash floods impact the natural and local environment. The surrounding environment may not be able to withstand and recover from flash flood events. Flash floods can destroy wildlife habitats, pollute rivers and streams, carry sediment and silt that can impact water quality, destroy crops and farms, uproot trees, and cause erosion of streambanks and other areas (Wyoming 2021), (eSchoolToday 2021) (New York City 2019).

Stormwater and Urban Flooding

Stormwater and urban flooding events can also impact the natural environment. Stormwater picks up and carries pollutants and other hazardous materials into waterways causing poor water quality, contaminated waters, and impacting fish and plants. Stormwater can also erode stream channels,

increase sediment and debris in waterbodies, and destroy fish and wildlife habitats (Environment 2021).

Ice Jam Flooding

Like other types of flood, the environmental impacts of ice jams can include water quality issues, destroy wildlife habitats, pollution, uproot trees and vegetation, and cause erosion along streambanks and other areas.

Dam Failure Flooding

The environmental impacts of a dam failure can include significant water-quality and debris-disposal issues. Flood waters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooded waterway. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals get added to flood waters. Hazardous materials may be released and distributed widely across the floodplain. Water supply and wastewater treatment facilities could be offline for weeks. After the flood waters subside, contaminated and flood-damaged building materials and contents must be properly disposed of. Contaminated sediment must be removed from buildings, yards, and properties. In addition, severe erosion is likely; such erosion can negatively impact local ecosystems.

Cascading Impacts on Other Hazards

Riverine, Flash, and Stormwater/Urban Flooding

Flood events can exacerbate the impacts of disease outbreak and landslides. After a flooding event, runoff can pick up and transport pollutants from wildlife and soils. Such organisms can then appear in water drinking facilities and transmit illnesses water-borne and vector diseases to the population. Flooding can also put additional strain on dams, which may lead to dam failure. More information about these hazards of concern can be found in Section 5.4.1 (Dam Failure) and Section 5.4.2 (Disease Outbreak).

Ice Jam and Dam Failure Flooding

Dam failures and ice jams can cause severe downstream flooding, depending on the magnitude of the failure. Other potential impacts are landslides and erosion. They can also cause environmental impacts if floodwaters flow through hazardous material facilities and bring those materials to other areas.

Future Changes That May Impact Vulnerability

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development

- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

As discussed and illustrated in Section 4 (County Profile), areas targeted for future growth and development have been identified across the County. New development that has occurred in the last five years within the County, and potential future development in the next five years as identified by the County and each municipality, is included in Section 4, County Profile (Volume I) as well as the jurisdictional annexes in Section 9 (Volume II), along with an indication of proximity to known hazard zones.

Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 6.8 percent since 2010. The County's population is anticipated to decrease over the next decade by 6.6 percent decrease by 2030). Changes in population density in flood hazard areas can affect the vulnerability of the population to flood impacts. Refer to Section 4 (County Profile), which includes a discussion on population trends for the County.

Climate Change

As discussed above, most studies project that the State of New York will see an increase in average annual temperatures and precipitation. It is anticipated that Herkimer County will continue to experience direct and indirect impacts of flooding events annually that may induce secondary hazards such as infrastructure deterioration or failure, utility failures, power outages, water quality and supply concerns, and transportation delays, accidents, and inconveniences.

Change of Vulnerability Since the 2017 HMP

Since the 2017 HMP was drafted, Hazus v5.1 was used to assess the losses in the County to the overall risk from 100-year flood risk. During the exposure analyses, both the 100-year and 500-year flood risks were processed to evaluate the County's exposure risk for critical facility and general building stock structures. Overall, this vulnerability assessment uses a more accurate and updated asset inventory which provides more accurate estimated exposure to the flood hazard.

5.4.1 Infestation and Invasive Species

Hazard Profile

Hazard Description

An infestation is defined as an invasion or overrun by parasites that attack plants, animals, and humans. Insect, fungi, and parasitic infestations can result in destruction of various natural habitats and cropland, impact human health, and cause disease and death among native plants, wildlife, and livestock. An infestation is the presence of pest organisms within an area or field, on the surface of a host, or in soil at numbers or quantities large enough to harm, threaten, or otherwise negatively affect native plants, animals, and humans. Pests are any organisms (insects, mammals, birds, parasite/pathogen, fungi, non-native species) that threaten other living species within an environment. Pests compete for natural resources and can transmit diseases to humans, crops, and livestock. Human populations are generally affected by insect or animal infestations that can lead to epidemics or endemics.

Invasive species are non-native species that can harm the environment, the economy, or human health. They may come from anywhere in the world, and as international trade increases, so does the rate of invasive species introductions. Invasive species threaten nearly every aspect of the world and are one of the greatest threats to New York State's biodiversity (NYSDEC n.d.). They can cause or contribute to the following:

- Habitat degradation and loss
- Loss of native fish, wildlife, and tree species
- Loss of recreational opportunities and income
- Crop damage, and diseases in humans and livestock (NYSDEC n.d.)

The Adirondack Park Invasive Plant Program (APIPP) serves as the Adirondack Partnership for Regional Invasive Species Management (PRISM), one of eight PRISMs across New York. APIPP services the northeastern section of New York State, including the northern half of Herkimer County. APIPP's mission is to work in partnership to minimize the impact of invasive species on the Adirondack region's communities, lands, and waters. APIPP is a partnership program founded in 1998 by The Nature Conservancy, New York State Department of Environmental Conservation (NYSDEC), New York State Department of Transportation and New York State Adirondack Park Agency, and it is housed under the Adirondack Chapter of The Nature Conservancy. Since APIPP's founding, the program has grown to include more than 30 partner organizations and hundreds of volunteers (APIPP 2023).

The Adirondack PRISM has identified the following invasive plant species of concern in the region:

- Autumn olive
- Bittersweet
- Bush honeysuckles

- Common buckthorn
- Common reed grass
- Cup plant
- Curly-leaf pondweed
- Eurasian watermilfoil
- European frog-bit
- Fanwort
- Garlic mustard
- Giant hogweed
- Glossy buckthorn
- Hydrilla
- Japanese angelica tree
- Japanese barberry
- Japanese stiltgrass
- Japanese tree lilac
- Mile-a-minute
- Multiflora rose
- Norway maple
- Porcelain berry
- Purple loosestrife
- Reed canary grass
- Scotch broom
- Slender false brome
- Starry stonewort
- Swallow-wort spp.
- Tree of heaven
- Variable-leaf watermilfoil
- Water chestnut
- Wineberry
- Winged burning bush
- Yellow iris (APIPP 2023)

The Adirondack PRISM has identified the following invasive animal species of concern in the region:

- Asian clam
- Asian longhorned beetle
- Beech leaf disease nematode
- Chinese mystery snail
- Emerald ash borer
- Eurasian boar
- Fishhook waterflea
- Hemlock wooly adelgid (HWA)
- Jumping worm
- Quagga mussel
- Round goby
- Rusty crayfish
- Spiny waterflea
- Spotted lanternfly
- Zebra mussel (APIPP 2023)

The Capital/Mohawk Region PRISM is hosted by the Cornell Cooperative Extension of Saratoga County. It includes the counties of Albany, Columbia, Montgomery, Rensselaer, Schenectady and portions of Fulton, Greene, Saratoga, Warren, Washington, and the southern half of Herkimer. The mission of Capital/Mohawk Prism is to detect, prevent, and control invasive species through direct action and education to protect biodiversity, the natural environment, economy, and quality of life (Capital Region PRISM 2019).

The Capital/Mohawk Region PRISM has identified the following invasive plant species of concern in the region:

- Sycamore Maple
- Hardy Kiwi, Taravine
- Silver Vine
- Chocolate Vine
- Italian Arum
- Slender False Brome
- Paper-mulberry
- Japanese Virgin's Bower
- Scotch Broom
- Pride-of-Rochester
- Chinese Yam
- Weeping Lovegrass
- Slender Leafy Spurge
- Castor-aralia
- Goldenrain Tree
- Perennial Pepperweed
- Chinese Bushclover
- Plume Poppy
- Wavyleaf Basketgrass
- Perilla Mint, Beefsteak Plant
- Oriental Red-tip
- Japanese Primrose
- European Dewberry
- Cutleaf Blackberry
- Gray Florist's Willow
- Sticky Sage
- Bog Bulrush
- Sapphireberry

- Linden Viburnum
- Japanese Maple
- Wild Chervil
- Small Carpetgrass
- Common Caraway
- Five-leaf Aralia
- Winter Creeper
- Leafy Spurge
- Giant Hogweed
- Policeman's Helmet, Himalayan Balsam
- Yellow Archangel
- Shrubby Bushclover/Lespedeza
- Yellow Garden Loosestrife
- Toringo Crabapple
- Chinese Silvergrass
- Nepalese Smartweed
- Mile-A-Minute Weed
- Amur Corktree
- Bamboo
- Kudzu
- Bradford/Callery Pear
- Giant Knotweed
- Jetbead
- Large Gray Willow
- Cup-plant
- Japanese Spiraea
- Japanese Tree-lilac
- Japanese Snowball
- Siebold's Viburnum
- Wisteria spp.
- Porcelainberry
- Narrowleaf Bittercress
- Wild Teasel, Fullers Teasel
- Lesser Celandine
- Japanese Hops
- Privet Species
- Japanese Stiltgrass
- Japanese Spurge
- Wineberry
- Norway Maple
- Bishop's Goutweed
- Tree-of-Heaven
- Garlic Mustard
- European Black Alder
- Mugwort
- Japanese Barberry
- Oriental Bittersweet
- Brown Knapweed
- Canada Thistle
- Cut-Leaved Teasel
- Autumn Olive
- Burning Bush
- Cypress Spurge
- Ground Ivy
- Honeysuckle
- Purple Loosestrife
- White Mulberry
- Wild Parsnip
- Reed Canary Grass
- Knotweed
- European/Common Buckthorn
- Black Locust
- Multiflora Rose
- Siberian Elm
- Swallow-wort
- Carolina fanwort
- Floating primrose willow
- Hydrilla
- Onerow yellowcress
- Parrot feather
- Sacred Lotus
- Uruguayan Primrose Willow
- Water Hyacinth
- Water Lettuce
- Waterwheel plant
- Brazilian elodea
- European frog-bit
- Starry stonewort
- Variable-leaf milfoil
- Flowering rush
- Yellow floating-heart
- Watercress
- Brittle naiad
- Common reed
- Curly-leaf pondweed
- Eurasian watermilfoil
- Purple loosestrife
- Water chestnut
- Yellow iris (Capital Region PRISM 2016)

The Capital/Mohawk Region PRISM has identified the following invasive animal species of concern in the region:

- Asian Longhorned Beetle
- European Fire Ant
- Asian Spongy Moth
- Southern Pine Beetle
- Beech Leaf Disease
- Nutria
- Eurasian Boar
- Spotted Lanternfly
- Oak Wilt
- Helmock Woolly Adelgid
- Emerald Ash Borer
- Elongate Hemlock Scale
- Crazy Snake Worm
- Spotted Wing Drosophila
- Brown Marmorated Stink Bug
- European Gypsy Moth
- Viburnum Leaf Beetle
- European Woodwasp
- Allium Leaf Miner
- Japanese Beetle
- Bitterling
- Eastern mosquitofish
- European stream valvata
- Fishhook Waterflea
- Guppy
- Mozambique tilapia
- New Zealand mudsnail
- Northern Snakehead
- Red swamp crayfish
- Redear sunfish
- Red-rim melania
- Tench
- Alewife
- Quagga mussel
- Round goby
- Sea lamprey
- Spiny waterflea
- White perch
- Asian clam
- Banded mysterysnail
- Bloody red shrimp
- Chinese mitten crab
- Chinese mysterysnail
- Didymo
- Mud bithynia (Faucet snail)
- Green sunfish
- Oriental weatherfish
- Red-eared Slider
- Grass carp
- Common carp
- Goldfish
- Rudd
- Rusty crayfish
- Zebra Mussel (Capital Region PRISM 2016)

New York State has been impacted by various past and present infestations, including high populations of mosquitoes, which can cause West Nile Virus (WNV); deer ticks, which can cause Lyme disease; and Asian longhorned beetles and hemlock woolly adelgid, which destroy trees. Other infestations that have affected the state include Eastern Equine Encephalitis, La Crosse Encephalitis, Powassan Virus, St. Louis Encephalitis, Western Equine Encephalitis, Emerald Ash Borer, and Sirex Woodwasp. Not all of these infestations have occurred in Herkimer County. The infestations and invasive species listed below merit attention.

Emerald Ash Borer

Emerald Ash Borer (EAB) is an invasive beetle from Asia and kills North American ash species (*Fraxinus* sp.), all of New York's ash trees are susceptible to EAB. The first EAB infestation in New York State was discovered in Cattaraugus County 2009. As of the summer of 2022, the presence of EAB has been confirmed in all New York counties except; Essex, Hamilton, and Lewis (NYSDEC 2021). The EAB is a small and very destructive beetle. It has four stages: adult, egg, larva, and pupa. The adult

beetle are roughly 3/8 to 5/8 inch long with metallic green wing covers and a coppery red or purple abdomen. They may be present from late May through early September but are most common in June and July. Signs of infection include tree canopy dieback, yellowing, and browning of leaves (NYSDEC 2021).

Hemlock Woolly Adelgid (HWA)

The adelgid uses long mouth parts to extract sap and nutrients from hemlock foliage, preventing free growth and causing needles to discolor from deep green to grayish green and to drop prematurely. Loss of new shoots and needles seriously impairs tree health. Infestation is usually fatal to the tree after several years. Wind, birds, other wildlife, and movement of infested host material (wood) by humans are all factors in dispersion of the adelgid (NYSDEC 2018). Hemlock wood is commonly used in barns and on farm building projects. Groves of hemlock trees provide habitat and cover for deer, ruffled grouse, turkey, rabbit, and snowshoe hare. Loss of hemlock groves can result in loss of cool, damp, and shaded microclimate that supports terrestrial plant communities. Losses can also result in warmer stream temperatures for fish and other aquatic species, thus harming them.

Spotted Lanternfly

The spotted lanternfly (*Lycorma deliculta*) is a planthopper native to China and Southeastern Asia. In the USA, spotted lanternfly is an invasive species that could be very devastating to some crops and hardwood trees. This insect *Spotted Lanternfly* Spotted lanternfly is a significant economic and lifestyle pest for residents, businesses, tourism, forestry, and agriculture. The greatest agricultural concern falls on grapes, hops, apples, blueberries, and stone fruits. Its presence has led to crop loss, exporting issues, and increased management costs (New York State Integrated Pest Management 2023).

Beaver

The beaver (*Castor canadensis*) is a native species whose behavior can cause hazardous conditions. It is unmistakable due to its large body size (26-65 pounds, 25-35 inches) and broad flattened tail (9-10 inches long, 6 inches wide), not to mention the characteristically altered habitat in which it resides. Possessing the unique ability to fell trees, they use this talent to not only get food. It is also a source of construction material for their lodges and the watertight dams they build to impound the area that they intend to inhabit (NYSDEC n.d.).

Knotweed

There are multiple closely related knotweed species present in New York State: Japanese knotweed, giant knotweed, and Bohemian knotweed. All species are fast-growing, herbaceous perennial shrubs with jointed, hollow stems. A cascade of white flowers bloom in August, and dormant reddish-brown stems are visible in winter. Knotweed species are found along forest edges and stream banks, as well as in disturbed and open areas such as roadways. Knotweed's early spring emergence and dense growth give it an edge over native plants, enabling it to take over large areas. Knotweed is very

difficult to control and often requires herbicide usage (Invasive Species Management Adirondacks 2023).

Zebra Mussels

Zebra mussels are filter-feeding freshwater bivalve mollusks. Zebra mussels are small, ¼" to 1 ½" long, and D-shaped with light and dark brown stripes. They have byssal threads that allow them to attach to solid surfaces. Invasive mussels displace native species, attach to and cover many surfaces, have sharp shells, and are a nuisance to humans. Although they have some predators, they breed faster than they can be consumed. As filter feeders, they remove particles from the water, affecting the clarity, content, and ultimately the food chain of aquatic ecosystems Once established, very little can be done apart from manual removal. In closed human systems such as water treatment plants, chemical, thermal, electrical, and biological controls can be used. The best method is prevention by cleaning boats, bait buckets, and gear. (Invasive Species Management Adirondacks 2023).

Harmful Algal Bloom

Algae blooms are caused by an excess of nutrients available in a waterbody, resulting in a rapid growth and reproduction of algae in what is commonly referred to as a "bloom." Waterbodies that are impacted by runoff of nutrients at high levels of both naturally occurring and manmade, algae can experience overloading of nutrients and become more vulnerable to algal blooms (Graham 2000).

Algae, like plants, photosynthesize, forming the basis of many aquatic and marine food chains. However, unlike plants, algae do not have roots for nutrient intake. Some species of macroalgae appear to have roots because they are attached to the bottom by a structure known as a holdfast, but the holdfast does not absorb and transfer nutrients in the same way that roots do. Instead, algae are able to draw their nutrients directly from the environment that surrounds them. Due to this phenomenon, high nutrients, warm temperatures, and low turbulence at the water's surface all increase the risk of algal blooms.

As the base of the food chain in aquatic systems, phytoplankton populations are under constant threat of being eaten by herbivores. Phytoplankton species employ a variety of natural defenses to limit the amount of population destruction that unabated grazing by herbivores can cause. These may include regulation of population size and seasonal occurrence, growth of spiny exteriors, and the creation of toxins. More than 40 cyanobacterial species are confirmed or suspected to produce toxins (Graham 2000). When these populations of algae grow out of control and produce toxins or have harmful effects, it is typically referred to as a Harmful Algal Bloom or HAB. Contact with water containing HABs can cause various health effects including diarrhea, nausea or vomiting; skin, eye, or throat irritation; and allergic reactions or breathing difficulties (NYSDOH 2017).

Regulations

The Invasive Species Council (Council) is a statutory body that was created in 2008 by Title 17, Section 9 of the Environmental Conservation Law (ECL). The Council was created to coordinate

among multiple State entities and partners in addressing the environmental and economic threats of invasive species. The legislation defines invasive species as "a species that is (a) non-native to the ecosystem under consideration; and (b) whose introduction causes or is likely to cause economic or environmental harm or harm to human health" (NYSDEC 2022).

The Council is co-led by the Department of Agriculture and Markets (AGM) and consist of nine members: the Commissioners of DEC, AGM, Transportation, Education, and Office of Parks Recreation and Historic Preservation (OPRHP), Secretary of State, the Chairperson of New York State Thruway Authority, the Director of the New York State Canal Corporation, and the Chairperson of the Adirondack Park Agency (APA) (NYSDEC 2022).

As of 2014, New York State has adopted regulations (6 New York Codes Rules and Regulations [NYCRR] Part 575) which identifies the regulations standards for selling and offering regulated species. Any persons who purchase a regulated invasive species is required to maintain all labels, signs and notices pertaining to invasive species in the given areas (New York Codes, Rules, and Regulations 2022).

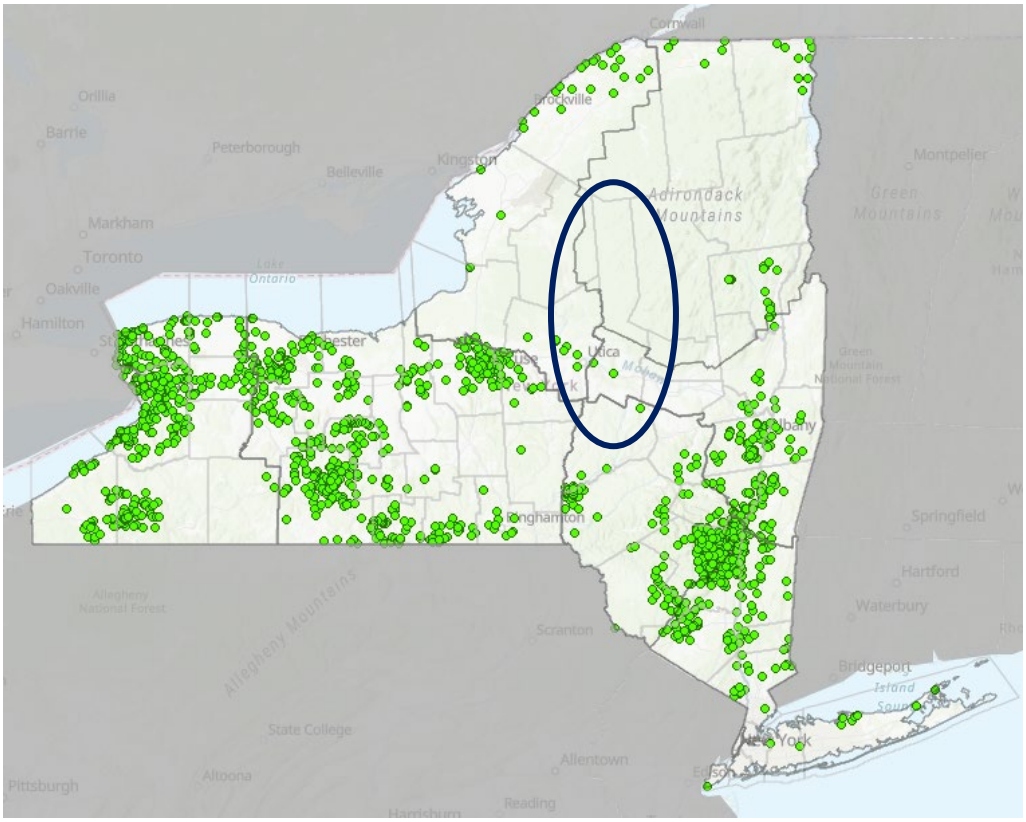
Location and Extent

The extent and location of an infestation or invasive species depend on the preferred habitat of the species, as well as the species' ease of movement and establishment. Each threat can impact most areas of New York State, including Herkimer County. Levels of threat from infestations and invasive species range from nuisance to widespread. The threat typically intensifies when the ecosystem or host species is already stressed, such as during periods of drought and increased periods of rainfall.

Emerald Ash Borer

All of New York's native ash trees are susceptible to EAB with nearly all counties reporting the presence of EAB. Signs of infestation in the tree canopy include dieback, yellowing, and browning of leaves. Most trees die within two to four years of becoming infested. Adult EABs typically fly less than ½ mile from their emergence tree. Most long-distance movement of EAB has been directly traced to ash firewood or ash nursery stock. New York State currently has a regulation restricting the movement of firewood to protect forests from invasive pests. As of 2019, EAB has been identified in the southern half of Herkimer County (NYSDEC n.d.). Figure 5.4.1-1 shows the distribution of the emerald ash borer in New York State and within the vicinity of Herkimer county.

Figure 5.4.1-1. Emerald Ash Borer New York Distribution Map

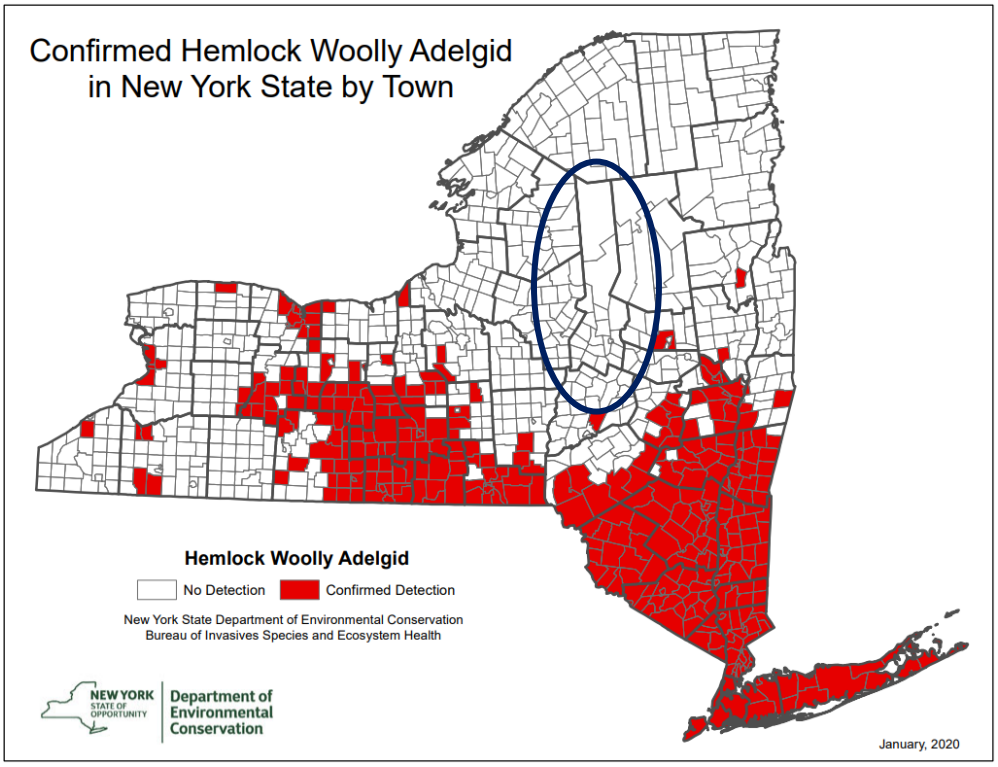


Source: New York Invasive Species Network 2019
Note: The black oval indicates the approximate position of Herkimer County

Hemlock Woolly Adelgid (HWA)

HWA has been in North America for twenty years and has been spreading across New York State and to higher elevations at an alarming rate (Cornell Cooperative Extension 2018). Early detection is the key to successful management, HWA are recognized by white woolly masses produced on twigs in late winter. Figure 5.4.1-2 shows the distribution of HWA in New York State as of January 2020. The dark blue oval indicates Herkimer County and shows Hemlock Woolly Adelgid has not been found in Herkimer County but has been identified in neighboring counties to the south and east.

Figure 5.4.1-2. Confirmed Hemlock Woolly Adelgid in New York State by Town

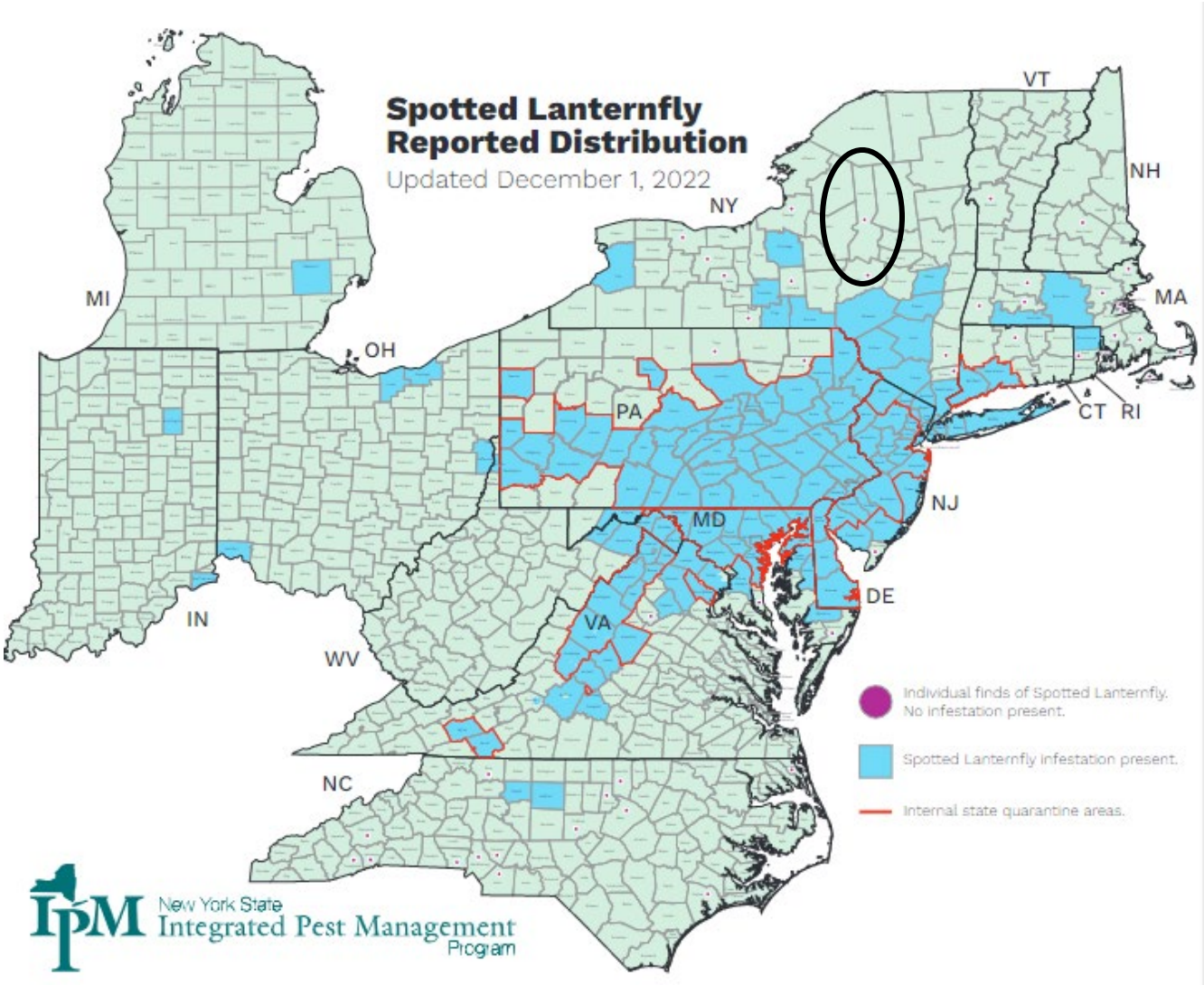


Source: NYSDEC 2020
Note: The black oval indicates the approximate position of Herkimer County

Spotted Lanternfly

The spotted lanternfly was accidentally introduced into Pennsylvania and was confirmed in September 2014. Since this time, the insect has spread throughout the mid-Atlantic As of December 2022, spotted lanternfly has been found in Herkimer County but infestation is not considered present at this time. The spotted lanternfly can feed on more than 70 plant species including cultivated grapes, fruit trees, and hardwood trees. Key tree hosts include black walnut; red maple; and agricultural crops such as grapes, hops, apples, and peaches (New York State Integrated Pest Management 2023). Figure 5.4.1-3 shows the distribution of spotted lantern flies in New York State and within the vicinity of Herkimer county.

Figure 5.4.1-3. Spotted Lanternfly Reported Distribution



Source: New York State Integrated Pest Management 2023
Note: The black oval indicates the position of Herkimer County

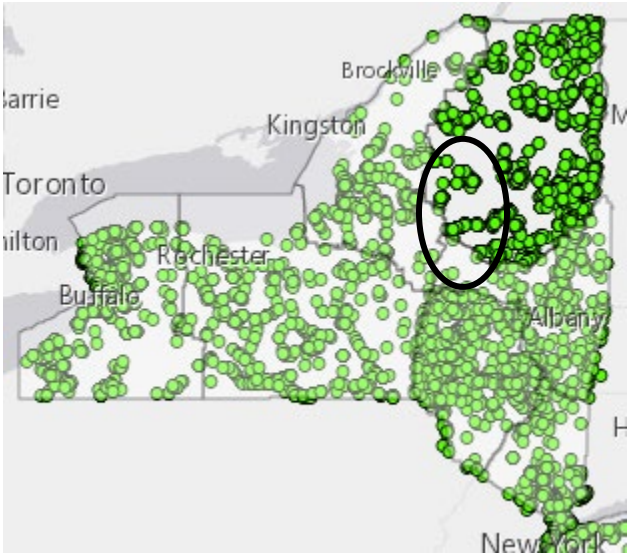
Beaver

Dubbed "nature's finest wetland engineer", beaver activity has both disruptive and beneficial impacts on any body of water they colonize. Their dam-building activity can cause widespread flooding of forest and agricultural lands. Nuisance complaints regarding beaver activity are widespread across New York State. Flooding not only has the potential to change the ecology of a colonized area, but it can also cause hazards to human habitation by plugging culverts and flooding roads, railroad tracks, and agricultural lands. There are also general property damage concerns. New beaver dams or failure of established dams can lead to significant flooding events (NYSDEC n.d.).

Knotweed

Knotweed species are found along forest edges and stream banks, as well as in disturbed and open areas such as roadways. Knotweed's early spring emergence and dense growth give it an edge over native plants, enabling it to take over large areas. Knotweed is very difficult to control and often requires herbicide usage (Invasive Species Management Adirondacks 2023). Figure 5.4.1-4 shows the distribution of knotweed in New York State and within the vicinity of Herkimer county.

Figure 5.4.1-4. Knotweed New York Distribution Map

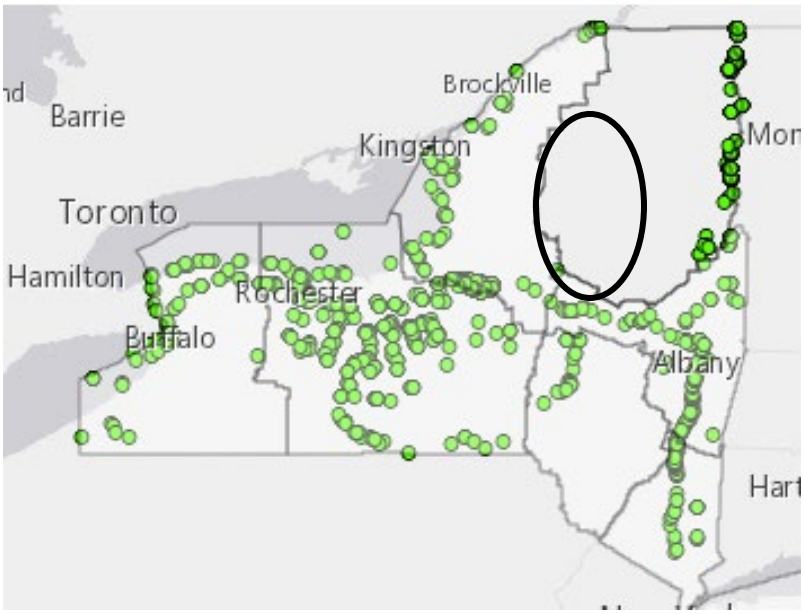


Source: Invasive Species Management Adirondacks 2023
Note: The black oval indicates the approximate position of Herkimer County

Zebra Mussels

As filter feeders, Zebra Mussels remove particles from the water, affecting the clarity, content, and ultimately the food chain of aquatic ecosystems Once established, very little can be done apart from manual removal. In closed human systems such as water treatment plants, chemical, thermal, electrical, and biological controls can be used. The best method is prevention by cleaning boats, bait buckets, and gear. (Invasive Species Management Adirondacks 2023). Figure 5.4.1-5 shows the distribution of zebra mussels in New York State and within the vicinity of Herkimer county.

Figure 5.4.1-5. Zebra Mussel New York Distribution Map



Source: Invasive Species Management Adirondacks 2023
Note: The black oval indicates the approximate position of Herkimer County

Harmful Algal Bloom

HABs have the potential to impact waterbodies throughout Herkimer County. Waterbodies that are calm and have issues with eutrophication (overloading of nutrients), are the most susceptible to HABs. In Herkimer County, Cedar Lake and Ilion Reservoir No 3 have had confirmed HABs. Kyser Lake had a suspected HAB (NYSDEC n.d.)

Wind currents can play a large role in the concentrations of algae that float at or near the water surface. Consistent winds can accumulate algae at downwind shorelines. Shorelines containing coves or other features that could capture floating algae may be more susceptible to HABs. In instances where freshwater intakes are impacted by these blooms, the extent may also include the area that is serviced by the impacted water utility or the private/residential intake.

Previous Occurrences

FEMA Major Disasters and Emergency Declarations

Between 1954 and 2022, Herkimer County was not included in any disaster (DR) or emergency (EM) declarations for infestation and invasive species-related events. However, Herkimer County was included in a West Nile Virus outbreak in 2000. Section 5.5.1 (Disease Outbreak) includes more information on this declaration. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 4 (County Profile).

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2012 and 2022, Herkimer County was not included in any infestation and invasive species-related agricultural disaster declarations.

Previous Events

As indicated in the Location and Extent section above, incidences of various infestations and citing of invasive species have occurred in neighboring counties and, as such, can be considered an emerging threat. Documentation and mapping from Invasive *Species Management Adirondacks* indicates the existence of Japanese Knotweed in the County. Per NYSDEC, there has been a documented Harmful Algal Bloom incident in Ilion Reservoir No. 3.

Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of infestation and invasive species events for the County. Based on historical documentation and given the overall impact of changing climate, New York State is expected to undergo increased incidences of infestation and invasive species. Herkimer County and all its jurisdictions will continue under threat of infestations and invasive species that may induce secondary hazards and health threats to the County population if infestations are not prevented, controlled, or eradicated.

Based on historical occurrences, the probability of an infestation and invasive species event occurring is considered frequent (100% annual probability). Refer to Section 5.3 for additional information on the hazard ranking methodology and probability criteria.

Climate Change Projections

Climate change is beginning to affect both people and resources in New York State, and these impacts are projected to increase. The impacts related to increasing temperatures and sea level rise are already causing complications in the state. *ClimAID: The Integrated Assessment for Effective Climate Change in New York State (ClimAID)* was undertaken to provide decision-makers with information on the state's vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge (NYSERDA 2011/2014).

Temperatures in New York State are warming, with an average rate of warming over the past century of 0.25° F per decade. Average annual temperatures are projected to increase across New York State by 2–3.4 °F by the 2020s, 4.1–6.8 °F by the 2050s, and 5.3–10.1 °F by the 2080s. By the end of the century, the greatest warming is projected to be in the northern section of the state (NYSERDA 2011/2014).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change, Herkimer County is part of Region 5 (East Hudson and Mohawk River Valleys). In Region 5, it is estimated that temperatures will increase by 4.5°F to 6.2°F by the 2050s and 5.6°F to 9.7°F by the 2080s (baseline of 47.6°F, middle range projection). Average annual temperatures are projected to increase across New York State by 4.1° F to 6.8° F by the 2050s and 5.3° F to 10.1° F by the 2080s with an average rate of warming over the past century of 0.25° F per decade. By the end of the century, the greatest warming is projected to be in the northern section of the State.

Table 5.4.1-1. Projected Seasonal Precipitation Change in Region 5, 2050s (% change)

Winter	Spring	Summer	Fall
+5 to +15	-5 to +10	-5 to +5	-5 to +10

Source: NYSERDA 2011

Temperature and rainfall increases due to climate change are anticipated, and evidence exists that climate change may be a factor in expansion of infestation and infectious diseases in the United States. Warmer temperatures and changing rainfall patterns provide an environment where insects can remain active longer, greatly increasing the risk for animals and humans. The changes in climate can also allow tropical and subtropical insects to move from regions where diseases thrive into new places (Natural Resource Defense Council 2015).

As temperatures increase and rainfall patterns change, these insects can remain active for longer seasons and within wider areas. The ability to predict the future distribution of invasive species in response to climate change is a difficult task due to the factors that influence local and short-term invasion patterns, and because invasive species and concurrent climate and land-use changes are dynamically linked (Finch, et al. 2021). Heavier rainfall events may also result in an increased likelihood of beaver dam failures, increasing the risk of flooding events.

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. A qualitative assessment was conducted for infestations and invasive species in Herkimer County.

Impact on life, Health, and Safety

The entire population of Herkimer County is vulnerable to infestation and invasive species. According to the 2020 U.S. Census, Herkimer County had a population of 60,139. As discussed earlier, infestations can have an impact on agricultural commodities. This destruction of crop may include consumable resources that are sold to persons in the County. Herkimer County is home to 596 farms (USDA 2017). It is reasonable to assume that the farms in Herkimer County also experience losses in crops. This not only impacts the livelihood of the farmers; it also affects the community that relies on these crops for food or other commodities.

Additionally, the impacts of harmful algal blooms on life, health, and safety depend on several factors, including the severity of the event and whether citizens and tourists have become exposed to waters suspected of containing toxins associated with cyanobacteria. Routes of exposure include consumption, inhalation, and dermal exposure. The population living near or visiting waterbodies is at risk for exposure as well as those that use those waterbodies for recreation, fishing, and water supply. Contact with water containing harmful algal blooms can cause various health effects including diarrhea, nausea or vomiting; skin, eye, or throat irritation; and allergic reactions or breathing difficulties (CDC 2020).

Further, the population living near waterbodies is at risk for exposure to HABs as well as those that use those waterbodies for recreation, fishing, and water supply. Therefore, exposure should not be limited to only those who reside in a defined hazard zone, but visitors to Herkimer County waterbodies as well. Contact with water containing HABs can cause various health effects including diarrhea, nausea or vomiting; skin, eye, or throat irritation; and allergic reactions or breathing difficulties (NYSDOH 2017).

Cyanobacteria blooms are one of the most common freshwater HABs, Cyanobacteria are known to produce toxins from the following classes:

Endotoxins: Endotoxins associated with cyanobacteria have been tied to fever and inflammation in humans that have come in contact with water that contains cyanobacterial blooms.

Hepatotoxins: Hepatotoxins are commonly tied to animal poisonings that are associated with cyanobacterial blooms. Animals may exhibit weakness, heavy breathing, paleness, cold extremities, vomiting, diarrhea, and bleeding in the liver. In humans, hepatotoxins have been indicated to promote tumors and may lead to increases in liver cancer. Some types of hepatotoxins, such as microcystin, can persist in fresh water for up to 2 weeks before being naturally broken down (algae).

Neurotoxins: Neurotoxins act to block transfers between neurons. Extreme cases can result in paralysis (US EPA 2014).

The EPA has established an incident checklist for HAB incidents impacting water utilities (US EPA 2017). This tool is available to help utilities detect, identify, and monitor a bloom. Locations in Herkimer County that rely on surface water intake for drinking water are most exposed to the impacts of HABs. Purchasing water may make some users more vulnerable if the utility has less control over the quality of the source. Coordinating with the supplier to ensure that the water is clear of harmful algae, thus maintaining the safety of users of the purchased water, is recommended.

Impact on General Building Stock

Structures are not anticipated to be directly affected by infestation or invasive species; however, EAB may cause a catastrophic loss of ash trees throughout the County, which could result in stream bank instability, erosion, and increased sedimentation, impacting ground stabilization and possibly

cause foundation issues for nearby structures. Additionally, with an increased number of dead trees, there is an increased risk of trees falling on roadways, power lines, and buildings.

Some invasive plants have been shown to destabilize soil due to high densities and shallow root systems, negatively impacting nearby buildings and septic systems. Other invasive plant species have been known to clog culverts and streams, increasing flooding risk.

Flooding associated with new beaver dams or beaver dam failure can result in damages to buildings, roadways, and other infrastructure.

Impact on Critical Facilities and Community Lifelines

Water treatment plants could be impacted by infestation and invasive species because of similar issues that the general building stock may experience. Water that becomes polluted due to increased sedimentation and erosion will require additional treatment. If the system becomes clogged with these pollutants, the ability of water treatment plants to operate may become impaired. Additionally, soil that becomes unstable due to decaying vegetation can impact critical facilities that are built on or around these soils.

The typical impact harmful algal blooms have on critical facilities are shutdowns of water intakes from the surface waters that are impacted by blooms and their toxins. Water treatment plants can remove variable amounts of microcystin from drinking water depending on the active removal process used by the water treatment plant (US EPA 2020). However, applying the wrong treatment process at a specific state in treatment could damage the facility and release cyanotoxins rather than remove them. The EPA has summarized the effectiveness of treatment options for harmful algal blooms (refer to Table 5.4.1-2. Assessment of Treatment Options for HABs).

Table 5.4.1-2. Assessment of Treatment Options for HABs

Treatment Process	Relative Effectiveness
Intracellular Cyanotoxins Removal (Intact Cells)	
Pre-treatment oxidation	Oxidation often stresses or lyses cyanobacteria cells releasing the cyanotoxin to the water. If oxidation is required to meet other treatment objectives, consider using lower doses of an oxidant less likely to lyse cells. If oxidation at higher doses must be used, sufficiently high doses should be used to not only lyse cells but also destroy total toxins present (see extracellular cyanotoxin removal).
Coagulation/ Sedimentation/ Filtration	Effective for the removal of intracellular toxins (cyanobacteria cells). Ensure that captured cells accumulated in sludge are removed frequently to release toxins. Ensure that sludge supernatant is not returned to the supply after sludge separation.
Membranes	Effective for removal of intracellular cyanotoxins (cyanobacteria cells). Microfiltration and ultrafiltration are effective when cells are not allowed to accumulate on membranes for long periods of time. More frequent cleaning may be required during a bloom event.
Flotation	Flotation processes, such as Dissolved Air Flotation (DAF), are effective for removal of intracellular cyanotoxins since many of the toxin-forming cyanobacteria are buoyant.
Extracellular (Dissolved) Cyanotoxins Removal	

Treatment Process	Relative Effectiveness
Membranes	Depends on the type of cyanotoxin, membrane material, membrane pore size distribution, and influent water quality. Nanofiltration is generally effective in removing extracellular microcystins. Reverse osmosis filtration is generally applicable for removal of microcystins and cylindrospermopsin. Cell lysis is highly likely. Further research is needed to characterize performance.
Potassium Permanganate	Effective for oxidizing microcystins and anatoxins. Further research is needed for cylindrospermopsin. Not effective for oxidizing saxitoxin.
Ozone	Very effective for oxidizing microcystins, anatoxin-a, and cylindrospermopsin. Not effective for oxidizing saxitoxin.
Chloramines	Not effective.
Chlorine dioxide	Not effective at doses typically used in drinking water treatment.
Free Chlorine	Effective for oxidizing microcystins as long as the pH is below 8. Effective for oxidizing cylindrospermopsin and saxitoxin. Not effective for oxidizing anatoxin-a.
UV Radiation	UV radiation alone is not effective at oxidizing microcystins and cylindrospermopsin at doses typically used in drinking water treatment. When UV radiation is coupled with ozone or hydrogen peroxide (called "advanced oxidation"), the process is effective at oxidizing anatoxin-a, cylindrospermopsin, and with high UV doses, microcystins.
Activated Carbon Adsorption	Powdered activated carbon (PAC): Effectiveness of PAC adsorption varies based on type of carbon, pore size, type of cyanotoxin, and other water quality parameters such as natural organic matter (NOM) concentration. Wood-based activated carbons are generally the most effective at microcystins adsorption. More research is needed to evaluate PAC's effectiveness at adsorbing cylindrospermopsin, anatoxin-a, and saxitoxin, however the limited research has demonstrated promising results. Doses in excess of 20mg/L may be needed for complete toxin removal, especially if NOM concentrations are high. Granular activated carbon (GAC): Effectiveness of GAC adsorption varies based on type of carbon, pore size, type of cyanotoxin, and other water quality parameters such as NOM concentration. GAC is effective for microcystins, and likely effective for cylindrospermopsin, anatoxin-a and saxitoxin. The condition of the carbon is an important factor in determining GAC's effectiveness for cyanotoxin removal. GAC may need to be regenerated more frequently to ensure adequate adsorption capacity for HAB season.

Source: US EPA 2020

Impact on the Economy

Impacts of infestation and invasive species on the economy and estimated dollar losses are difficult to measure and quantify. Costs associated with activities and programs implemented to conduct surveillance and address infestation have not been quantified in available documentation. Crop losses from invasive species may be significant. In 2017, there were 69,490 acres of cropland in Herkimer County with $58 million in crops sold (USDA 2017). Therefore, it is reasonable to believe that Herkimer County farmers have experienced monetary losses from infestations.

EAB is the responsible for placing all three of New York's ash species in serious decline. The cost of removal for ash trees can be upwards of $1 million depending on the number of trees for removal and their location.

Flood repairs from beaver dam flooding can be costly and involve replacing washed out roads and culverts.

HAB-related economic impacts on Herkimer County would largely focus on the agricultural and recreation sector. News of a closure of a body of water can result in visitors avoiding the area. Even after closures are lifted, negative public reaction can persist and continue to impact local revenue and property values. As mentioned, there is a price tied to programs that protect water bodies from harmful algal blooms. The cost to operate and monitor these programs will vary depending on the extent of the blooms. Additional costs may include money spent on nutrient reduction programs for agricultural commodities, purchasing backup water sources, and costs to implement advanced drinking water treatment. Agricultural producers may need to develop better strategies to reduce the nutrient runoff that cause harmful algal blooms, which may increase production costs for their commodities and overall costs for their buyers.

Impact on the Environment

As previously discussed, Herkimer County's parks, forests, landscaping, and agricultural areas are vulnerable to infestations and invasive species. Species that cause eventual destabilization of soil, such as invasive insects that destroy plants or invasive plants that outcompete native vegetation but have less effective root systems, can increase runoff into waterbodies. Soil destabilization can also increase the likelihood of mudslides in areas with a steep slope. Beavers can destroy existing habitat during dam building.

Harmful algal blooms can release toxins that can kill fish and invertebrate (US EPA 2019). Animals that prey on fish and invertebrates in surface waters, such as birds and mammals, may be affected if they ingest impacted prey. Both harmful and non-harmful algal blooms can have drastic impacts on oxygen levels in surface waters. When algae begin to die off following a bloom, bacteria begin to decompose the organic material. This decomposition consumes dissolved oxygen and releases carbon dioxide. If the bloom and die off is large enough, dissolved oxygen levels in aquatic systems can rapidly crash. Anoxic conditions connected to algal blooms have resulted in large fish and invertebrate kills.

Future Changes That May Impact Vulnerability

Understanding future changes that impact vulnerability in the County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Section 4 identifies areas targeted for future growth and development across the County. Any areas of growth located within Herkimer County could be potentially impacted by invasive species and infestation. Specific areas of recent and new development are indicated in tabular form and/or on the hazard maps included in Volume II, Section 9 (Jurisdictional Annexes) of this plan.

Projected Changes in Population

Changes in the density of population could lead to increased infestation of homes and other structures. When building developments locate near wetlands, forested areas, or agricultural lands, it increases the possibility of infestation. Refer to Section 4 (County Profile), which includes a discussion on population trends for the County.

Climate Change

Climate change and invasive species are two of the top four drivers of global biodiversity loss, affecting production landscapes, reducing crop yields, and the provision of ecosystem services (Masters and Norgrove 2010). Land use changes because of climate change creates an empty niche for invasive species to occur so together these drivers have a greater impact. Climate change can facilities invasive species and infestation such as new species that become invasive entering regions due to climate change, species hierarchy in ecosystems will begin to shift, leading to new dominants that may portrait invasive behaviors, and climate induced stress in the ecosystem will facilitate invasive ecosystems (Masters and Norgrove 2010). Alternatively, invasive species and infestations can facilitate climate stress by increasing the ecosystems susceptibility to climatic disturbance, through reducing the number of species and their functional types within an ecosystem.

Change of Vulnerability Since the 2017 HMP

Overall, the County's vulnerability has not changed since the 2017 HMP, and exposure and vulnerability to infestation and invasive species will continue throughout Herkimer County.

5.4.1 Severe Storm

Hazard Profile

Hazard Description

Severe storm events are a common occurrence in Herkimer County. A variety of severe storm types, such as thunderstorms, lightning, hail, tornadoes, straight-line winds, and hurricanes have damaged property and infrastructure, disrupt power, downing trees and power lines, and causing injuries and fatalities. The following section describes the different severe storm types that impact Herkimer County.

Thunderstorms

A thunderstorm is a local storm produced by a cumulonimbus cloud and accompanied by lightning and thunder (NWS, National Weather Service Glossary 2021). A thunderstorm forms from a combination of moisture, rapidly rising warm air, and a force capable of lifting air, such as a warm and cold front, a sea breeze, or a mountain. Thunderstorms form from the equator to as far north as Alaska. Although thunderstorms generally affect a small area when they occur, they have the potential to become dangerous due to their ability in generating tornadoes, hailstorms, strong winds, flash flooding, and lightning. The NWS considers a thunderstorm *severe* only if it produces damaging wind gusts of 58 mph or higher or large hail one inch (quarter size) in diameter or larger or tornadoes (NWS, National Weather Service Glossary 2021)

Lightning

Lighting is a bright flash of electrical energy produced by a thunderstorm. The resulting clap of thunder is the result of a shock wave created by the rapid heating and cooling of the air in the lightning channel. All thunderstorms produce lightning and are very dangerous. Lightning ranks as one of the top weather killers in the United States, killing approximately 50 people and injuring hundreds each year. Lightning can occur anywhere there is a thunderstorm. Lightning can be cloud to air, cloud to cloud, and cloud to ground (New York State 2019).

Hail

Hail is a type of precipitation that is formed when drops of water freeze together in the cold upper regions of thunderstorm clouds, also referred to as hailstones. Hail can cause severe crop damage and may affect vehicles, roofs, landscaping, and other areas of the built environment. Hailstorm events can occur anywhere within New York State independently or during a tornado, lightning, or thunderstorm event.

Tornadoes

A tornado is a violently rotating column of air that extends from a thunderstorm to the ground with an average forward speed of 30 miles per hour (mph). Tornadoes typically develop from either a severe thunderstorm or hurricane as cool air rapidly overrides a layer of warm air. Tornadoes can

occur at any time of the year, with peak seasons at different times for different states (NWS, Thunderstorms, Tornadoes, Lightning...Nature's Most Violent Storms 2010).

Straight Line Winds

High Winds (Straight Line) are not associated with rotation, like tornado winds. Damaging winds are often called "straight-line" winds to differentiate the damage they cause from tornado damage. High winds can cause flying debris or downed trees and power lines that pose a threat to safety and property. High winds combined with dry conditions increases the probability of wildfires. These events can cause significant damage to communities and infrastructure which has caused the state millions of dollars in damage (New York State 2019).

Hurricanes/Tropical Storms

Hurricanes are large swirling storms that produce winds of 74 mph or higher. They are a type of storm called a tropical cyclone, which forms over tropical or subtropical waters. A hurricane, or tropical cyclone, is one of the most destructive kinds of storms. High sustained winds within the storm can cause widespread structural damage to both man-made and natural structures. These winds can roll over vehicles, collapse walls and blow over trees. The prevailing winds of a hurricane push a wall of water, called a storm surge, in front of it. If the storm surge happens to coincide with high tide, it causes beach erosion and significant inland flooding.

Hurricanes deliver massive downpours of rain. A particularly large storm can dump dozens of inches of rain in just a day or two. That amount of rain can create flooding, potentially devastating large areas in the path of the hurricane. Additionally, hurricane winds often spawn tornadoes that cause more damage (New York State 2019).

Location

All of Herkimer County is vulnerable to severe storms, including thunderstorms, lightning, hail, straight-line (high) winds, and hurricanes. Herkimer County is located in Central New York; the Mohawk River flows across the southern portion of the county and the northern part of the county is in the Adirondack Park. Despite Herkimer County's central location, coastal storms, such as hurricanes, can impact the County. Hurricanes can impact Herkimer County from June to November, the official eastern U.S. hurricane season (New York State 2019). Although one of the most severe impacts associated with hurricane is storm surge, due to Herkimer County's location, storm surge is not a concern for the County and has not been detailed in this profile.

According to the FEMA wind zone map, Herkimer County is located within Wind Zone III where wind speeds can reach up to 200 mph. Figure 5.4.x-1 illustrates wind zones across the United States, which indicates the impacts of the strength and frequency of wind activity per region.

Thunderstorms

Thunderstorms an occur anywhere within New York State and Herkimer County and damages from thunderstorms and lightening is often underestimated. (New York State 2019)

Lightning

Lightning strikes can occur anywhere within New York State and Herkimer County (New York State 2019).

Hail

Hailstorm events can occur anywhere within New York State and Herkimer County, independently or during a tornado, thunder or lightning storm event and are usually localized in scale (New York State 2019).

Tornadoes

In New York State, tornadic destruction ranges from light to catastrophic depending on wind speed, width, and the distance traveled. Wind gusts of 3 seconds can range from 45 mph (F0 tornadoes) to over 250 mph (F5 tornadoes) (New York State 2019). They can occur anywhere in Warren County.

Straight-Line Winds

New York State and Herkimer County are located in a region highly susceptible to high wind events; this includes straight-line wind events (New York State 2019). In the National Risk Index, a 'Strong Wind Risk Index' score and rating represents a community's relative risk for strong winds (exceeding 58 miles per hour). According to the National Risk Index, Herkimer County has a relatively low risk to strong winds (FEMA 2023).

Hurricanes/Tropical Storms

In New York State, Hurricanes can impact New York City, Long Island, and in some cases, the Catskills, Hudson Valley, and Upstate (New York State 2019).

Mean Return Period

In evaluating the potential for hazard events of a given magnitude, a MRP is often used. The MRP provides an estimate of the magnitude of an event that may occur within any given year based on past recorded events. MRP is the average period of time, in years, between occurrences of a particular hazard event, equal to the inverse of the annual frequency of exceedance (Dinicola 2009).

Figure 5.4.1-1 and Figure 5.4.1-2 show the estimated maximum 3-second gust wind speeds that can be anticipated in the study area associated with the 100- and 500-year MRP events. These peak wind speed projections were generated using FEMA's Hazus-MH v5.1 wind model. The maximum wind speeds for the 100-year MRP event is less than 39 mph. The maximum 3-second gust wind speeds for Herkimer County are 39-73 mph (Tropical Storm), for the 500-year MRP event. The associated impacts and losses from these MRP hurricane event model runs are discussed in the Vulnerability Assessment subsection.

Figure 5.4.1-1. Wind Speeds for the 100-Year Mean Return Period Event

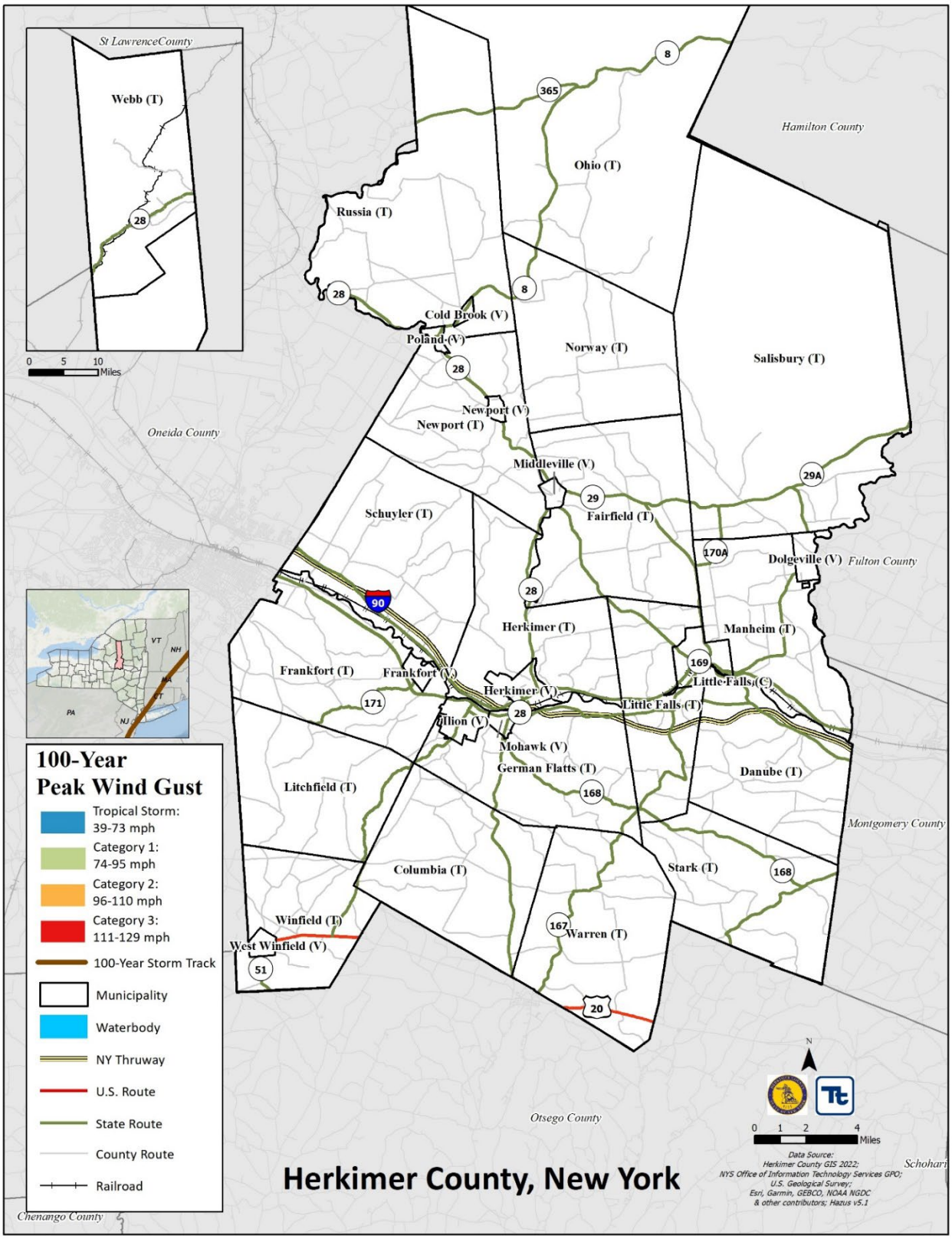
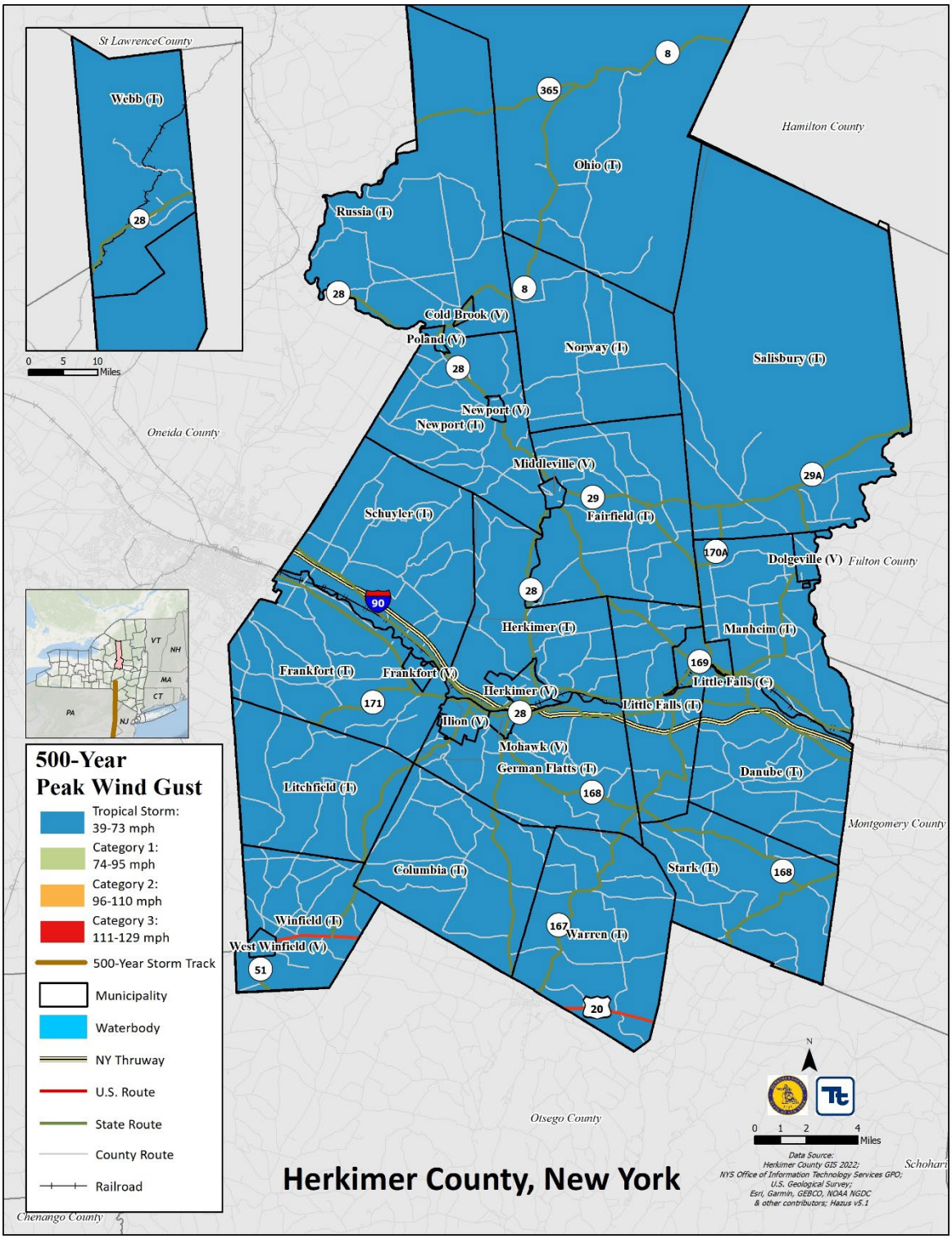


Figure 5.4.1-2. Wind Speeds for the 500-Year Mean Return Period Event



Extent

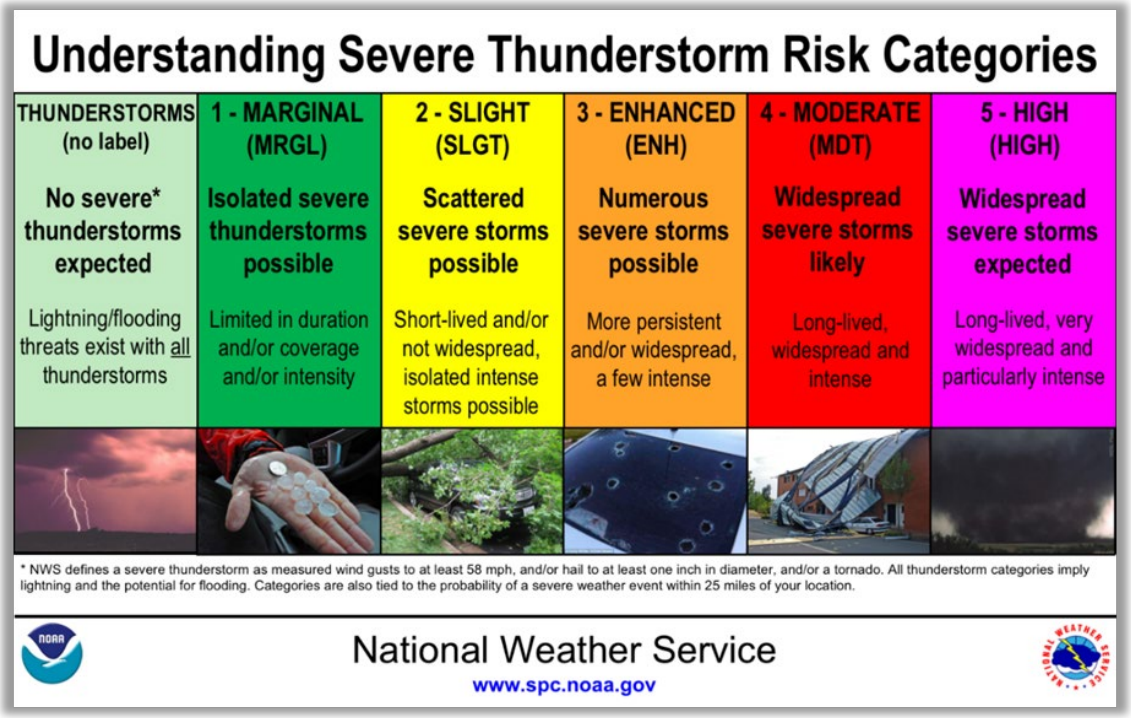
Thunderstorms

Severe thunderstorm statements, watches, and warnings are issued by the local NWS office and the Storm Prediction Center (SPC). The NWS and SPC will update the watches and warnings and notify the public when they are no longer in effect. NWS issues statements, watches, and warnings for thunderstorms:

- **Special Weather Statement:** Issued for strong storms that are below severe levels but may have impacts. Usually reserved for the threat of wind gust of 40–57 mph or hail of 0.5-inches to 0.99-inches in diameter (NWS 2023).
- **Severe Thunderstorm Watches:** A severe thunderstorm watch is issued when severe thunderstorms are possible in and near watch areas (NWS 2023).
- **Severe Thunderstorm Warning:** A severe thunderstorm is imminent or occurring; it is either detected by weather radar or reported by storm spotters. A severe thunderstorm is one that produces winds 58 mph or stronger and/or hail 1 inch in diameter or larger. A warning means to take shelter (NWS 2023).

The NWS has five risk categories for severe weather: marginal, slight, enhanced, moderate, and high. The probabilistic forecast directly expresses the best estimate of a severe weather event occurring within 25 miles of a point (NWS 2022). Figure 5.4.1-3 details the thunderstorm risk categories.

Figure 5.4.1-3. Thunderstorm Risk



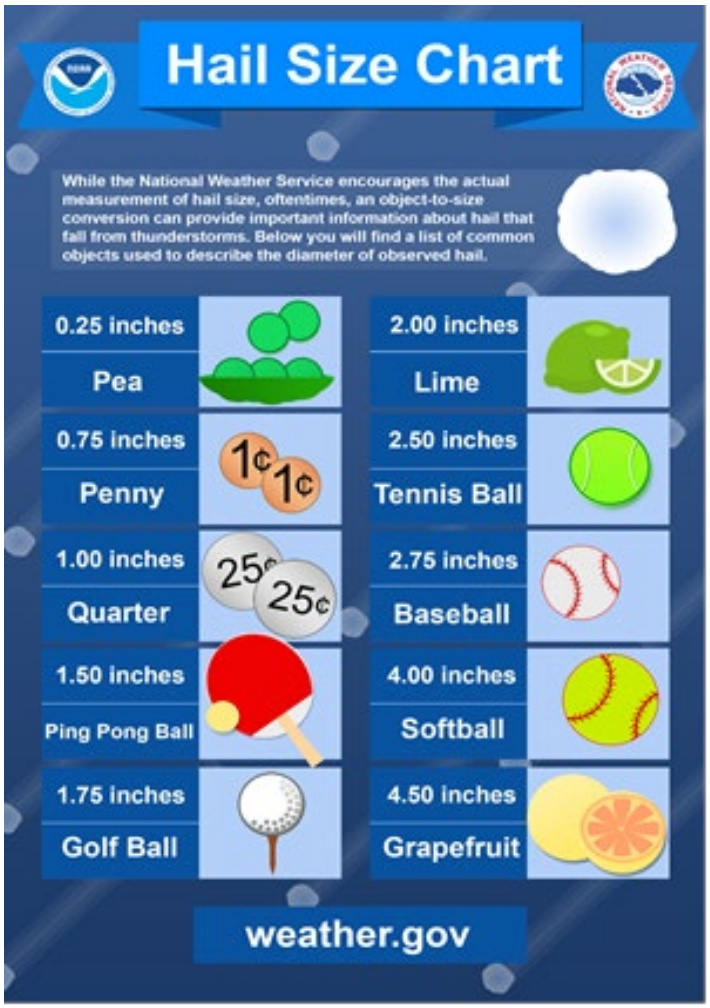
Lightning

Currently, cloud-to-ground (CG) and intra-cloud (IC) lightning flashes are detected and mapped in real-time by two different networks in the United States: the National Lightning Detection Network (NLDN) and the Earth Networks Total Lightning Network. These systems work by detecting radio waves (sferics) emitted by fast electric currents (strokes) in lightning channels. A "stroke" can be a fast current within the cloud, or a "return stroke" in a channel to ground (NOAA n.d.).

Hail

The severity of hail is measured by duration, hail size, and geographic extent. Hail can exhibit a variety of sizes, though only the very largest hail stones pose serious risk to people, if exposed. It is often estimated by comparing it to a known object (Figure 5.4.1-4). Most hailstorms are made up of a mix of different sizes, and only the very largest hail stones pose serious risk to people caught in the open (NSSL 2021).

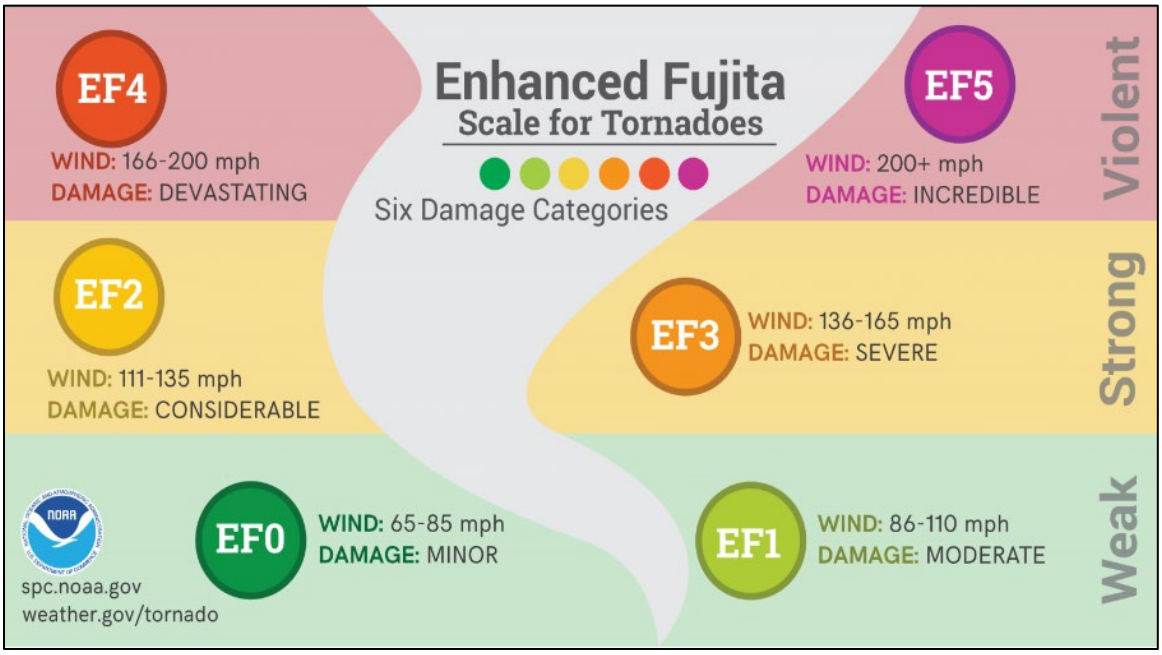
Figure 5.4.1-4. Hail Size Chart



Tornadoes

Damage from tornadoes can vary from minor damage that breaks tree limbs to massive damage demolishing homes in its path. The type of damage depends on the intensity, size, and duration of the tornado. The magnitude or severity of a tornado is categorized using the Enhanced Fujita Tornado Intensity Scale (EF Scale). This is the scale now used exclusively for determining tornado ratings by comparing wind speed and actual damage. Figure 5.4.1-5 illustrates the EF ratings, wind speeds, and expected tornado damage.

Figure 5.4.1-5. Enhanced Fujita Scale (EF Scale)



Source: NWS 2018

Straight-Line Winds

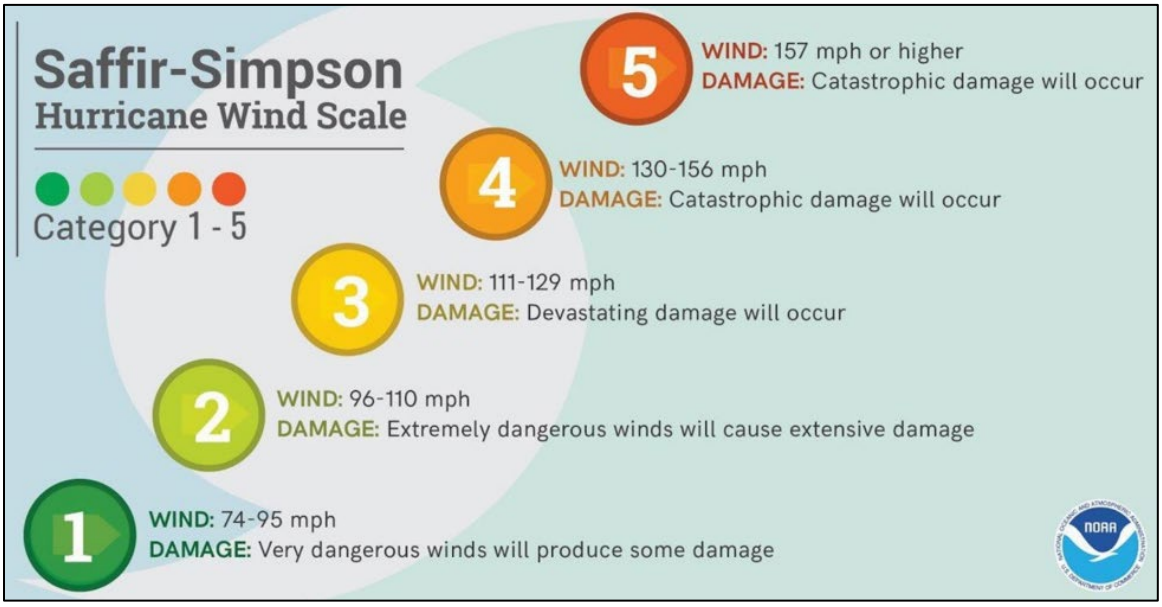
The NWS issues advisories and warnings for winds that are typically site-specific. The NWS issues high wind advisories, watches, and warnings when wind speeds can pose a hazard or are life threatening. The criterion for each of these varies from state to state. According to the NWS (2023), wind warnings and advisories for the State of New York are as follows:

- **High Wind Watch/Warnings:** Issued when sustained wind speeds of 40 mph or greater lasting for one hour or longer or for winds of 58 mph or greater for any duration or widespread damage are possible (NWS 2023).
- **Wind Advisories:** Issued when sustained winds of 30 to 39 mph are forecast for one hour or longer, or wind gusts of 46 to 57 mph for any duration (NWS 2023).

Hurricanes/Tropical Storm

The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 categorization based on the hurricane's intensity at the indicated time; however, it does not take into account other potential hazards such as storm surge, rainfall flooding, and tornadoes. The scale estimates potential property damage.

Figure 5.4.1-6. Saffir-Simpson Hurricane Wind Scale



Source: NOAA 2017

The NWS issues hurricane and tropical storm watches and warnings. These watches and warnings are issued or will remain in effect after a tropical cyclone becomes post-tropical, when such a storm poses a significant threat to life and property. The NWS allows the National Hurricane Center (NHC) to issue advisories during the post-tropical stage (NHC NOAA 2010).

Figure 5.4.1-7. NHC Hurricane Watches and Warnings

Previous Occurrences

FEMA Major Disasters and Emergency Declarations

Between 1954 and 2022, Herkimer County was included in 7 disaster (DR) or emergency (EM) declarations for severe storm-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 4 (County Profile).

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2012 and 2022, Herkimer County was included in 14 severe storm-related agricultural disaster declarations.

Previous Events

For this 2023 HMP update, known severe storm events that impacted Herkimer County between 2017 and 2022 are discussed below. For events prior to 2017, refer to Appendix E (Supplementary Data).

Table 5.4.1-1. Hazard Events in Herkimer County (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
January 10, 2017 – January 11, 2017	Strong Wind	N/A	Yes	A strong storm system moved from the eastern Great Lakes towards the St. Lawrence Valley. Ahead of this storm system, strong south to southeast winds were in place across the entire region, with the strongest winds across the higher elevations. As the storm's cold front crossed the region, winds switched to the west to southwest and continued to be gusty. These strong wind gusts resulted in many downed trees, power poles, and power lines
April 1, 2017	Excessive rain	S4265	Yes	Excessive rain
June 30, 2017	Tornado	N/A	Yes	Fast moving upper level shortwave passed through the area. With warm and muggy air mass in place, the shortwave sparked numerous strong to severe thunderstorms. The severe storms produced two EF-1 tornados in Fulton and Herkimer counties.
August 17, 2018	Lightning	N/A	Yes	A series of disturbances ahead of a cold frontal boundary brought rounds of heavy rainfall and strong to severe

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
				thunderstorms to the region. As a result of these disturbances, numerous trees and wires were downed across the region.
October 31, 2019 – November 1, 2019	Severe Storms, Straight-line Winds, and Flooding	DR-4472	Yes	A powerful storm system tracked across the eastern Great Lakes late on 31 October 2019 and produced an axis of 3 to 5 inches of rain, which caused significant flooding across the region. Strong winds aloft mixed down to the surface as an intense line of showers developed along the front, resulting in sporadic wind damage over eastern New York and western New England. A large swath of rainfall totaling 2-5 inches occurred over the Mohawk Valley and southern Adirondacks, resulting in reports of flash flooding. The runoff caused rapid rises on area creeks and streams, with four river gauges reaching record levels. The flooding was extensive over portions of the area, damaging numerous roads and structures and resulting in water rescues.
May 15, 2020	Thunderstorm Wind	N/A	Yes	Intense line of thunderstorms quickly developed near Lake Ontario and raced eastward into eastern New York. A segment of particularly strong and long-lasting thunderstorms impacted the region from just north of the Mohawk Valley in Herkimer County into Saratoga and Washington counties, producing damaging winds throughout its path. Notable areas of damage include a confirmed macroburst near Russia and Cold Brook, NY where wind estimates ranged from 80 to 100 mph

Sources: NCEI/NOAA, FEMA
Notes: NCEI/NOAA incidents are based on $25,000 or more

Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of severe storm events for the County. Information from NOAA-NCEI storm events database, the 2019 State of New York HMP, and the 2017 Herkimer County HMP were used to identify the number of severe storm events that occurred between 1950 and 2022. Table 5.4.1-2 presents the probability of future events for the dam/levee failure in the Planning Area.

Table 5.4.1-2. Probability of Future Severe Storm Events in Herkimer County

Hazard Type	Number of Occurrences Between 1970 and 2022	Percent Chance of Occurring in Any Given Year
Thunderstorms	178	100%
Lightning	10	13.7%
Hail	53	72.6%
Tornado	9	12.3%
Straight-line Winds	79	100%
Hurricane	1	1.3%
TOTAL	**330**	**100%**

Sources: NOAA NCEI 2022, State of New York 2019, FEMA 2022

Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and severe storm events as reported by NWS. Due to changes in the data collection and periods of record availability depending on the event type, not all severe storm events occurring between 1950 and 2022 are accounted for in the tally of occurrences. As a result, the probability of future occurrences may be underestimated.

Based on the County's history of severe storms, Herkimer County could experience at least five severe weather events (of any type) each year. In Section 5.3, the identified hazards of concern for Herkimer County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Partnership, the probability of occurrence for severe storms in the County is considered 'frequent'.

Climate Change Projections

Climate change is beginning to affect both people and resources in Herkimer County, and these impacts are projected to continue growing. The Integrated Assessment for Effective Climate Change in New York State (ClimAID) was undertaken to provide decision-makers with information on the state's vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge (NYSERDA 2011).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change. Herkimer County is part of Region 5. In Region 5, it is estimated that temperatures will increase by 3.0 °F to 5.5 °F by the 2050s and 4.0 °F to 8.0 °F by the 2080s (baseline of 50.0 °F, mid-range projection). Precipitation totals will increase between 0 and 5 percent by the 2050s and 5 to 10 percent by the 2080s (baseline of 38.0 inches, mid-range projection). Table 5.4.1-3 displays the projected seasonal precipitation change for ClimAID Region 5 (NYSERDA 2014).

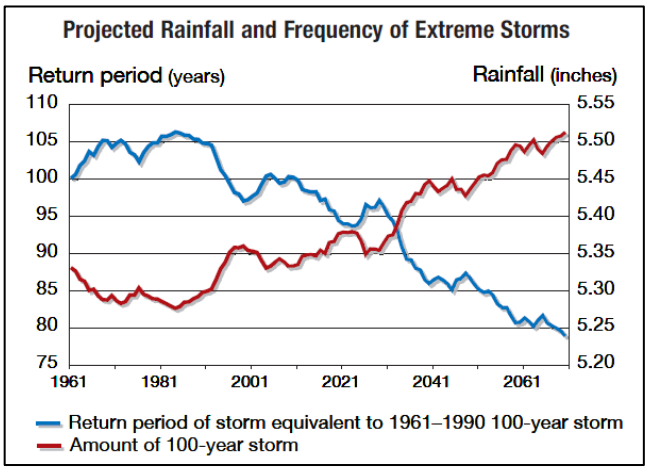
Table 5.4.1-3. Projected Seasonal Precipitation Change in Region 5, 2050s (% change)

Winter	Spring	Summer	Fall
+5 to +15	-5 to +10	-5 to +5	-5 to +10

Source: NYSERDA 2014

The projected increase in precipitation is expected to fall in heavy downpours and less in light rains. Downpours are very likely to increase in frequency and intensity, a change which has the potential to affect drinking water; heighten the risk of riverine flooding; flood key rail lines, roadways, and transportation hubs; and increase delays and hazards related to extreme weather events (NYSERDA 2011). Less frequent rainfall during the summer months may impact the ability of water supply systems. Increasing water temperatures in rivers and streams will affect aquatic health and reduce the capacity of streams to assimilate effluent wastewater treatment plants (NYSERDA 2011).

Figure 5.4.1-8. Projected Rainfall and Frequency of Extreme Storms



Source: NYSERDA 2014

Figure 5.4.1-8 displays the project rainfall and frequency of extreme storms in New York State. The amount of rainfall in a 100-year event is projected to increase, while the number of years between such storms (return period) is projected to decrease. Rainstorms will become more severe and more frequent (NYSERDA 2014).

Vulnerability Assessment

All assets in Herkimer County are at risk to hurricane and tropical storm events. Potential losses associated with high-wind events were calculated for two probabilistic wind events: the 100-year and 500-year MRP events. The impacts on population, existing structures, critical facilities, lifelines, and the economy are presented below.

Impact on life, Health, and Safety

The impact of a hurricane wind event on life, health, and safety is dependent upon several factors including the severity of the event and whether or not adequate warning time was provided to residents. All Herkimer County residents are at risk to the impacts caused by hurricane wind events (60,139 persons; 2020 Census).

The vulnerable population also includes those who would not have adequate warning from an emergency warning system (e.g., television or radio); this would include residents and visitors. The population adversely affected by severe summer weathers may also include those beyond the disaster area that rely on affected roads for transportation.

Research has shown that some populations, while they may not have more hazard exposure, may experience exacerbated impacts and prolonged recovery if/when impacted. This is due to many factors including their physical and financial ability to react or respond during a hazard. Economically disadvantaged populations are vulnerable because they are

likely to evaluate their risk and make decisions based on the major economic impact to their family and may not have funds to evacuate. The population over the age of 65 is also vulnerable and, physically, they may have more difficulty evacuating. Additionally, the elderly are considered vulnerable because they require extra time or outside assistance during evacuations and are more likely to seek or need medical attention which may not be available due to isolation during a storm event. Please refer to Section 4 (County Profile) for the statistics of these populations.

Residents may be displaced or require temporary to long-term sheltering. In addition, downed trees, damaged buildings, and debris carried by high winds can lead to injury or loss of life. Socially vulnerable populations are most susceptible, based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Hazus estimates there will be zero displaced households and no people will require temporary shelter or be displaced or will seek short-term sheltering due to 100-year and 500-year MRP events.

Impact on General Building Stock

Damage to buildings is dependent upon several factors, including wind speed, storm duration, and path of the storm track. Building construction also plays a major role in the extent of damage resulting from a coastal storm. Due to differences in construction, residential structures are generally more susceptible to wind damage than commercial and industrial structures. Mobile/manufactured homes, and structures constructed of wood and masonry buildings, in general, tend to experience more damage than concrete or steel buildings.

To better understand these risks, Hazus was used to estimate the expected wind-related building damages. Specific types of wind damages are also summarized in Hazus at the following wind damage categories: no damage/very minor damage, minor damage, moderate damage, severe damage, and total destruction. Table 5.4.1-4 summarizes the definition of the damage categories. Table 5.4.1-5 summarizes the number and type of buildings and their estimated severity of expected damage.

Table 5.4.1-4. Description of Damage Categories

Qualitative Damage Description	Roof Cover Failure	Window Door Failures	Roof Deck	Missile Impacts on Walls	Roof Structure Failure	Wall Structure Failure
No Damage or Very Minor Damage Little or no visible damage from the outside. No broken windows, or failed roof deck. Minimal loss of roof cover, with no or very limited water penetration.	≤2%	No	No	No	No	No
Minor Damage Maximum of one broken window, door or garage door. Moderate roof cover loss that can be covered to prevent	>2% and≤15%	One window, door, or garage door failure	No	<5 impacts	No	No

Qualitative Damage Description	Roof Cover Failure	Window Door Failures	Roof Deck	Missile Impacts on Walls	Roof Structure Failure	Wall Structure Failure
additional water entering the building. Marks or dents on walls requiring painting or patching for repair.						
Moderate Damage Major roof cover damage, moderate window breakage. Minor roof sheathing failure. Some resulting damage to interior of building from water.	>15% and≤50%	> one and ≤the larger of20% & 3	1 to 3panels	Typically 5 to 10impacts	No	No
Severe Damage Major window damage or roof sheathing loss. Major roof cover loss. Extensive damage to interior from water.	>50%	> the larger of 20% & 3and ≤50%	>3 and≤25%	Typically 10 to 20impacts	No	No
Destruction Complete roof failure and/or, failure of wall frame. Loss of more than 50% of roof sheathing.	Typically >50%	>50%	>25%	Typically >20impacts	Yes	Yes

Source: Hazus Hurricane Technical Manual

Table 5.4.1-5. Expected Severity of Damages from the 100-Year and 500-Year Mean Return Period Hurricane Wind Events

Occupancy Class	Total Number of Buildings Assessed in Occupancy	Severity of Expected Damage	100-Year Mean Return Period Hurricane		500-Year Mean Return Period Hurricane	
			Building Count	Percent of Buildings in Occupancy Class	Building Count	Percent of Buildings in Occupancy Class
Residential Exposure (Single and Multi-Family Dwellings)	28,523	None	0	0	28,512	100.0%
		Minor	0	0	10	0.0%
		Moderate	0	0	0	0.0%
		Severe	0	0	0	0.0%
		Complete Destruction	0	0	0	0.0%
Commercial Buildings	1,316	None	0	0	1,313	100.0%
		Minor	0	0	3	0.2%
		Moderate	0	0	0	0.0%
		Severe	0	0	0	0.0%
		Complete Destruction	0	0	0	0.0%
Industrial Buildings	387	None	0	0	386	100.0%
		Minor	0	0	1	0.3%
		Moderate	0	0	0	0.0%
		Severe	0	0	0	0.0%
		Complete Destruction	0	0	0	0.0%
Government, Religion, Agricultural, and	438	None	0	0	437	100.0%
		Minor	0	0	1	0.2%
		Moderate	0	0	0	0.0%

Occupancy Class	Total Number of Buildings Assessed in Occupancy	Severity of Expected Damage	100-Year Mean Return Period Hurricane		500-Year Mean Return Period Hurricane	
			Building Count	Percent of Buildings in Occupancy Class	Building Count	Percent of Buildings in Occupancy Class
Education Buildings		Severe	0	0	0	0.0%
		Complete Destruction	0	0	0	0.0%

Source: Census 2020; 2021; Hazus v5.1
Notes: % = Percent; < = Less Than

Table 5.4.1-6 summarizes the replacement cost value damage for all occupancies estimated for the 500-year MRP wind-only events. Based on the results of the Hazus analysis, there are no expected damages due to the 100-year MRP event related to the built infrastructure in the County. Damage estimates are reported for the County's probabilistic Hazus model scenarios. The data shown indicates total losses associated with wind damage to the building only.

The total damage to buildings for all occupancy types across Herkimer County is estimated to be approximately $552,349 for the 500-year MRP wind-only event. The majority of these losses are to residential buildings. Due to differences in building construction, residential structures are generally more susceptible to wind damage than commercial and industrial structures. The damage counts include buildings damaged at all severity levels from minor damage to destruction. Total dollar damage reflects the overall impact to buildings at an aggregate level. The Town of Little Falls is estimated to experience the greatest damage, approximately $57,339 in a 500-year MRP event.

Table 5.4.1-6. Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane Wind Events

Jurisdiction	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane	Percent of Total	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for Residential Structures Only	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for Commercial Structures Only
Cold Brook (V)	$108	<0.1%	$108	$0
Columbia (T)	$25,449	<0.1%	$25,449	$0
Danube (T)	$24,479	<0.1%	$24,479	$0
Dolgeville (V)	$10,235	<0.1%	$10,235	$0
Fairfield (T)	$12,030	<0.1%	$12,030	$0
Frankfort (T)	$37,342	<0.1%	$37,342	$0
Frankfort (V)	$9,874	<0.1%	$9,874	$0
German Flatts (T)	$54,660	<0.1%	$54,660	$0
Herkimer (T)	$33,081	<0.1%	$33,081	$0
Herkimer (V)	$18,513	<0.1%	$18,513	$0
Ilion (V)	$33,828	<0.1%	$33,828	$0

Jurisdiction	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane	Percent of Total	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for Residential Structures Only	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for Commercial Structures Only
Litchfield (T)	$21,751	<0.1%	$21,751	$0
Little Falls (C)	$57,339	<0.1%	$57,339	$0
Little Falls (T)	$18,742	<0.1%	$18,742	$0
Manheim (T)	$5,656	<0.1%	$5,656	$0
Middleville (V)	$241	<0.1%	$241	$0
Mohawk (V)	$32,725	<0.1%	$32,725	$0
Newport (T)	$9,240	<0.1%	$9,240	$0
Newport (V)	$174	<0.1%	$174	$0
Norway (T)	$10,555	<0.1%	$10,555	$0
Ohio (T)	$14,718	<0.1%	$14,718	$0
Poland (V)	$146	<0.1%	$146	$0
Russia (T)	$11,852	<0.1%	$11,852	$0
Salisbury (T)	$19,968	<0.1%	$19,968	$0
Schuyler (T)	$19,912	<0.1%	$19,912	$0
Stark (T)	$25,642	<0.1%	$25,642	$0
Warren (T)	$27,210	<0.1%	$27,210	$0
Webb (T)	$0	0%	$0	$0
West Winfield (V)	$654	<0.1%	$654	$0
Winfield (T)	$16,225	<0.1%	$16,225	$0
Herkimer County (Total)	**$552,349**	**<0.1%**	**$552,349**	**$0**

Source: Census 2010; Census 2020; Hazus v5.1

Notes: C = City; T = Town; V = Village; % = Percent; < = Less Than

Impact on Critical Facilities and Community Lifelines

Critical facilities may experience structural damage directly from high winds or falling tree limbs/flying debris, which can also result in the loss of power. Power loss can greatly impact households, business operations, public utilities, and emergency personnel. The elderly population may be more vulnerable if power loss results in interruption of heating and cooling services, stagnated hospital operations, and potable water supplies. Emergency personnel such as police, fire, and EMS may not be able to effectively respond and maintain the safety of its residents.

Hazus estimates the probability that critical facilities (i.e., medical facilities, fire/EMS, police, EOC, schools, and user-defined facilities such as shelters and municipal buildings) could sustain damage as a result of 100-year and 500-year MRP wind events. Additionally, Hazus estimates the loss of use for each facility in number of days. Due to the sensitive nature of the critical facility dataset, individual facility estimated loss is not provided.

Table 5.4.1-7 summarizes the percent probability that each facility type may experience damage as a result of the 500-year mean return period hurricane wind event.

Table 5.4.1-7. Estimated Impacts to Critical Facilities and Lifelines from the 500-Year Mean Return Period Hurricane Wind Event

Facility Type	500-Year Mean Return Period Hurricane				
		Percent-Probability of Sustaining Damage			
	Loss of Days	Minor	Moderate	Severe	Complete
Emergency Response Centers	0	0.3%	0.0%	0.0%	0.0%
Fire Stations	0	0% - 0.2%	0.0%	0.0%	0.0%
Medical Care Facilities	0	0% - <0.1%	0.0%	0.0%	0.0%
Police Stations	0	0% - 0.3%	0.0%	0.0%	0.0%
Schools	0	0% - 0.1%	0.0%	0.0%	0.0%

Source: Hazus v5.1

At this time, Hazus does not estimate losses to transportation lifelines and utilities as part of the hurricane model. Transportation lifelines are not considered particularly vulnerable to the wind hazard; they are more vulnerable to cascading effects such as flooding, falling debris etc. Impacts to transportation lifelines affect both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting) transportation needs.

Impact on the Economy

Damage to structures from flooding and wind occur immediately; however, this damage can have long-lasting impacts on the economy. When a business is closed during storm recovery, there is lost economic activity in the form of day-to-day business and wages to employees. Overall, economic impacts include the loss of business function (e.g., tourism, recreation), damage to inventory, relocation costs, wage loss and rental loss due to the repair/replacement of buildings.

Hazus estimates the total economic loss associated with each storm scenario (direct building losses and business interruption losses). Direct building losses are the estimated costs to repair or replace the damage caused to the building. This is reported in the "Impact on General Building Stock" subsection discussed earlier. Business interruption losses are the losses associated with the inability to operate a business because of the wind damage sustained during the storm or the temporary living expenses for those displaced from their home because of the event. Refer to Table 5.4.1-8 for a summary of Hazus estimated economic losses for Herkimer County caused by the 100-year and the 500-year mean return period hurricane wind events.

Table 5.4.1-8. Estimated Economic Losses for the 100-Year and 500-Year Mean Return Period Hurricane Wind Events

Mean Return Period (MRP)	Inventory Loss	Income Loss	Relocation Loss	Building Losses	Content Losses	Wages Losses	Rental Losses
100-year	$0	$0	$0	$0	$0	$0	$0
500-year	$0	$0	$570	$552,590	$221,730	$0	$0

Source: Hazus v5.1

Debris management can be costly. Hazus estimates the amount of debris that might be produced as result of the 100-year and 500-year mean return period hurricane wind events. Because the estimated debris production does not include debris generated by flooding, this is likely a conservative estimate and could be higher if multiple impacts occur. According to the Hazus Hurricane User Manual, estimates of weight and volume of eligible tree debris consist of downed trees that would likely be collected and disposed at public expense. Refer to the User Manual for additional details regarding these estimates. Hazus does not estimate a significant amount of debris will be generated during a 100-year mean return period wind event. County-wide, it is estimated that approximately 7,936 tons of tree material will be generated during a 500-year event. Table 5.4.1-9 summarizes the estimated debris by municipality for the 500-year mean return period hurricane wind events, respectively, which should be considered a lower-bound analysis.

Table 5.4.1-9. Debris Production for the 500-Year Mean Return Period Hurricane Wind Event

Jurisdiction	Estimated Debris Created During the 500-Year Mean Return Period Hurricane Wind Event			
	Brick and Wood (Tons)	Concrete and Steel (Tons)	Tree (Tons)	Eligible Tree Volume (Cubic Yards)
Cold Brook (V)	0.0	0	0	0
Columbia (T)	0.3	0	1,134	560
Danube (T)	0.0	0	960	545
Dolgeville (V)	1.0	0	0	0
Fairfield (T)	0.0	0	0	0
Frankfort (T)	0.5	0	0	0
Frankfort (V)	0.5	0	0	1,006
German Flatts (T)	1.4	0	957	711
Herkimer (T)	0.2	0	6	26
Herkimer (V)	0.8	0	26	31
Ilion (V)	1.6	0	47	0
Litchfield (T)	0.2	0	965	476
Little Falls (C)	3.0	0	129	419
Little Falls (T)	0.0	0	710	406
Manheim (T)	0.0	0	2	9
Middleville (V)	0.0	0	0	0
Mohawk (V)	1.0	0	29	197
Newport (T)	0.0	0	0	0
Newport (V)	0.0	0	0	0
Norway (T)	0.0	0	0	0
Ohio (T)	0.0	0	0	0
Poland (V)	0.0	0	0	0
Russia (T)	0.0	0	0	0
Salisbury (T)	0.0	0	0	0
Schuyler (T)	0.0	0	0	0
Stark (T)	0.0	0	1,007	571
Warren (T)	0.3	0	1,211	598
Webb (T)	0.0	0	0	0
West Winfield (V)	0.0	0	29	0
Winfield (T)	0.2	0	724	357

Jurisdiction	Estimated Debris Created During the 500-Year Mean Return Period Hurricane Wind Event			
	Brick and Wood (Tons)	Concrete and Steel (Tons)	Tree (Tons)	Eligible Tree Volume (Cubic Yards)
Herkimer County	**11**	**0**	**7,936**	**5,914**

Source: Hazus v5.1

Notes: C = City; T = Town; V = Village

Impact on the Environment

Extreme winds from hurricanes or tropical storms may create several tons of debris because the wind tears apart foliage and trees. Plants along waterways may be uprooted from surge causing even further instability and alterations of the shoreline. Consequentially, natural habitat that shelters the County from wind and storm surge can be destroyed, impacting future mitigation.

Cascading Impacts on Other Hazards

The impacts of hurricane related windstorms on the environment typically take place over a larger area. Where these events occur, widespread, severe damage to plant species is likely. This includes uprooting or destruction of trees and an increased threat of wildfire in areas where dead trees are not removed. Section 5.4.5 (Flood) provides additional environmental impacts due to flooding from heavy rainfalls.

Future Changes That May Impact Vulnerability

Understanding future changes that effect vulnerability in the County can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Understanding future changes that impact vulnerability in the Herkimer County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. It is anticipated that any new development and new residents will be exposed to the hurricane and tropical storm hazard. However, due to increased standards and codes, new development might be less vulnerable to wind-related hazards compared to the aging building stock. The tables and hazard maps included in the jurisdictional annexes contain additional information regarding the specific areas of development that would increase County vulnerability to a wind event.

Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 3.4 percent since 2010. The County's population is anticipated to decrease by 2040 (a projected 2.7%). Refer to Section 4 (County Profile), which includes a discussion on population trends for the County.

Climate Change

As discussed above, most studies project that the State of New York will see an increase in average annual temperatures and precipitation. An increase in temperatures may also lead to an increase in the frequency and intensity of severe storm events. More frequent and severe storms will increase the County's vulnerability to both wind-related and storm surge impacts.

The northeast region of the United States has experienced a greater increase in extreme precipitation than any other region in the U.S. between 1958 and 2010, the Northeast experienced more than 70 percent increase in the amount of precipitation falling in rain events (Global Change 2014). Refer to Section 5.4.3 (Flood) for a discussion related to the impact of climate change due to increases in rainfall. With an increased likelihood of more frequent storm events and associated strong winds and tornado events, the County's assets continue to be at risk.

Change of Vulnerability Since the 2017 HMP

Since the 2017 HMP was drafted, Hazus version 5.1 was used to assess the County's overall risk to the 100-year and 500-year mean return period hurricane wind events. Overall, this vulnerability assessment uses a more accurate and updated asset inventory which provides more accurate estimated exposure to the severe storm hazard.

5.4.1 Severe Storm

Hazard Profile

Hazard Description

Severe storm events are a common occurrence in Herkimer County. A variety of severe storm types, such as thunderstorms, lightning, hail, tornadoes, straight-line winds, and hurricanes have damaged property and infrastructure, disrupt power, downing trees and power lines, and causing injuries and fatalities. The following section describes the different severe storm types that impact Herkimer County.

Thunderstorms

A thunderstorm is a local storm produced by a cumulonimbus cloud and accompanied by lightning and thunder (NWS, National Weather Service Glossary 2021). A thunderstorm forms from a combination of moisture, rapidly rising warm air, and a force capable of lifting air, such as a warm and cold front, a sea breeze, or a mountain. Thunderstorms form from the equator to as far north as Alaska. Although thunderstorms generally affect a small area when they occur, they have the potential to become dangerous due to their ability in generating tornadoes, hailstorms, strong winds, flash flooding, and lightning. The NWS considers a thunderstorm *severe* only if it produces damaging wind gusts of 58 mph or higher or large hail one inch (quarter size) in diameter or larger or tornadoes (NWS, National Weather Service Glossary 2021)

Lightning

Lighting is a bright flash of electrical energy produced by a thunderstorm. The resulting clap of thunder is the result of a shock wave created by the rapid heating and cooling of the air in the lightning channel. All thunderstorms produce lightning and are very dangerous. Lightning ranks as one of the top weather killers in the United States, killing approximately 50 people and injuring hundreds each year. Lightning can occur anywhere there is a thunderstorm. Lightning can be cloud to air, cloud to cloud, and cloud to ground (New York State 2019).

Hail

Hail is a type of precipitation that is formed when drops of water freeze together in the cold upper regions of thunderstorm clouds, also referred to as hailstones. Hail can cause severe crop damage and may affect vehicles, roofs, landscaping, and other areas of the built environment. Hailstorm events can occur anywhere within New York State independently or during a tornado, lightning, or thunderstorm event.

Tornadoes

A tornado is a violently rotating column of air that extends from a thunderstorm to the ground with an average forward speed of 30 miles per hour (mph). Tornadoes typically develop from either a severe thunderstorm or hurricane as cool air rapidly overrides a layer of warm air. Tornadoes can

occur at any time of the year, with peak seasons at different times for different states (NWS, Thunderstorms, Tornadoes, Lightning...Nature's Most Violent Storms 2010).

Straight Line Winds

High Winds (Straight Line) are not associated with rotation, like tornado winds. Damaging winds are often called "straight-line" winds to differentiate the damage they cause from tornado damage. High winds can cause flying debris or downed trees and power lines that pose a threat to safety and property. High winds combined with dry conditions increases the probability of wildfires. These events can cause significant damage to communities and infrastructure which has caused the state millions of dollars in damage (New York State 2019).

Hurricanes/Tropical Storms

Hurricanes are large swirling storms that produce winds of 74 mph or higher. They are a type of storm called a tropical cyclone, which forms over tropical or subtropical waters. A hurricane, or tropical cyclone, is one of the most destructive kinds of storms. High sustained winds within the storm can cause widespread structural damage to both man-made and natural structures. These winds can roll over vehicles, collapse walls and blow over trees. The prevailing winds of a hurricane push a wall of water, called a storm surge, in front of it. If the storm surge happens to coincide with high tide, it causes beach erosion and significant inland flooding.

Hurricanes deliver massive downpours of rain. A particularly large storm can dump dozens of inches of rain in just a day or two. That amount of rain can create flooding, potentially devastating large areas in the path of the hurricane. Additionally, hurricane winds often spawn tornadoes that cause more damage (New York State 2019).

Location

All of Herkimer County is vulnerable to severe storms, including thunderstorms, lightning, hail, straight-line (high) winds, and hurricanes. Herkimer County is located in Central New York; the Mohawk River flows across the southern portion of the county and the northern part of the county is in the Adirondack Park. Despite Herkimer County's central location, coastal storms, such as hurricanes, can impact the County. Hurricanes can impact Herkimer County from June to November, the official eastern U.S. hurricane season (New York State 2019). Although one of the most severe impacts associated with hurricane is storm surge, due to Herkimer County's location, storm surge is not a concern for the County and has not been detailed in this profile.

According to the FEMA wind zone map, Herkimer County is located within Wind Zone III where wind speeds can reach up to 200 mph. Figure 5.4.x-1 illustrates wind zones across the United States, which indicates the impacts of the strength and frequency of wind activity per region.

Thunderstorms

Thunderstorms an occur anywhere within New York State and Herkimer County and damages from thunderstorms and lightening is often underestimated. (New York State 2019)

Lightning

Lightning strikes can occur anywhere within New York State and Herkimer County (New York State 2019).

Hail

Hailstorm events can occur anywhere within New York State and Herkimer County, independently or during a tornado, thunder or lightning storm event and are usually localized in scale (New York State 2019).

Tornadoes

In New York State, tornadic destruction ranges from light to catastrophic depending on wind speed, width, and the distance traveled. Wind gusts of 3 seconds can range from 45 mph (F0 tornadoes) to over 250 mph (F5 tornadoes) (New York State 2019). They can occur anywhere in HerkimerCounty.

Straight-Line Winds

New York State and Herkimer County are located in a region highly susceptible to high wind events; this includes straight-line wind events (New York State 2019). In the National Risk Index, a 'Strong Wind Risk Index' score and rating represents a community's relative risk for strong winds (exceeding 58 miles per hour). According to the National Risk Index, Herkimer County has a relatively low risk to strong winds (FEMA 2023).

Hurricanes/Tropical Storms

In New York State, Hurricanes can impact New York City, Long Island, and in some cases, the Catskills, Hudson Valley, and Upstate (New York State 2019).

Mean Return Period

In evaluating the potential for hazard events of a given magnitude, a MRP is often used. The MRP provides an estimate of the magnitude of an event that may occur within any given year based on past recorded events. MRP is the average period of time, in years, between occurrences of a particular hazard event, equal to the inverse of the annual frequency of exceedance (Dinicola 2009).

Figure 5.4.1-1 and Figure 5.4.1-2 show the estimated maximum 3-second gust wind speeds that can be anticipated in the study area associated with the 100- and 500-year MRP events. These peak wind speed projections were generated using FEMA's Hazus-MH v5.1 wind model. The maximum wind speeds for the 100-year MRP event is less than 39 mph. The maximum 3-second gust wind speeds for Herkimer County are 39-73 mph (Tropical Storm), for the 500-year MRP event. The associated impacts and losses from these MRP hurricane event model runs are discussed in the Vulnerability Assessment subsection.

Figure 5.4.1-1. Wind Speeds for the 100-Year Mean Return Period Event

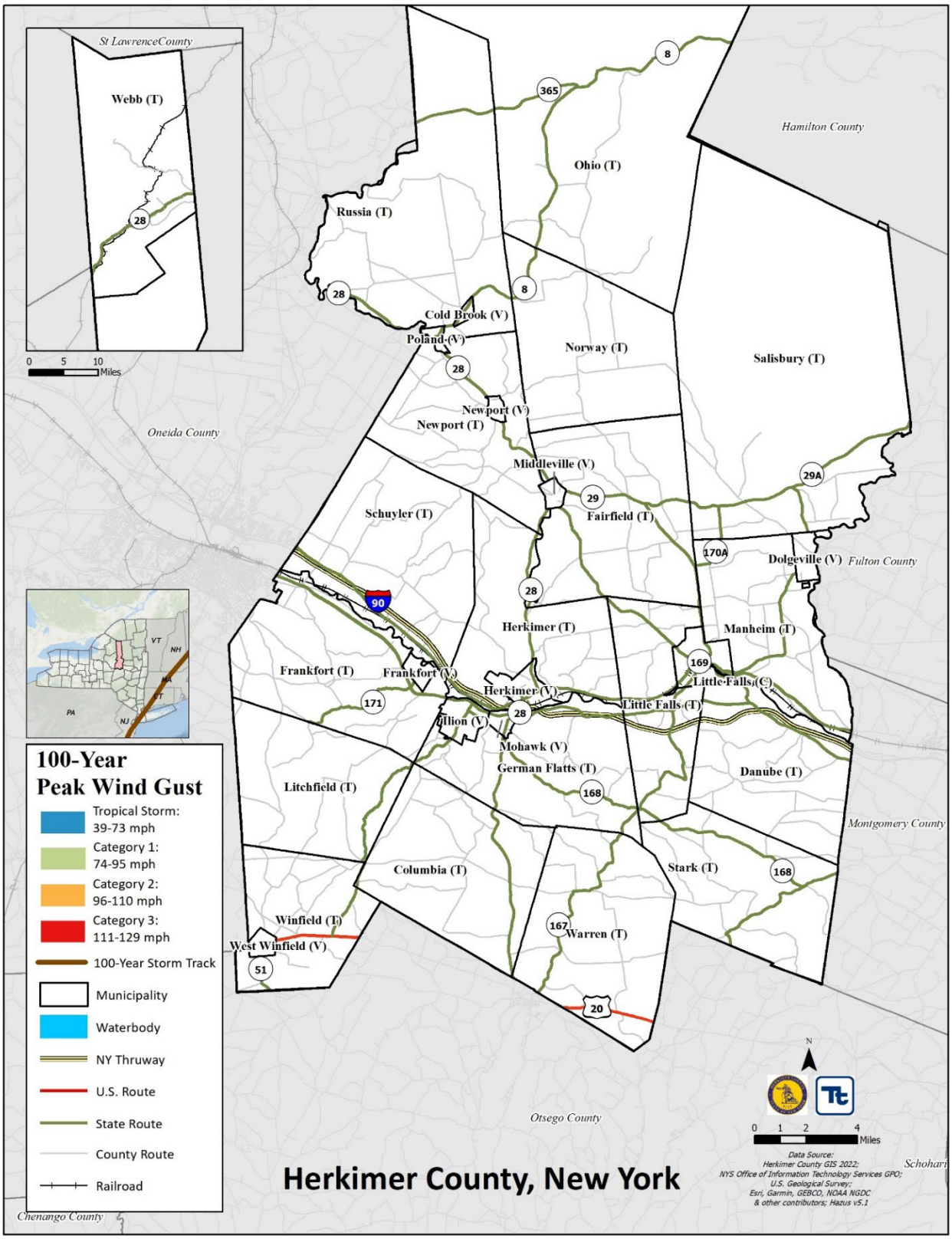
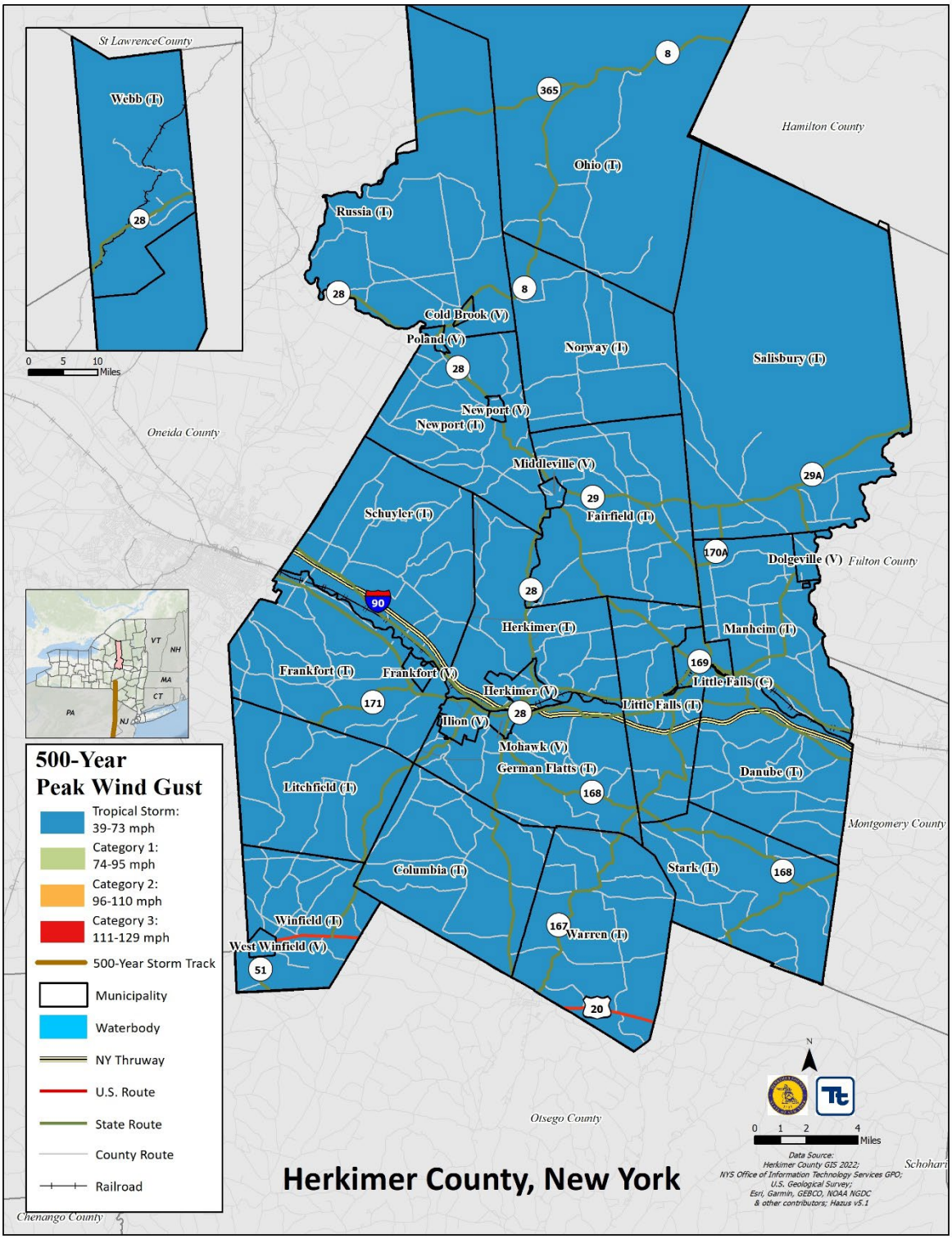


Figure 5.4.1-2. Wind Speeds for the 500-Year Mean Return Period Event



Extent

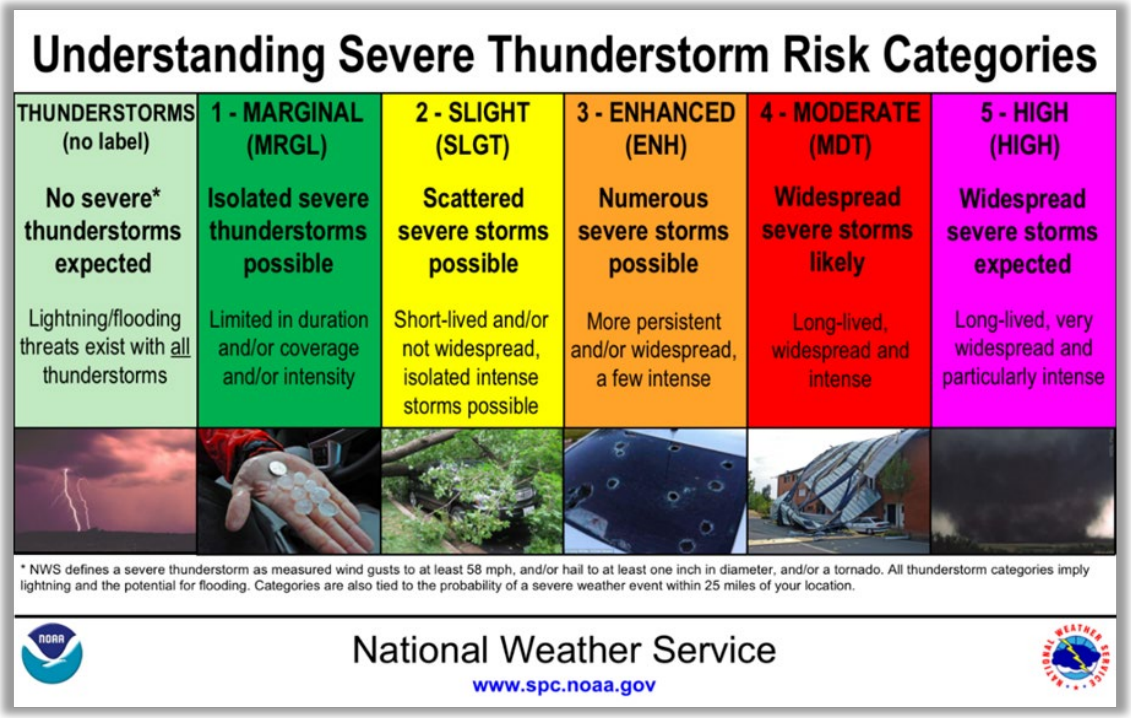
Thunderstorms

Severe thunderstorm statements, watches, and warnings are issued by the local NWS office and the Storm Prediction Center (SPC). The NWS and SPC will update the watches and warnings and notify the public when they are no longer in effect. NWS issues statements, watches, and warnings for thunderstorms:

- **Special Weather Statement:** Issued for strong storms that are below severe levels but may have impacts. Usually reserved for the threat of wind gust of 40–57 mph or hail of 0.5-inches to 0.99-inches in diameter (NWS 2023).
- **Severe Thunderstorm Watches:** A severe thunderstorm watch is issued when severe thunderstorms are possible in and near watch areas (NWS 2023).
- **Severe Thunderstorm Warning:** A severe thunderstorm is imminent or occurring; it is either detected by weather radar or reported by storm spotters. A severe thunderstorm is one that produces winds 58 mph or stronger and/or hail 1 inch in diameter or larger. A warning means to take shelter (NWS 2023).

The NWS has five risk categories for severe weather: marginal, slight, enhanced, moderate, and high. The probabilistic forecast directly expresses the best estimate of a severe weather event occurring within 25 miles of a point (NWS 2022). Figure 5.4.1-3 details the thunderstorm risk categories.

Figure 5.4.1-3. Thunderstorm Risk



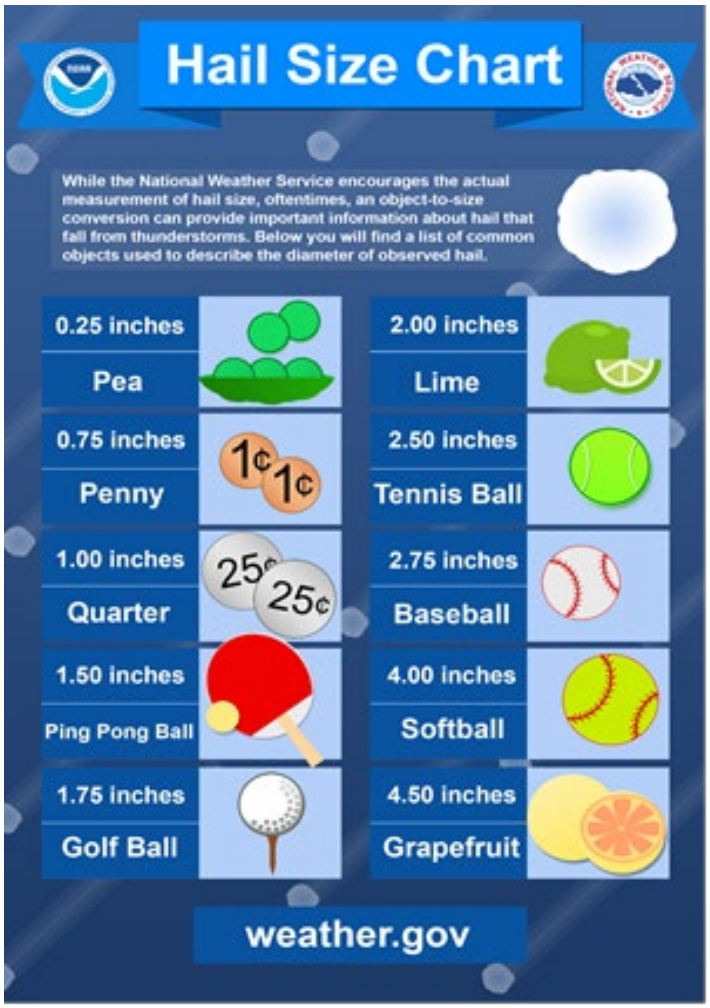
Lightning

Currently, cloud-to-ground (CG) and intra-cloud (IC) lightning flashes are detected and mapped in real-time by two different networks in the United States: the National Lightning Detection Network (NLDN) and the Earth Networks Total Lightning Network. These systems work by detecting radio waves (sferics) emitted by fast electric currents (strokes) in lightning channels. A "stroke" can be a fast current within the cloud, or a "return stroke" in a channel to ground (NOAA n.d.).

Hail

The severity of hail is measured by duration, hail size, and geographic extent. Hail can exhibit a variety of sizes, though only the very largest hail stones pose serious risk to people, if exposed. It is often estimated by comparing it to a known object (Figure 5.4.1-4). Most hailstorms are made up of a mix of different sizes, and only the very largest hail stones pose serious risk to people caught in the open (NSSL 2021).

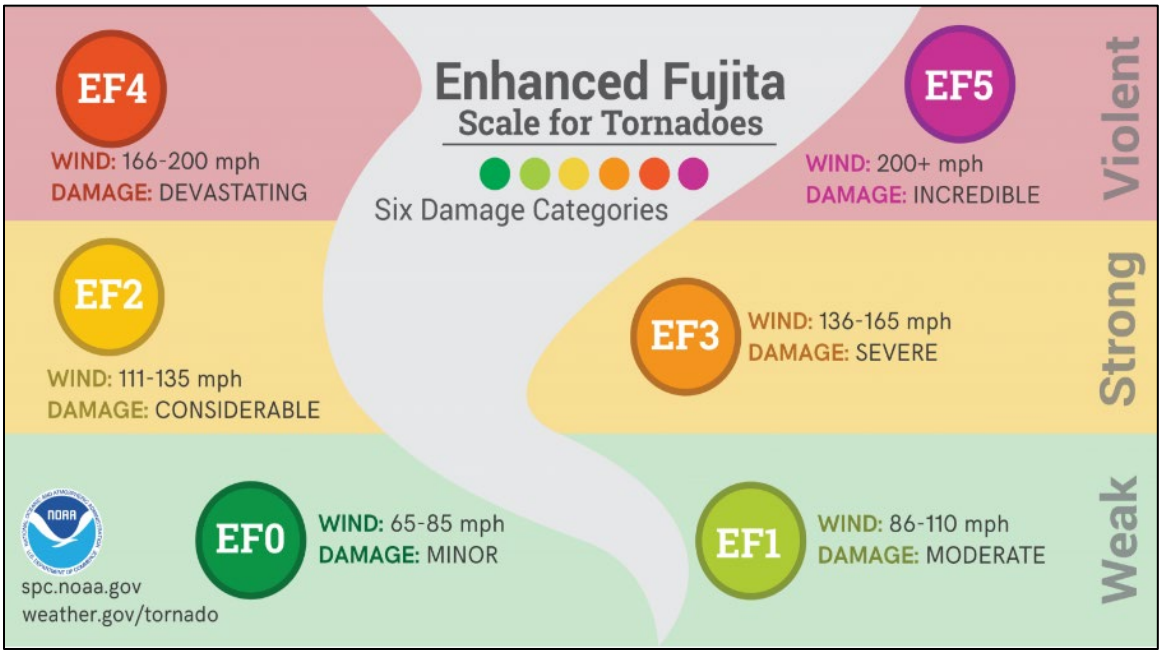
Figure 5.4.1-4. Hail Size Chart



Tornadoes

Damage from tornadoes can vary from minor damage that breaks tree limbs to massive damage demolishing homes in its path. The type of damage depends on the intensity, size, and duration of the tornado. The magnitude or severity of a tornado is categorized using the Enhanced Fujita Tornado Intensity Scale (EF Scale). This is the scale now used exclusively for determining tornado ratings by comparing wind speed and actual damage. Figure 5.4.1-5 illustrates the EF ratings, wind speeds, and expected tornado damage.

Figure 5.4.1-5. Enhanced Fujita Scale (EF Scale)



Source: NWS 2018

Straight-Line Winds

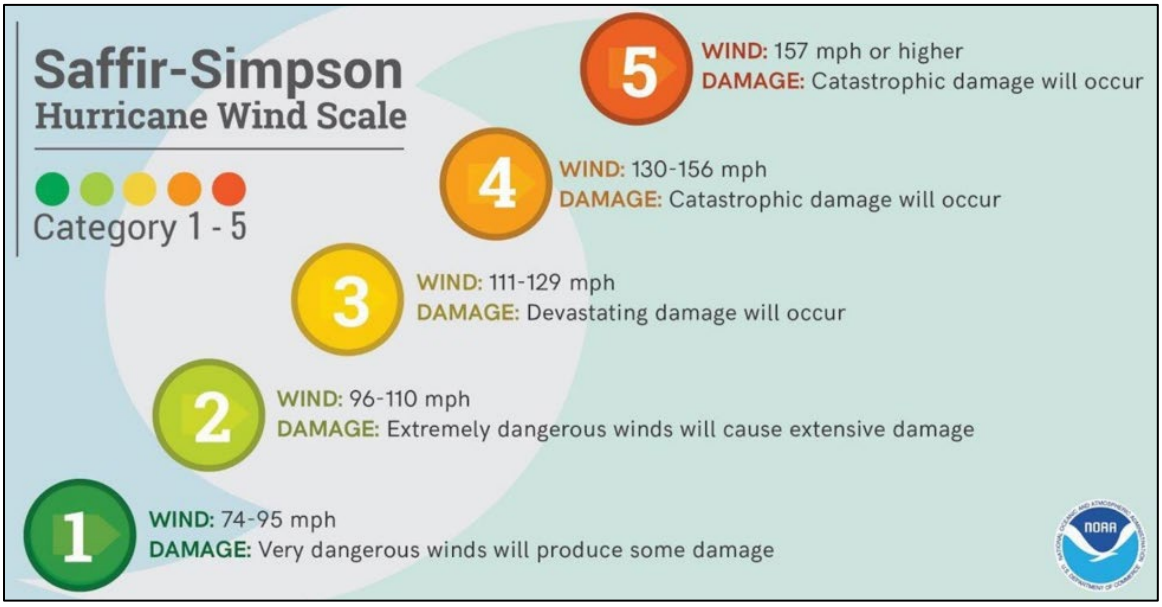
The NWS issues advisories and warnings for winds that are typically site-specific. The NWS issues high wind advisories, watches, and warnings when wind speeds can pose a hazard or are life threatening. The criterion for each of these varies from state to state. According to the NWS (2023), wind warnings and advisories for the State of New York are as follows:

- **High Wind Watch/Warnings:** Issued when sustained wind speeds of 40 mph or greater lasting for one hour or longer or for winds of 58 mph or greater for any duration or widespread damage are possible (NWS 2023).
- **Wind Advisories:** Issued when sustained winds of 30 to 39 mph are forecast for one hour or longer, or wind gusts of 46 to 57 mph for any duration (NWS 2023).

Hurricanes/Tropical Storm

The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 categorization based on the hurricane's intensity at the indicated time; however, it does not take into account other potential hazards such as storm surge, rainfall flooding, and tornadoes. The scale estimates potential property damage.

Figure 5.4.1-6. Saffir-Simpson Hurricane Wind Scale



Source: NOAA 2017

The NWS issues hurricane and tropical storm watches and warnings. These watches and warnings are issued or will remain in effect after a tropical cyclone becomes post-tropical, when such a storm poses a significant threat to life and property. The NWS allows the National Hurricane Center (NHC) to issue advisories during the post-tropical stage (NHC NOAA 2010).

Figure 5.4.1-7. NHC Hurricane Watches and Warnings

Previous Occurrences

FEMA Major Disasters and Emergency Declarations

Between 1954 and 2022, Herkimer County was included in 7 disaster (DR) or emergency (EM) declarations for severe storm-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 4 (County Profile).

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2012 and 2022, Herkimer County was included in 14 severe storm-related agricultural disaster declarations.

Previous Events

For this 2023 HMP update, known severe storm events that impacted Herkimer County between 2017 and 2022 are discussed below. For events prior to 2017, refer to Appendix E (Supplementary Data).

Table 5.4.1-1. Hazard Events in Herkimer County (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
January 10, 2017 – January 11, 2017	Strong Wind	N/A	Yes	A strong storm system moved from the eastern Great Lakes towards the St. Lawrence Valley. Ahead of this storm system, strong south to southeast winds were in place across the entire region, with the strongest winds across the higher elevations. As the storm's cold front crossed the region, winds switched to the west to southwest and continued to be gusty. These strong wind gusts resulted in many downed trees, power poles, and power lines
April 1, 2017	Excessive rain	S4265	Yes	Excessive rain
June 30, 2017	Tornado	N/A	Yes	Fast moving upper level shortwave passed through the area. With warm and muggy air mass in place, the shortwave sparked numerous strong to severe thunderstorms. The severe storms produced two EF-1 tornados in Fulton and Herkimer counties.
August 17, 2018	Lightning	N/A	Yes	A series of disturbances ahead of a cold frontal boundary brought rounds of heavy rainfall and strong to severe

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
				thunderstorms to the region. As a result of these disturbances, numerous trees and wires were downed across the region.
October 31, 2019 – November 1, 2019	Severe Storms, Straight-line Winds, and Flooding	DR-4472	Yes	A powerful storm system tracked across the eastern Great Lakes late on 31 October 2019 and produced an axis of 3 to 5 inches of rain, which caused significant flooding across the region. Strong winds aloft mixed down to the surface as an intense line of showers developed along the front, resulting in sporadic wind damage over eastern New York and western New England. A large swath of rainfall totaling 2-5 inches occurred over the Mohawk Valley and southern Adirondacks, resulting in reports of flash flooding. The runoff caused rapid rises on area creeks and streams, with four river gauges reaching record levels. The flooding was extensive over portions of the area, damaging numerous roads and structures and resulting in water rescues.
May 15, 2020	Thunderstorm Wind	N/A	Yes	Intense line of thunderstorms quickly developed near Lake Ontario and raced eastward into eastern New York. A segment of particularly strong and long-lasting thunderstorms impacted the region from just north of the Mohawk Valley in Herkimer County into Saratoga and Washington counties, producing damaging winds throughout its path. Notable areas of damage include a confirmed macroburst near Russia and Cold Brook, NY where wind estimates ranged from 80 to 100 mph

Sources: NCEI/NOAA, FEMA
Notes: NCEI/NOAA incidents are based on $25,000 or more

Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of severe storm events for the County. Information from NOAA-NCEI storm events database, the 2019 State of New York HMP, and the 2017 Herkimer County HMP were used to identify the number of severe storm events that occurred between 1950 and 2022. Table 5.4.1-2 presents the probability of future events for the dam/levee failure in the Planning Area.

Table 5.4.1-2. Probability of Future Severe Storm Events in Herkimer County

Hazard Type	Number of Occurrences Between 1970 and 2022	Percent Chance of Occurring in Any Given Year
Thunderstorms	178	100%
Lightning	10	13.7%
Hail	53	72.6%
Tornado	9	12.3%
Straight-line Winds	79	100%
Hurricane	1	1.3%
TOTAL	**330**	**100%**

Sources: NOAA NCEI 2022, State of New York 2019, FEMA 2022

Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and severe storm events as reported by NWS. Due to changes in the data collection and periods of record availability depending on the event type, not all severe storm events occurring between 1950 and 2022 are accounted for in the tally of occurrences. As a result, the probability of future occurrences may be underestimated.

Based on the County's history of severe storms, Herkimer County could experience at least five severe weather events (of any type) each year. In Section 5.3, the identified hazards of concern for Herkimer County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Partnership, the probability of occurrence for severe storms in the County is considered 'frequent'.

Climate Change Projections

Climate change is beginning to affect both people and resources in Herkimer County, and these impacts are projected to continue growing. The Integrated Assessment for Effective Climate Change in New York State (ClimAID) was undertaken to provide decision-makers with information on the state's vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge (NYSERDA 2011).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change. Herkimer County is part of Region 5. In Region 5, it is estimated that temperatures will increase by 3.0 °F to 5.5 °F by the 2050s and 4.0 °F to 8.0 °F by the 2080s (baseline of 50.0 °F, mid-range projection). Precipitation totals will increase between 0 and 5 percent by the 2050s and 5 to 10 percent by the 2080s (baseline of 38.0 inches, mid-range projection). Table 5.4.1-3 displays the projected seasonal precipitation change for ClimAID Region 5 (NYSERDA 2014).

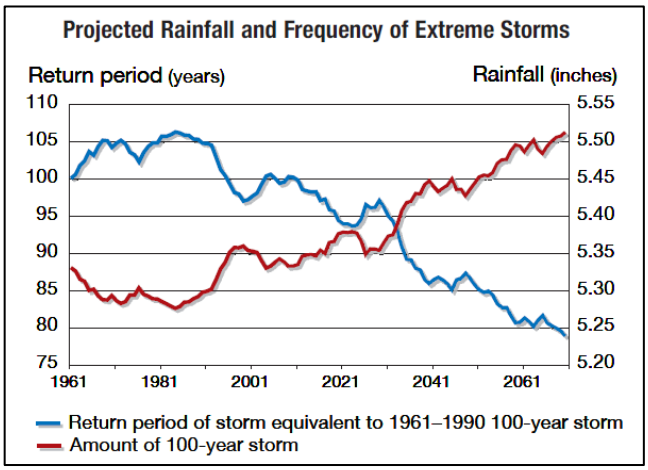
Table 5.4.1-3. Projected Seasonal Precipitation Change in Region 5, 2050s (% change)

Winter	Spring	Summer	Fall
+5 to +15	-5 to +10	-5 to +5	-5 to +10

Source: NYSERDA 2014

The projected increase in precipitation is expected to fall in heavy downpours and less in light rains. Downpours are very likely to increase in frequency and intensity, a change which has the potential to affect drinking water; heighten the risk of riverine flooding; flood key rail lines, roadways, and transportation hubs; and increase delays and hazards related to extreme weather events (NYSERDA 2011). Less frequent rainfall during the summer months may impact the ability of water supply systems. Increasing water temperatures in rivers and streams will affect aquatic health and reduce the capacity of streams to assimilate effluent wastewater treatment plants (NYSERDA 2011).

Figure 5.4.1-8. Projected Rainfall and Frequency of Extreme Storms



Source: NYSERDA 2014

Figure 5.4.1-8 displays the project rainfall and frequency of extreme storms in New York State. The amount of rainfall in a 100-year event is projected to increase, while the number of years between such storms (return period) is projected to decrease. Rainstorms will become more severe and more frequent (NYSERDA 2014).

Vulnerability Assessment

All assets in Herkimer County are at risk to hurricane and tropical storm events. Potential losses associated with high-wind events were calculated for two probabilistic wind events: the 100-year and 500-year MRP events. The impacts on population, existing structures, critical facilities, lifelines, and the economy are presented below.

Impact on life, Health, and Safety

The impact of a hurricane wind event on life, health, and safety is dependent upon several factors including the severity of the event and whether or not adequate warning time was provided to residents. All Herkimer County residents are at risk to the impacts caused by hurricane wind events (60,139 persons; 2020 Census).

The vulnerable population also includes those who would not have adequate warning from an emergency warning system (e.g., television or radio); this would include residents and visitors. The population adversely affected by severe summer weathers may also include those beyond the disaster area that rely on affected roads for transportation.

Research has shown that some populations, while they may not have more hazard exposure, may experience exacerbated impacts and prolonged recovery if/when impacted. This is due to many factors including their physical and financial ability to react or respond during a hazard. Economically disadvantaged populations are vulnerable because they are

likely to evaluate their risk and make decisions based on the major economic impact to their family and may not have funds to evacuate. The population over the age of 65 is also vulnerable and, physically, they may have more difficulty evacuating. Additionally, the elderly are considered vulnerable because they require extra time or outside assistance during evacuations and are more likely to seek or need medical attention which may not be available due to isolation during a storm event. Please refer to Section 4 (County Profile) for the statistics of these populations.

Residents may be displaced or require temporary to long-term sheltering. In addition, downed trees, damaged buildings, and debris carried by high winds can lead to injury or loss of life. Socially vulnerable populations are most susceptible, based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Hazus estimates there will be zero displaced households and no people will require temporary shelter or be displaced or will seek short-term sheltering due to 100-year and 500-year MRP events.

Impact on General Building Stock

Damage to buildings is dependent upon several factors, including wind speed, storm duration, and path of the storm track. Building construction also plays a major role in the extent of damage resulting from a coastal storm. Due to differences in construction, residential structures are generally more susceptible to wind damage than commercial and industrial structures. Mobile/manufactured homes, and structures constructed of wood and masonry buildings, in general, tend to experience more damage than concrete or steel buildings.

To better understand these risks, Hazus was used to estimate the expected wind-related building damages. Specific types of wind damages are also summarized in Hazus at the following wind damage categories: no damage/very minor damage, minor damage, moderate damage, severe damage, and total destruction. Table 5.4.1-4 summarizes the definition of the damage categories. Table 5.4.1-5 summarizes the number and type of buildings and their estimated severity of expected damage.

Table 5.4.1-4. Description of Damage Categories

Qualitative Damage Description	Roof Cover Failure	Window Door Failures	Roof Deck	Missile Impacts on Walls	Roof Structure Failure	Wall Structure Failure
No Damage or Very Minor Damage Little or no visible damage from the outside. No broken windows, or failed roof deck. Minimal loss of roof cover, with no or very limited water penetration.	≤2%	No	No	No	No	No
Minor Damage Maximum of one broken window, door or garage door. Moderate roof cover loss that can be covered to prevent	>2% and≤15%	One window, door, or garage door failure	No	<5 impacts	No	No

Qualitative Damage Description	Roof Cover Failure	Window Door Failures	Roof Deck	Missile Impacts on Walls	Roof Structure Failure	Wall Structure Failure
additional water entering the building. Marks or dents on walls requiring painting or patching for repair.						
Moderate Damage Major roof cover damage, moderate window breakage. Minor roof sheathing failure. Some resulting damage to interior of building from water.	>15% and≤50%	> one and ≤the larger of20% & 3	1 to 3panels	Typically 5 to 10impacts	No	No
Severe Damage Major window damage or roof sheathing loss. Major roof cover loss. Extensive damage to interior from water.	>50%	> the larger of 20% & 3and ≤50%	>3 and≤25%	Typically 10 to 20impacts	No	No
Destruction Complete roof failure and/or, failure of wall frame. Loss of more than 50% of roof sheathing.	Typically >50%	>50%	>25%	Typically >20impacts	Yes	Yes

Source: Hazus Hurricane Technical Manual

Table 5.4.1-5. Expected Severity of Damages from the 100-Year and 500-Year Mean Return Period Hurricane Wind Events

Occupancy Class	Total Number of Buildings Assessed in Occupancy	Severity of Expected Damage	100-Year Mean Return Period Hurricane		500-Year Mean Return Period Hurricane	
			Building Count	Percent of Buildings in Occupancy Class	Building Count	Percent of Buildings in Occupancy Class
Residential Exposure (Single and Multi-Family Dwellings)	28,523	None	0	0	28,512	100.0%
		Minor	0	0	10	0.0%
		Moderate	0	0	0	0.0%
		Severe	0	0	0	0.0%
		Complete Destruction	0	0	0	0.0%
Commercial Buildings	1,316	None	0	0	1,313	100.0%
		Minor	0	0	3	0.2%
		Moderate	0	0	0	0.0%
		Severe	0	0	0	0.0%
		Complete Destruction	0	0	0	0.0%
Industrial Buildings	387	None	0	0	386	100.0%
		Minor	0	0	1	0.3%
		Moderate	0	0	0	0.0%
		Severe	0	0	0	0.0%
		Complete Destruction	0	0	0	0.0%
Government, Religion, Agricultural, and	438	None	0	0	437	100.0%
		Minor	0	0	1	0.2%
		Moderate	0	0	0	0.0%

Occupancy Class	Total Number of Buildings Assessed in Occupancy	Severity of Expected Damage	100-Year Mean Return Period Hurricane		500-Year Mean Return Period Hurricane	
			Building Count	Percent of Buildings in Occupancy Class	Building Count	Percent of Buildings in Occupancy Class
Education Buildings		Severe	0	0	0	0.0%
		Complete Destruction	0	0	0	0.0%

Source: Census 2020; 2021; Hazus v5.1
Notes: % = Percent; < = Less Than

Table 5.4.1-6 summarizes the replacement cost value damage for all occupancies estimated for the 500-year MRP wind-only events. Based on the results of the Hazus analysis, there are no expected damages due to the 100-year MRP event related to the built infrastructure in the County. Damage estimates are reported for the County's probabilistic Hazus model scenarios. The data shown indicates total losses associated with wind damage to the building only.

The total damage to buildings for all occupancy types across Herkimer County is estimated to be approximately $552,349 for the 500-year MRP wind-only event. The majority of these losses are to residential buildings. Due to differences in building construction, residential structures are generally more susceptible to wind damage than commercial and industrial structures. The damage counts include buildings damaged at all severity levels from minor damage to destruction. Total dollar damage reflects the overall impact to buildings at an aggregate level. The Town of Little Falls is estimated to experience the greatest damage, approximately $57,339 in a 500-year MRP event.

Table 5.4.1-6. Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane Wind Events

Jurisdiction	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane	Percent of Total	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for Residential Structures Only	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for Commercial Structures Only
Cold Brook (V)	$108	<0.1%	$108	$0
Columbia (T)	$25,449	<0.1%	$25,449	$0
Danube (T)	$24,479	<0.1%	$24,479	$0
Dolgeville (V)	$10,235	<0.1%	$10,235	$0
Fairfield (T)	$12,030	<0.1%	$12,030	$0
Frankfort (T)	$37,342	<0.1%	$37,342	$0
Frankfort (V)	$9,874	<0.1%	$9,874	$0
German Flatts (T)	$54,660	<0.1%	$54,660	$0
Herkimer (T)	$33,081	<0.1%	$33,081	$0
Herkimer (V)	$18,513	<0.1%	$18,513	$0
Ilion (V)	$33,828	<0.1%	$33,828	$0

Jurisdiction	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane	Percent of Total	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for Residential Structures Only	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for Commercial Structures Only
Litchfield (T)	$21,751	<0.1%	$21,751	$0
Little Falls (C)	$57,339	<0.1%	$57,339	$0
Little Falls (T)	$18,742	<0.1%	$18,742	$0
Manheim (T)	$5,656	<0.1%	$5,656	$0
Middleville (V)	$241	<0.1%	$241	$0
Mohawk (V)	$32,725	<0.1%	$32,725	$0
Newport (T)	$9,240	<0.1%	$9,240	$0
Newport (V)	$174	<0.1%	$174	$0
Norway (T)	$10,555	<0.1%	$10,555	$0
Ohio (T)	$14,718	<0.1%	$14,718	$0
Poland (V)	$146	<0.1%	$146	$0
Russia (T)	$11,852	<0.1%	$11,852	$0
Salisbury (T)	$19,968	<0.1%	$19,968	$0
Schuyler (T)	$19,912	<0.1%	$19,912	$0
Stark (T)	$25,642	<0.1%	$25,642	$0
Warren (T)	$27,210	<0.1%	$27,210	$0
Webb (T)	$0	0%	$0	$0
West Winfield (V)	$654	<0.1%	$654	$0
Winfield (T)	$16,225	<0.1%	$16,225	$0
Herkimer County (Total)	**$552,349**	**<0.1%**	**$552,349**	**$0**

Source: Census 2010; Census 2020; Hazus v5.1

Notes: C = City; T = Town; V = Village; % = Percent; < = Less Than

Impact on Critical Facilities and Community Lifelines

Critical facilities may experience structural damage directly from high winds or falling tree limbs/flying debris, which can also result in the loss of power. Power loss can greatly impact households, business operations, public utilities, and emergency personnel. The elderly population may be more vulnerable if power loss results in interruption of heating and cooling services, stagnated hospital operations, and potable water supplies. Emergency personnel such as police, fire, and EMS may not be able to effectively respond and maintain the safety of its residents.

Hazus estimates the probability that critical facilities (i.e., medical facilities, fire/EMS, police, EOC, schools, and user-defined facilities such as shelters and municipal buildings) could sustain damage as a result of 100-year and 500-year MRP wind events. Additionally, Hazus estimates the loss of use for each facility in number of days. Due to the sensitive nature of the critical facility dataset, individual facility estimated loss is not provided.

Table 5.4.1-7 summarizes the percent probability that each facility type may experience damage as a result of the 500-year mean return period hurricane wind event.

Table 5.4.1-7. Estimated Impacts to Critical Facilities and Lifelines from the 500-Year Mean Return Period Hurricane Wind Event

Facility Type	500-Year Mean Return Period Hurricane				
		Percent-Probability of Sustaining Damage			
	Loss of Days	Minor	Moderate	Severe	Complete
Emergency Response Centers	0	0.3%	0.0%	0.0%	0.0%
Fire Stations	0	0% - 0.2%	0.0%	0.0%	0.0%
Medical Care Facilities	0	0% - <0.1%	0.0%	0.0%	0.0%
Police Stations	0	0% - 0.3%	0.0%	0.0%	0.0%
Schools	0	0% - 0.1%	0.0%	0.0%	0.0%

Source: Hazus v5.1

At this time, Hazus does not estimate losses to transportation lifelines and utilities as part of the hurricane model. Transportation lifelines are not considered particularly vulnerable to the wind hazard; they are more vulnerable to cascading effects such as flooding, falling debris etc. Impacts to transportation lifelines affect both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting) transportation needs.

Impact on the Economy

Damage to structures from flooding and wind occur immediately; however, this damage can have long-lasting impacts on the economy. When a business is closed during storm recovery, there is lost economic activity in the form of day-to-day business and wages to employees. Overall, economic impacts include the loss of business function (e.g., tourism, recreation), damage to inventory, relocation costs, wage loss and rental loss due to the repair/replacement of buildings.

Hazus estimates the total economic loss associated with each storm scenario (direct building losses and business interruption losses). Direct building losses are the estimated costs to repair or replace the damage caused to the building. This is reported in the "Impact on General Building Stock" subsection discussed earlier. Business interruption losses are the losses associated with the inability to operate a business because of the wind damage sustained during the storm or the temporary living expenses for those displaced from their home because of the event. Refer to Table 5.4.1-8 for a summary of Hazus estimated economic losses for Herkimer County caused by the 100-year and the 500-year mean return period hurricane wind events.

Table 5.4.1-8. Estimated Economic Losses for the 100-Year and 500-Year Mean Return Period Hurricane Wind Events

Mean Return Period (MRP)	Inventory Loss	Income Loss	Relocation Loss	Building Losses	Content Losses	Wages Losses	Rental Losses
100-year	$0	$0	$0	$0	$0	$0	$0
500-year	$0	$0	$570	$552,590	$221,730	$0	$0

Source: Hazus v5.1

Debris management can be costly. Hazus estimates the amount of debris that might be produced as result of the 100-year and 500-year mean return period hurricane wind events. Because the estimated debris production does not include debris generated by flooding, this is likely a conservative estimate and could be higher if multiple impacts occur. According to the Hazus Hurricane User Manual, estimates of weight and volume of eligible tree debris consist of downed trees that would likely be collected and disposed at public expense. Refer to the User Manual for additional details regarding these estimates. Hazus does not estimate a significant amount of debris will be generated during a 100-year mean return period wind event. County-wide, it is estimated that approximately 7,936 tons of tree material will be generated during a 500-year event. Table 5.4.1-9 summarizes the estimated debris by municipality for the 500-year mean return period hurricane wind events, respectively, which should be considered a lower-bound analysis.

Table 5.4.1-9. Debris Production for the 500-Year Mean Return Period Hurricane Wind Event

Jurisdiction	Estimated Debris Created During the 500-Year Mean Return Period Hurricane Wind Event			
	Brick and Wood (Tons)	Concrete and Steel (Tons)	Tree (Tons)	Eligible Tree Volume (Cubic Yards)
Cold Brook (V)	0.0	0	0	0
Columbia (T)	0.3	0	1,134	560
Danube (T)	0.0	0	960	545
Dolgeville (V)	1.0	0	0	0
Fairfield (T)	0.0	0	0	0
Frankfort (T)	0.5	0	0	0
Frankfort (V)	0.5	0	0	1,006
German Flatts (T)	1.4	0	957	711
Herkimer (T)	0.2	0	6	26
Herkimer (V)	0.8	0	26	31
Ilion (V)	1.6	0	47	0
Litchfield (T)	0.2	0	965	476
Little Falls (C)	3.0	0	129	419
Little Falls (T)	0.0	0	710	406
Manheim (T)	0.0	0	2	9
Middleville (V)	0.0	0	0	0
Mohawk (V)	1.0	0	29	197
Newport (T)	0.0	0	0	0
Newport (V)	0.0	0	0	0
Norway (T)	0.0	0	0	0
Ohio (T)	0.0	0	0	0
Poland (V)	0.0	0	0	0
Russia (T)	0.0	0	0	0
Salisbury (T)	0.0	0	0	0
Schuyler (T)	0.0	0	0	0
Stark (T)	0.0	0	1,007	571
Warren (T)	0.3	0	1,211	598
Webb (T)	0.0	0	0	0
West Winfield (V)	0.0	0	29	0
Winfield (T)	0.2	0	724	357

Jurisdiction	Estimated Debris Created During the 500-Year Mean Return Period Hurricane Wind Event			
	Brick and Wood (Tons)	Concrete and Steel (Tons)	Tree (Tons)	Eligible Tree Volume (Cubic Yards)
Herkimer County	**11**	**0**	**7,936**	**5,914**

Source: Hazus v5.1

Notes: C = City; T = Town; V = Village

Impact on the Environment

Extreme winds from hurricanes or tropical storms may create several tons of debris because the wind tears apart foliage and trees. Plants along waterways may be uprooted from surge causing even further instability and alterations of the shoreline. Consequentially, natural habitat that shelters the County from wind and storm surge can be destroyed, impacting future mitigation.

Cascading Impacts on Other Hazards

The impacts of hurricane related windstorms on the environment typically take place over a larger area. Where these events occur, widespread, severe damage to plant species is likely. This includes uprooting or destruction of trees and an increased threat of wildfire in areas where dead trees are not removed. Section 5.4.5 (Flood) provides additional environmental impacts due to flooding from heavy rainfalls.

Future Changes That May Impact Vulnerability

Understanding future changes that effect vulnerability in the County can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Understanding future changes that impact vulnerability in the Herkimer County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. It is anticipated that any new development and new residents will be exposed to the hurricane and tropical storm hazard. However, due to increased standards and codes, new development might be less vulnerable to wind-related hazards compared to the aging building stock. The tables and hazard maps included in the jurisdictional annexes contain additional information regarding the specific areas of development that would increase County vulnerability to a wind event.

Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 3.4 percent since 2010. The County's population is anticipated to decrease by 2040 (a projected 2.7%). Refer to Section 4 (County Profile), which includes a discussion on population trends for the County.

Climate Change

As discussed above, most studies project that the State of New York will see an increase in average annual temperatures and precipitation. An increase in temperatures may also lead to an increase in the frequency and intensity of severe storm events. More frequent and severe storms will increase the County's vulnerability to both wind-related and storm surge impacts.

The northeast region of the United States has experienced a greater increase in extreme precipitation than any other region in the U.S. between 1958 and 2010, the Northeast experienced more than 70 percent increase in the amount of precipitation falling in rain events (Global Change 2014). Refer to Section 5.4.3 (Flood) for a discussion related to the impact of climate change due to increases in rainfall. With an increased likelihood of more frequent storm events and associated strong winds and tornado events, the County's assets continue to be at risk.

Change of Vulnerability Since the 2017 HMP

Since the 2017 HMP was drafted, Hazus version 5.1 was used to assess the County's overall risk to the 100-year and 500-year mean return period hurricane wind events. Overall, this vulnerability assessment uses a more accurate and updated asset inventory which provides more accurate estimated exposure to the severe storm hazard.

5.4.8 Wildfire

Hazard Profile

Hazard Description

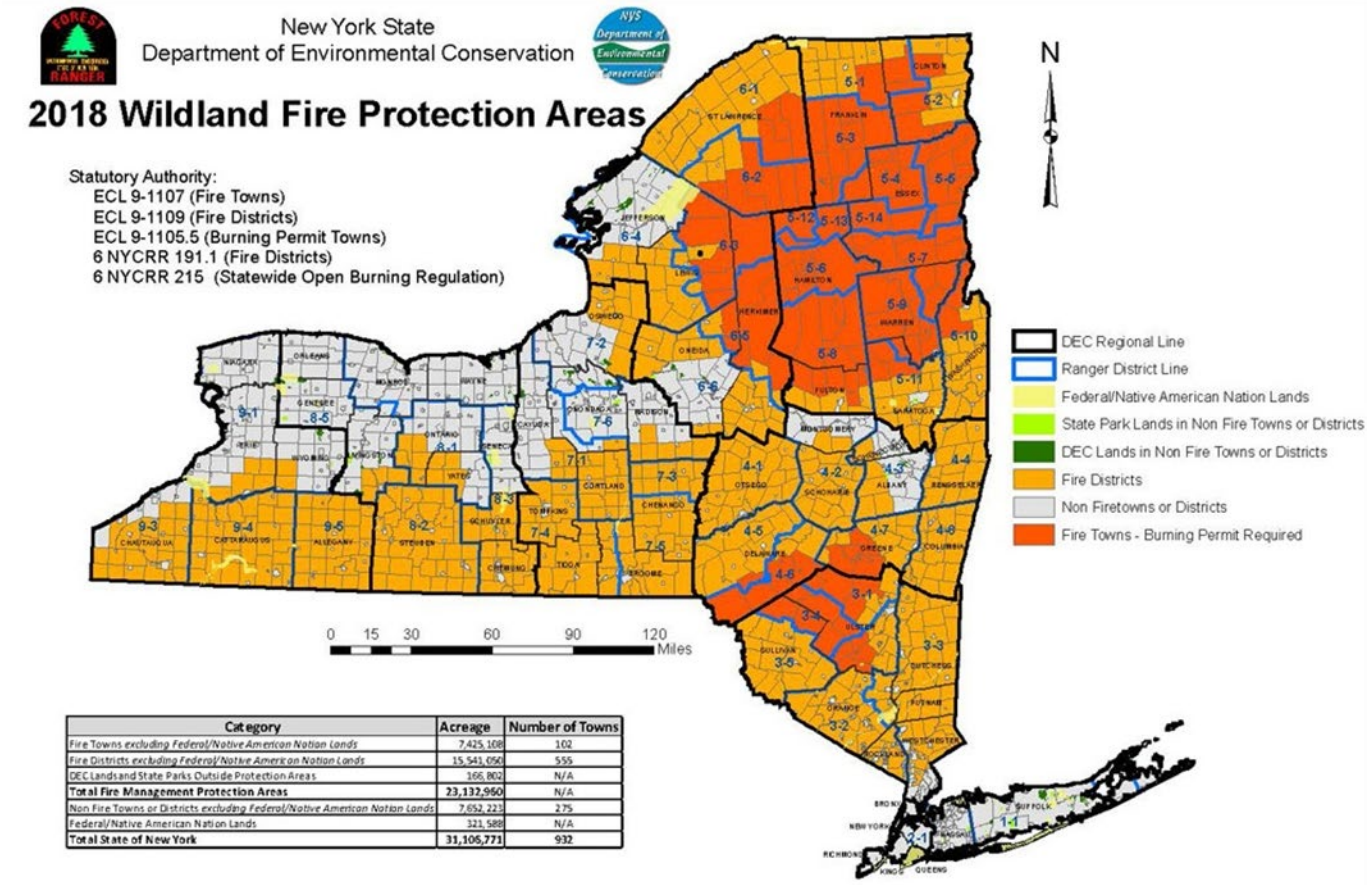
Wildfire is defined as an uncontrolled fire spreading through natural or unnatural vegetation that can threaten lives and property if not contained. Wildfires are commonly termed forest fires, brush fires, grass fires, wildland-urban interface fires, range fires, or ground fires. Wildfires do not include fires naturally or purposely ignited to manage vegetation for one or more benefits (NYS DHSES 2019). Although destructive fires do not occur annually, the State's fire history shows a cycle of outbreaks that have caused human death, property loss, forest destruction, and air pollution (NYS DHSES 2019).

Location

According to the U.S. Fire Administration (USFA), the fire problem in the United States varies from region to region. This variation often is a result of climate, poverty, education, demographics, and other causal factors (USFA 2022). Wildfires do occur in Herkimer County. Many areas in the County, particularly those that are heavily forested or contain large tracts of brush and shrubs, are prone to fires (NYSDEC 2015).

In New York State, the NYSDEC's Division of Forest Protection (Forest Ranger Division) is designated as the state's lead agency for wildfire mitigation. The Forest Ranger Division has a statutory requirement to provide a forest fire protection system for 657 of the 932 jurisdictions throughout New York State. This jurisdiction includes cities and villages and covers 23.1 million acres of land, including all state-owned land outside of the jurisdictions. The Lake Ontario Plains and New York City-Long Island areas are the general areas not under the statutory requirement. Records on wildfires in this area are collected from fire department reports to evaluate any need to expand statutory responsibilities. displays the fire protection areas in New York State. Figure 5.4.1-1 indicates that, as of 2018, Herkimer County is part of wildfire protection areas 6-3, 6-5, and 6-6. Figure 5.4.1-2 shows the Forest Ranger Divisions in New York State. Herkimer County is part of Forest Ranger Division 6 (NYSDEC 2022).

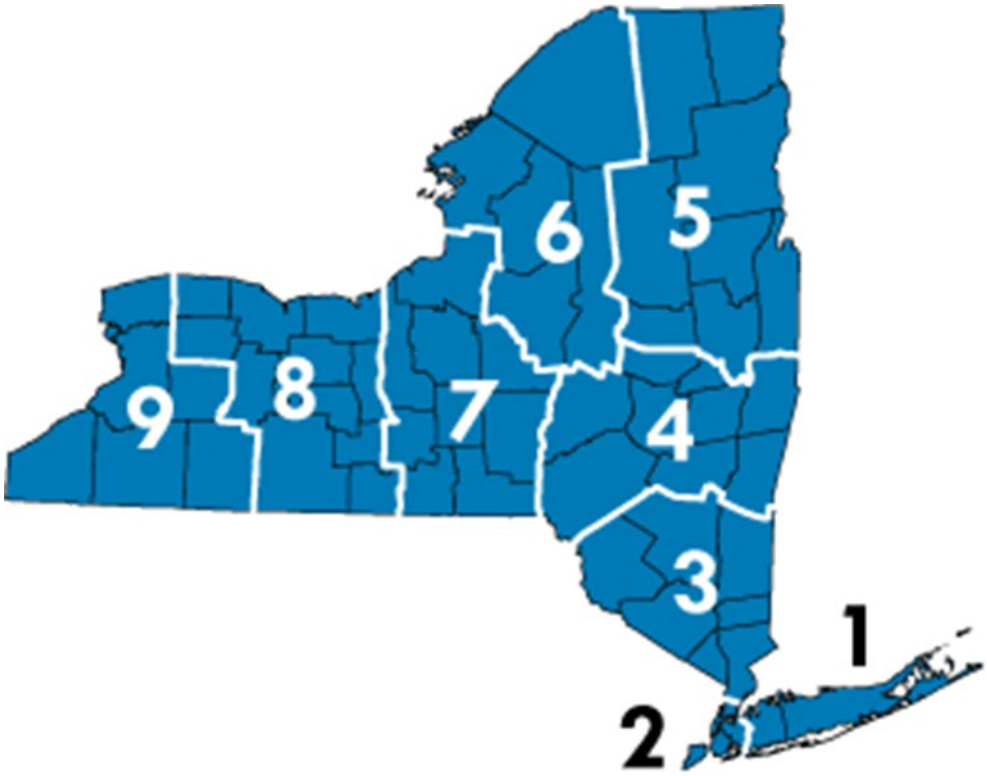
Figure 5.4.1-1 Wildland Fire Protection Areas



Category	Acreage	Number of Towns
Fire Towns excluding Federal/Native American Nation Lands	7,425,108	102
Fire Districts excluding Federal/Native American Nation Lands	15,541,056	555
DEC Lands and State Parks Outside Protection Areas	166,802	N/A
Total Fire Management Protection Areas	**23,132,960**	N/A
Non Fire Towns or Districts excluding Federal/Native American Nation Lands	7,652,223	275
Federal/Native American Nation Lands	321,588	N/A
Total State of New York	**31,106,771**	932

Source: NYSDEC 2018

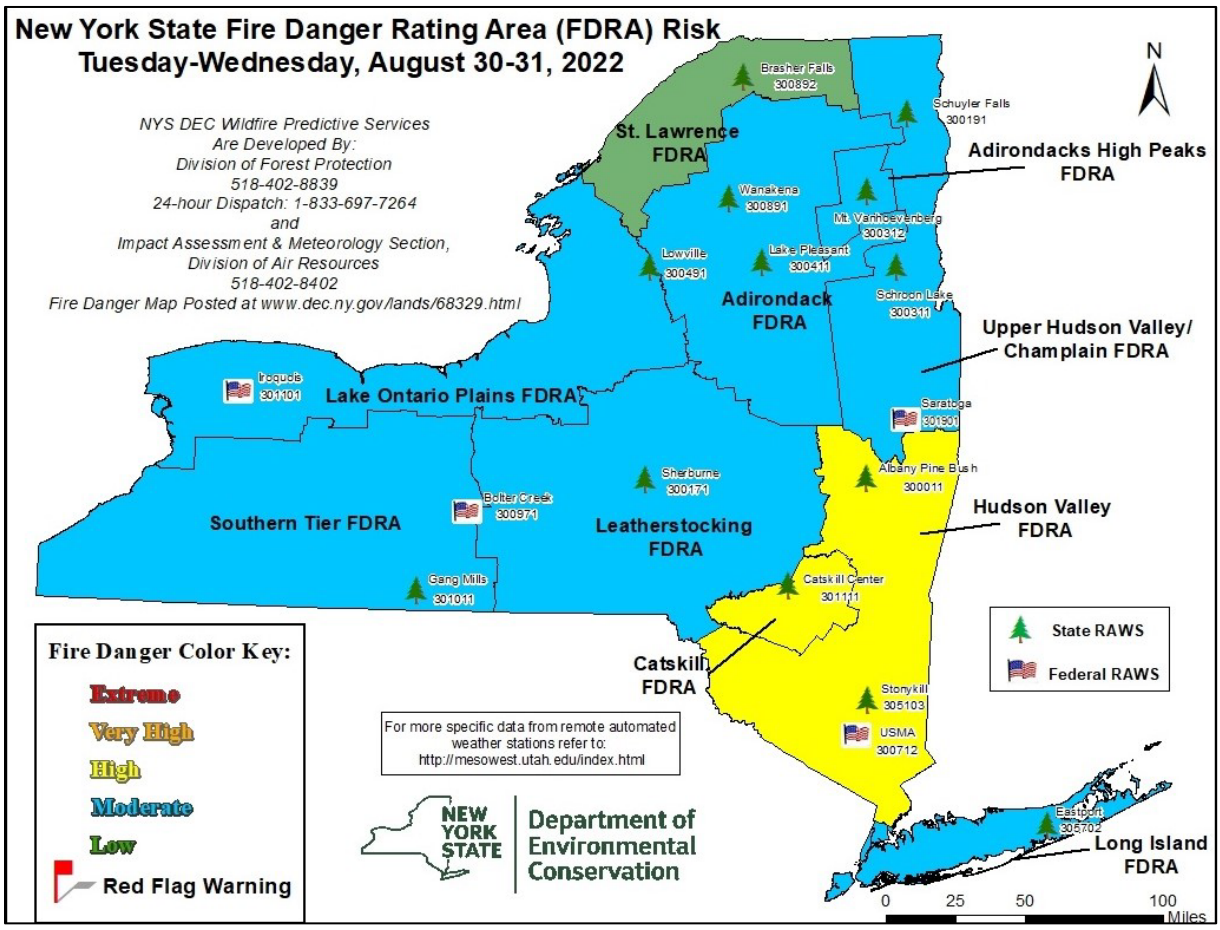
Figure 5.4.1-2. Forest Ranger Division Wildfire Protection Areas



Source: NYSDEC 2022

New York State is divided into 10 Fire Danger Rating Areas (FDRAs). FDRAs are defined as areas of similar vegetation, climate, and topography in conjunction with agency regional boundaries, NWS fire weather zones, political boundaries, fire occurrence history, and other influences. Herkimer County is part of the Adirondack FDRA. The Forest Ranger Division issues daily fire danger warnings when the fire danger rating within one or more FDRAs is at "high" or above. A current fire danger rating map is updated daily on the NYSDEC website. Figure 5.4.1-3 shows an example of this map.

Figure 5.4.1-3. New York State Fire Danger Rating Areas



Source: NYSDEC 2022

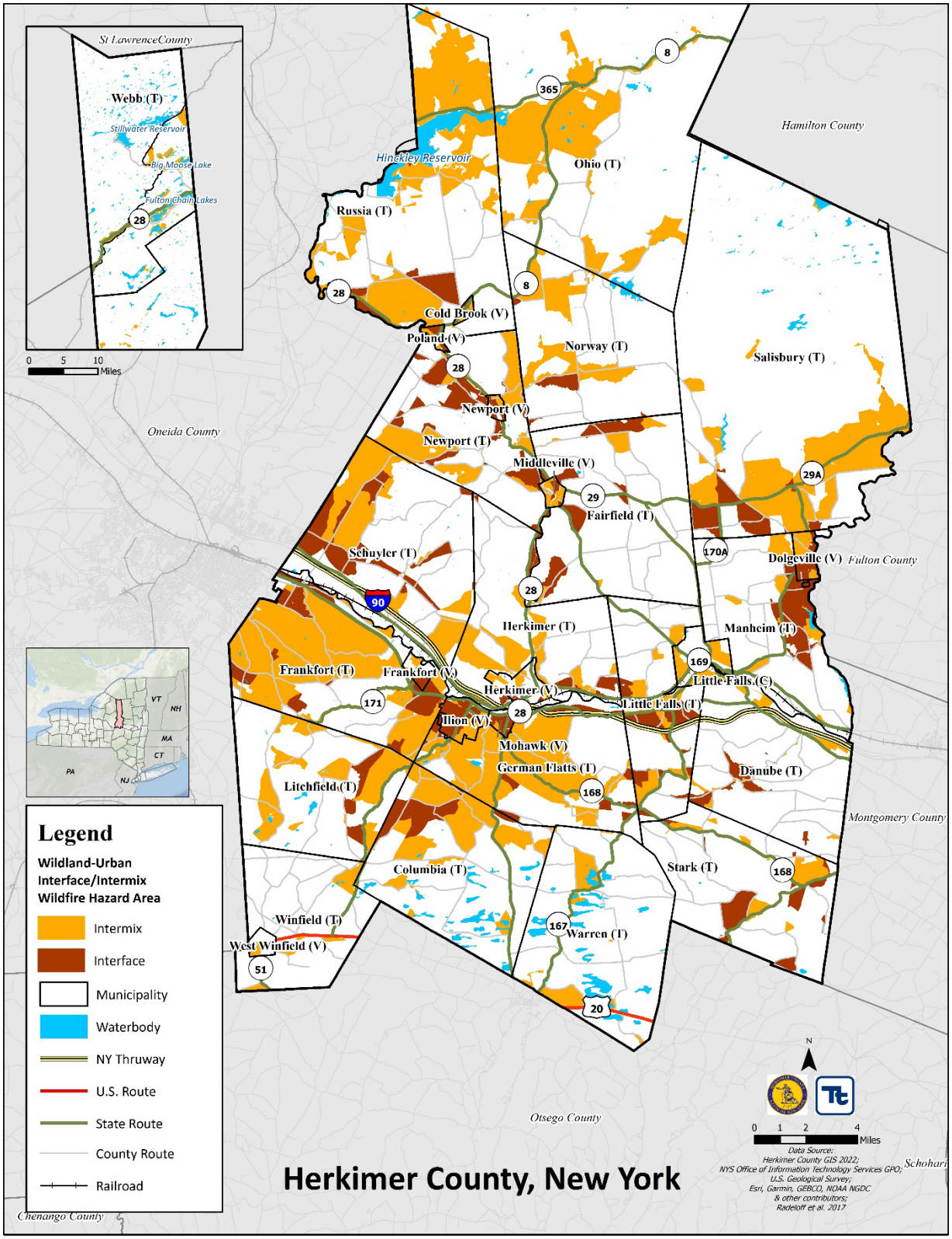
Wildfire/Urban Interface (WUI) in New York State/Herkimer County

The wildland/urban interface (WUI) is any location where human structures and woodlands intermingle, allowing a wildland fire to reach beyond trees, brush, and other natural fuels to ignite homes and their immediate surroundings (NYSDEC n.d.). The WUI can also be subdivided into three categories: intermix, interface, and occluded / interior (Sustainable Defensible Space n.d.). The NYS HMP indicates that New York State has all three types of WUI interfaces. The Adirondack and Catskill Mountains contain large tracts of forests with the mixed, and to a lesser extent, the classic interface occurring throughout. The remainder of the state contains classic and mixed interfaces, with some major cities containing an occluded interface. Population migration from urban to suburban and rural living will continue, increasing the possibility of loss or damage to structures in the WUI, for a number of reasons. Many property owners are unaware that a threat from a wildfire exists or that their homes are not defensible from it. Water supplies at the scene in the WUI are often inadequate. Access by firefighting equipment is often blocked or hindered by driveways that are narrow, winding, dead-ended, have tight turning radii, or have weight restrictions. Most wildland fire

suppression personnel are inadequately prepared for fighting structural fires, and local fire departments are not usually fully trained or equipped for wildfire suppression. Furthermore, the mix of structures, ornamental vegetation, and wildland fuels may cause erratic fire behavior. These factors and others substantially increase risk to life, property, and economic welfare in the WUI. While many interface communities are present throughout New York State and Herkimer County, an official list that details the location, type of interface, and surrounding fuel makeup does not exist (NYS DHSES 2011).

A detailed WUI (interface and intermix) that also defines the wildfire hazard area was obtained through the SILVIS Laboratory, Department of Forest Ecology and Management, University of Wisconsin – Madison**.** The California Fire Alliance determined that areas within 1.5 miles of wildland vegetation are the approximate distance that firebrands can be carried from a wildland fire to the roof of a house. Therefore, even structures not located within the forest are at risk from wildfire. This buffer distance, along with housing density and vegetation type, were used to define the WUI illustrated on Figure 5.4.1-4 below (Radeloff 2018). Specifically, significant portions of land area in the Town of Frankfort, Village of Ilion, and Village of Mohawk are within the WUI interface/intermix.

Figure 5.4.1-4. WUI in Herkimer County



Extent

Wildfire events can range in size and intensity. A wildfire's intensity depends significantly on both meteorological conditions and human activity.

Wildfire Behavior and Fire Ecology

Fire behavior is defined as the way fuel ignites, flame develops, and fire spreads, which depend on interactions among fuel, weather, and topography. Fire behavior is one of the most important aspects of wildfires because almost all actions in response to a fire depend on how it behaves. The extent to which fire manages can understand and predict fire behavior relies on success in pre-suppression planning and actual suppression of wildfires.

Potential for wildfire and its subsequent development (growth) and severity are controlled by the three principal factors of topography, fuel, and weather, described as follows:

Topography – Topography can powerfully influence wildfire behavior. Movement of air over the terrain tends to direct a fire's course. A gulch or canyon can funnel air and act as a chimney, intensifying fire behavior and inducing faster spread. Saddles on ridgetops tend to offer lower resistance to passage of air and draw fires. Solar heating of drier, south-facing slopes produces upslope thermal winds that can complicate behavior. Slope is an important factor. If the percentage of uphill slope doubles, the rate the wildfire spreads will most likely double as well. Terrain can inhibit wildfires: fire travels downslope much more slowly than it does upslope, and ridgetops often mark the end of a wildfire's rapid spread (FEMA 1997).

Fuel – Fuels are classified by weight or volume (fuel loading) and by type. Fuel loading is used to describe the amount of vegetative material available. If this amount doubles, energy released can also double. Each fuel type is given a burn index—an estimate of amount of potential energy that may be released, effort required to ignite a fire in a given fuel and expected flame length. Different fuels have different burn qualities, and some burn more easily than others. Grass fires release relatively little energy but can sustain very high rates of spread (FEMA 1997). According to the U.S. Forest Service (USFS), a forest stand may consist of several layers of live and dead vegetation in the understory (surface fuels), midstory (ladder fuels), and overstory (crown fuels):

- Surface fuels consist of grasses, shrubs, litter, and woody material lying on the ground. Surface fires burn low vegetation, woody debris, and litter. Under the right conditions, surface fires reduce likelihood that future wildfires will grow into crown fires.
- Ladder fuels consist of live and dead small trees and shrubs; live and dead lower branches from larger trees, needles, vines, lichens, mosses; and any other combustible biomass between the top of surface fuels and bottom of overstory tree crowns.
- Crown fuels are suspended above the ground in treetops or other vegetation and consist mostly of live and dead fine material. When historically low-density forests become

overcrowded, tree crowns may merge and form a closed canopy. Tree canopies constitute the primary fuel layer in a forest crown fire (USFS 2013).

Weather / Air Mass – Weather is the most important factor influencing fire behavior, but it is always changing. Air mass, defined by the National Weather Service (NWS) as a body of air covering a relatively wide area and exhibiting horizontally uniform properties, can affect wildfire through climatic factors that include temperature and relative humidity, local wind speed and direction, cloud cover, precipitation amount and duration, and stability of the atmosphere at the time of the fire (NWS 2009). Extreme weather leads to extreme events, and often a subsidence of severe weather marks the end of a wildfire's growth and the beginning of successful containment. High temperatures and low humidity can produce vigorous fire activity. Fronts and thunderstorms can produce winds that radically and suddenly change in speed and direction, causing similar changes in fire activity. The rate of spread of a fire varies directly with wind velocity. Winds may play a dominant role in directing the course of a fire. The most damaging firestorms are typically marked by high winds (FEMA 1997).

Several tools are available to estimate fire potential, extent, danger, and growth, including, but not limited to, the following:

- The Wildland Fire Assessment System (WFAS) is an internet-based information system that provides a national view of weather and fire potential, including national fires danger, weather maps, and satellite-derived "greenness" maps (USFS n.d.).
- The Fire Potential Index (FPI) is derived by combining information on daily weather and vegetation condition and can identify areas most susceptible to fire ignition (Burgan, Klaver and Klaver 2000).
- Fuel Moisture (FM) content is quantity of water in a fuel particle expressed as a percent of oven-dry weight of the fuel particle and is an expression of cumulative effects of past and present weather events, to help evaluate the effects of current or future weather on fire potential (Burgan, Klaver and Klaver 2000).
- The Keetch-Byram Drought Index (KBDI) is designed for fire potential assessment and is a number representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency in deep duff and upper soil layers (USFS n.d.).
- The Haines Index, also known as the Lower Atmosphere Stability Index, is a fire weather index based on stability and moisture content of the lower atmosphere that measures potential for existing fires to become large fires (USFS n.d.).
- The Buildup Index (BUI) is a number that reflects combined cumulative effects of daily drying and precipitation in fuels with a 10-day time lag constant (North Carolina Forest Service 2009).

The Fire Danger Rating in New York is established using information from the National Fire Danger Rating System (NFDRS) and takes into account current and antecedent weather, fuel types, and both live and dead fuel moisture. This information is provided by local station managers (USFS n.d.) in

each of the ten regions of New York State. Herkimer County is part of the Adirondack FDRA. Table 5.4.1-1 lists fire danger ratings and color codes, also used by NYSDEC to update its fire danger rating maps, identified earlier.

Table 5.4.1-1. Description of Fire Danger Ratings in New York State

Adjective Rating Class and Color Code	Class Description
Red Flag	A short-term, temporary warning, indicating the presence of a dangerous combination of temperature, wind, relative humidity, fuel or drought conditions that can contribute to new fires or rapid spread of existing fires. A Red Flag Warning can be issued at any Fire Danger level.
Extreme (Red)	Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous, except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessens.
Very High (orange)	Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.
High (yellow)	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly, and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small.
Moderate (blue)	Fires can start from most accidental causes but, with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.
Low (green)	Fuels do not ignite readily from small firebrands, although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering and burn in irregular fingers. There is little danger of spotting.

Source: NYS DHSES 2022

Previous Occurrences

FEMA Major Disasters and Emergency Declarations

Between 1954 and 2022, Herkimer County was not included in any disaster (DR) or emergency (EM) declarations for wildfire-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2023). Detailed information about the declared disasters since 1954 is provided in Section 4 (County Profile).

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2017 and 2022, Herkimer County was not included in any wildfire-related agricultural disaster declarations (USDA 2023).

Previous Events

For this 2023 HMP update, known wildfire events that impacted Herkimer County between 2017 and 2023 are discussed below. For events prior to 2017, refer to Appendix (Supplementary Data).

According to a review of FEMA disasters, the NOAA NCEI storm events database, and a search of local news, no significant wildfire events occurred in Herkimer County between 2017 and 2023 (NOAA NCEI 2023; FEMA 2023).

Probability of Future Occurrences

According to the New York State Forest Ranger Division, wildfire occurrence data from 1993 to 2017 have shown that New York State, including Herkimer County, is susceptible to wildfires. Beginning in 2010, New York State enacted revised open burning regulations that ban brush burning statewide during this time period. Forest ranger data indicate that this new statewide ban resulted in 74 percent fewer wildfires caused by debris burning in upstate New York from 2010 to 2012. Forest ranger and fire department historical fire occurrence data recorded after the new burn ban regulations were enacted in 2010 will serve as a benchmark for analysis of wildfire occurrence (NYS DHSES 2014).

Fire probability depends on local weather conditions, outdoor activities (such as camping, debris burning, and construction) and the degree of public cooperation with fire prevention measures. Dry weather, such as drought, can increase the likelihood of wildfire events. Lightning can also trigger wildfire and urban fire events. Other natural disasters can increase the probability of wildfires by producing fuel in both urban and rural areas. Forest damage from hurricanes and tornadoes may block interior access roads and fire breaks, pull down overhead power lines, or damage pavement and underground utilities (NVRC 2006).

Wildfire experts point to four reasons why wildfire risks are increasing:

- Fuel, in the form of fallen leaves, branches, and plant growth, has accumulated over time on the forest floor. Now, this fuel has the potential to "feed" a wildfire.
- Increasingly hot, dry weather has occurred and will occur within the United States.
- Weather patterns across the country are changing.
- More homes are built within areas of WUI, meaning that homes are built closer to wildland areas where wildfires can occur (NYS DHSES 2011).

Annual small wildfires likely will occur throughout New York State (as the state has regularly undergone in the past). However, advanced methods of wildfire management and control and a better understanding of the fire ecosystems should reduce the number of devastating fires in the future (NYS DHSES 2011).

Based on historical occurrences, the probability of a wildfire event occurring is considered rare (between 1 and 10% annual probability of occurrence). Refer to Section 5.3 for additional information on the hazard ranking methodology and probability criteria.

Climate Change Projections

Fire potential depends on climate variability, local topography, and human intervention. Climate change can affect multiple elements of the wildfire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot, dry spells create the highest fire risk. With temperatures increasing in New York State, wildfire danger may intensify with warming and drying of vegetation. When climate alters fuel loads and fuel moisture, the susceptibility of the forest to wildfires changes. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods.

Climate change is beginning to affect both people and resources in New York State, and these impacts are projected to continue growing. Impacts related to increasing temperatures and heavier precipitation are already being felt in the state. ClimAID: the Integrated Assessment for Effective Climate Change in New York State (ClimAID) was undertaken to provide decision makers with information on the state's vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge (NYSERDA 2014).

Temperatures in New York State are warming, with an average rate of warming over the past century of 0.25 °F per decade. Average annual temperatures are projected to increase across New York State by 2 °F to 3.4 °F by the 2020s, 4.1 °F to 6.8 °F by the 2050s, and 5.3 °F to 10.1 °F by the 2080s. By the end of the century, the greatest warming is projected to be in the northern section of the State (NYSERDA 2014). The total number of hot days in New York State is expected to increase as this century progresses. The frequency and duration of heat waves, defined as three or more consecutive days with maximum temperatures at or above 90 ˚F, are also expected to increase. In contrast, extreme cold events, defined both as the number of days per year with minimum temperature at or below 32 ˚F and those at or below 0 ˚F, are expected to decrease as average temperatures rise (NYSERDA 2011).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change, Herkimer County is part of Region 5 (East Hudson and Mohawk River Valleys). In Region 5, it is estimated that temperatures will increase by 4.5°F to 6.2°F by the 2050s and 5.6°F to 9.7°F by the 2080s (baseline of 47.6°F, middle range projection). Average annual temperatures are projected to increase across New York State by 4.1° F to 6.8° F by the 2050s and 5.3° F to 10.1° F by the 2080s

with an average rate of warming over the past century of 0.25° F per decade. By the end of the century, the greatest warming is projected to be in the northern section of the State.

Extreme events are also projected to increase, as illustrated in Table 5.4.1-2 below (NYSERDA 2014).

Table 5.4.1-2. Extreme Event Projections for Region 5

Event Type (2050s)	Low Estimate (10th Percentile)	Middle Range (25th to 75th Percentile)	High Estimate (90th Percentile)
Days over 90 °F (8 days)	22	27 to 41	50
# Of Heat Waves (0.7 heat waves)	3	4 to 6	7
Duration of Heat Wave (4 days)	5	5 to 6	6
Days below 32 °F (133 days)	98	104 to 119	125
Days over 1" Rainfall (5 days)	10	11 to 12	13
Days over 2" Rainfall (0.6 days)	1	1 to 2	2

Source: NYSERDA 2014

A gradual change in temperatures will alter the growing environment of many tree species throughout the United States and New York, reducing the growth of some trees and increasing the growth of others. Tree growth and regeneration may be affected more by extreme weather events and climatic conditions than by gradual changes in temperature or precipitation. Warmer temperatures may lead to longer dry seasons and multi-year droughts, creating triggers for wildfires, insects, and invasive species. Increased temperature and change in precipitation will also affect fuel moisture during wildfire season and the length of time wildfires can burn in a given year (USDA 2011).

Climate change may also increase the frequency of lightning strikes. A warmer atmosphere holds more moisture, which is one of the key items for triggering a lightning strike. Lightning strikes cause approximately half of the wildfires in the United States. If the frequency of lightning strikes increases, the potential for wildfires from these strikes also increases (Lee 2014). Wildfire incidents are predicted to increase throughout the United States because of climate change, causing at least a doubling of areas burned within the next century (USDA 2011).

Climate change directly and indirectly affects growth and productivity of forests: directly as a result of changes in atmospheric carbon dioxide and climate, and indirectly through complex interactions within forest ecosystems. Climate also affects the frequency and severity of many forest disturbances, such as infestations, invasive species, wildfires, and storm events. As temperatures increase, the suitability of a habitat for specific types of trees changes. There is also evidence that prolonged heat waves are likely to lead to a greater number of wildfires. Stronger winds from larger storms may lead to more fallen branches for wildfires to consume. An increase in rain and snow events primes forests for fire by supporting growth of more fuel. Drought and warmer temperatures lead to drier forest fuels (NYS DHSES 2014).

Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable in the hazard area identified. The areas of the County located within the WUI have been identified as exposed for the wildfire events. The following text evaluates and estimates the potential impact of wildfire on Herkimer County, including:

- Impact on Life, Health, and Safety
- Impact on General Building Stock
- Impact on Critical Facilities and Community Lifelines
- Impact on Economy
- Impact on the Environment
- Future Changes That May Impact Vulnerability
- Change of Vulnerability Since the 2017 HMP

Impact on life, Health, and Safety

Wildfires have the potential to impact human health and life of residents and responders, structures, infrastructure, and natural resources. Given the immediate response times to reported wildfires, the likelihood of injuries and casualties is minimal. Smoke and air pollution from wildfires can be a health hazard, especially for sensitive populations, including children, the elderly, and those with respiratory and cardiovascular diseases. Wildfire may also threaten the health and safety of those fighting the fires. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke. The most vulnerable populations include emergency responders and those within a short distance of the interface between the built environment and the wildland environment. Table 5.4.1-3 summarizes the estimated population exposed to the wildfire hazard by jurisdiction.

Based on the analysis, an estimated 21,962 residents (36.5 percent of the County population) are located in the WUI interface hazard area and 14,990 residents (24.9 percent of the County's population) are located in the WUI intermix hazard areas. Overall, the Town of Frankfort has the greatest number of individuals located in the wildfire hazard areas (i.e., 2,130 persons in the WUI interface and 2,243 in the WUI intermix).

Table 5.4.1-3. Estimated Population within the WUI in Herkimer County

Jurisdiction*	Total Population (2020 Decennial)	Estimated Population Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Hazard Areas			
		Number of People in the WUI Interface Wildfire Hazard Area	Percent of Total	Number of People in the WUI Intermix Wildfire Hazard Area	Percent of Total
Cold Brook (V)	250	75	29.8%	175	70.2%
Columbia (T)	1,569	162	10.3%	563	35.9%
Danube (T)	953	103	10.8%	146	15.3%

Jurisdiction*	Total Population (2020 Decennial)	Estimated Population Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Hazard Areas			
		Number of People in the WUI Interface Wildfire Hazard Area	Percent of Total	Number of People in the WUI Intermix Wildfire Hazard Area	Percent of Total
Dolgeville (V)	2,042	1,759	86.1%	283	13.9%
Fairfield (T)	1,197	238	19.9%	116	9.7%
Frankfort (T)	4,691	2,130	45.4%	2,243	47.8%
Frankfort (V)	2,320	945	40.7%	148	6.4%
German Flatts (T)	2,202	703	31.9%	1,301	59.1%
Herkimer (T)	2,332	647	27.8%	636	27.3%
Herkimer (V)	7,234	701	9.7%	683	9.4%
Ilion (V)	7,646	7,228	94.5%	418	5.5%
Litchfield (T)	1,444	97	6.7%	490	33.9%
Little Falls (C)	4,605	0	0.0%	818	17.8%
Little Falls (T)	1,497	435	29.1%	409	27.3%
Manheim (T)	1,040	241	23.2%	185	17.8%
Middleville (V)	407	170	41.9%	237	58.1%
Mohawk (V)	2,415	2,333	96.6%	82	3.4%
Newport (T)	1,321	353	26.7%	504	38.2%
Newport (V)	543	400	73.6%	143	26.4%
Norway (T)	740	47	6.4%	378	51.0%
Ohio (T)	962	14	1.4%	641	66.6%
Poland (V)	464	328	70.7%	133	28.6%
Russia (T)	1,702	249	14.6%	924	54.3%
Salisbury (T)	1,830	269	**14.7%**	1,153	63.0%
Schuyler (T)	3,296	1,510	45.8%	565	17.1%
Stark (T)	714	238	33.3%	152	21.3%
Warren (T)	1,029	0	0.0%	225	21.9%
Webb (T)	1,797	587	32.7%	1,034	57.6%
West Winfield (V)	733	0	0.0%	102	13.9%
Winfield (T)	1,164	0	0.0%	103	8.8%
Herkimer County	**60,139**	**21,962**	**36.5%**	**14,990**	**24.9%**

Source: *Census 2010, 2020; Radeloff et al. 2017*
Notes: *(C) = City, (T) = Town, (V) = Village*

Of the population exposed, the most vulnerable include the economically disadvantaged and the population over age 65. Herkimer County contains approximately 12,538 people over the age of 65 and 7,754 people below the poverty level (2020 Decennial Census; 2021 5-year ACS). Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on net economic impacts on their families. The population over age 65 is also more vulnerable because they are more likely to seek or need medical attention that may not be available due to isolation during a wildfire event, and they may have more difficulty evacuating. Smoke and air pollution from wildfires can be a severe health hazard, especially for sensitive populations, including children, the elderly, and those with respiratory and cardiovascular diseases. Smoke generated by wildfire consists of visible and invisible emissions that contain

particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, and nitrogen oxides), and toxics (formaldehyde and benzene). Emissions from wildfires depend on the type of fuel, the moisture content of the fuel, the efficiency (or temperature) of combustion, and the weather. Public health impacts associated with wildfire include difficulty in breathing, odor, and reduction in visibility.

Impact on General Building Stock

The most vulnerable structures to wildfire events are those located within the WUI areas. If a wildfire occurs at a WUI, it can also cause an urban fire and in this case has the potential for great damage to infrastructure, because of the high density of population and structures in these areas. Buildings constructed of wood or vinyl siding are generally more likely to be damaged by the fire hazard than buildings constructed of brick or concrete. The hazard areas were overlaid on the building inventory in the County (Census block) to estimate the buildings exposed to the wildfire hazard. The replacement cost value of the structures with their center in the hazard area were totaled. Table 5.4.1-4 summarizes the number of buildings exposed by municipality. The limitations of this analysis are recognized, and as such the analysis is only used to provide a general estimate. Approximately 31.2 percent of the County's buildings are located in the WUI interface hazard area, and approximately 32.2 percent of the County's buildings are located in the WUI intermix hazard area.

Table 5.4.1-4. Building Stock within the WUI in Herkimer County

Jurisdiction*	Total Number of Buildings	Estimated Building Stock Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Fuel Hazard Areas			
		Number of Buildings in the WUI Interface Wildfire Hazard Area	Percent of Total	Number of Buildings in the WUI Intermix Wildfire Hazard Area	Percent of Total
Cold Brook (V)	132	39	29.5%	93	70.5%
Columbia (T)	714	79	11.0%	257	36.0%
Danube (T)	491	51	10.5%	71	14.4%
Dolgeville (V)	836	717	85.8%	115	13.8%
Fairfield (T)	552	107	19.3%	51	9.2%
Frankfort (T)	2,063	908	44.0%	982	47.6%
Frankfort (V)	971	384	39.5%	58	6.0%
German Flatts (T)	1,074	325	30.3%	638	59.4%
Herkimer (T)	1,098	330	30.0%	274	25.0%
Herkimer (V)	2,653	253	9.5%	244	9.2%
Ilion (V)	2,779	2,629	94.6%	141	5.1%
Litchfield (T)	757	46	6.1%	324	42.8%
Little Falls (C)	1,848	0	0.0%	303	16.4%
Little Falls (T)	690	192	27.8%	191	27.7%
Manheim (T)	657	201	30.6%	119	18.1%
Middleville (V)	250	99	39.6%	149	59.6%
Mohawk (V)	1,092	1,046	95.8%	39	3.6%
Newport (T)	526	146	27.7%	197	37.5%

Jurisdiction*	Total Number of Buildings	Estimated Building Stock Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Fuel Hazard Areas			
		Number of Buildings in the WUI Interface Wildfire Hazard Area	Percent of Total	Number of Buildings in the WUI Intermix Wildfire Hazard Area	Percent of Total
Newport (V)	263	199	75.7%	64	24.3%
Norway (T)	404	25	6.2%	174	43.2%
Ohio (T)	1,039	29	2.8%	560	53.9%
Poland (V)	210	154	73.5%	54	25.7%
Russia (T)	1,106	130	11.7%	667	60.3%
Salisbury (T)	990	127	12.9%	606	61.2%
Schuyler (T)	1,542	705	45.7%	247	16.0%
Stark (T)	351	115	32.8%	72	20.4%
Warren (T)	461	0	0.0%	102	22.1%
Webb (T)	4,220	545	12.9%	2,987	70.8%
West Winfield (V)	389	0	0.0%	61	15.7%
Winfield (T)	497	0	0.0%	46	9.3%
Herkimer County	**30,655**	**9,579**	**31.2%**	**9,884**	**32.2%**

Source: *Census 2010, 2020; Radeloff et al. 2017*
Notes: *(C) = City, (T) = Town, (V) = Village*

Impact on Critical Facilities and Community Lifelines

A number of critical facilities are within the wildfire hazard area and are also vulnerable to the threat of wildfire. Many of these facilities are locations of vulnerable populations (schools and senior facilities) and agencies that respond to wildfire events (fire and police). Table 5.4.1-5 summarizes the number of lifeline facilities within the WUI Interface and Intermix hazard areas in Herkimer County. Overall, 116 lifeline facilities are located in the wildland-urban interface hazard area and 116 lifeline facilities are located in the wildland-urban intermix hazard area.

Table 5.4.1-5. Lifeline Facilities within the WUI (Intermix or Interface) in Herkimer County

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the Wildland-Urban Interface Wildfire Hazard Area	Number of Lifelines Located in the Wildland-Urban Intermix Wildfire Hazard Area
Communications	29	6	9
Energy	33	3	11
Food, Water, Shelter	33	10	6
Hazardous Materials	22	6	2
Health and Medical	27	6	7
Safety and Security	248	71	53
Transportation	125	14	28
Herkimer County (Total)	**248**	**116**	**116**

Source: Herkimer County GIS 2022; Radeloff et al. 2017

Impact on the Economy

Wildfire events can have major economic impacts on a community from the initial loss of structures and the subsequent loss of revenue from destroyed businesses and decreases in tourism. Wildfires can cost thousands of taxpayer dollars to suppress and control and can involve hundreds of operating hours on fire apparatus and thousands of volunteer man hours from the volunteer firefighters. There are also many direct and indirect costs to local businesses that provide employees with time off to volunteer to fight these fires.

Table 5.4.1-6 summarizes the estimated building stock inventory exposed by municipality. The limitations of this analysis are recognized, and as such the analysis is only used to provide a general estimate. Approximately 30.9 percent ($3.8 billion) of the County's replacement cost value is located in the WUI interface hazard area, and approximately 26.6 percent ($3.2 billion) of the County's replacement cost value is located in the WUI intermix hazard area.

Table 5.4.1-6. Building Stock Replacement Cost Value within the WUI in Herkimer County

Jurisdiction*	Total Replacement Cost Value (RCV)	Estimated Building Stock Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Fuel Hazard Areas			
		Total Replacement Cost Value of Buildings Located in the WUI Interface Wildfire Hazard Area	Percent of Total	Total Replacement Cost Value of Buildings Located in the WUI Intermix Wildfire Hazard Area	Percent of Total
Cold Brook (V)	$31,447,000	$9,600,000	30.5%	$21,839,985	69.5%
Columbia (T)	$233,619,000	$23,067,670	9.9%	$76,477,128	32.7%
Danube (T)	$138,056,000	$11,030,175	8.0%	$16,821,738	12.2%
Dolgeville (V)	$380,709,000	$322,558,320	84.7%	$49,360,900	13.0%
Fairfield (T)	$167,531,000	$30,734,729	18.3%	$13,665,787	8.2%
Frankfort (T)	$809,592,000	$384,359,736	47.5%	$332,883,151	41.1%
Frankfort (V)	$419,877,000	$132,276,179	31.5%	$18,556,681	4.4%
German Flatts (T)	$329,725,000	$97,415,230	29.5%	$193,501,244	58.7%
Herkimer (T)	$449,516,000	$129,901,210	28.9%	$104,643,862	23.3%
Herkimer (V)	$1,713,408,000	$102,805,769	6.0%	$134,561,966	7.9%
Ilion (V)	$1,278,193,000	$1,215,098,921	95.1%	$52,279,999	4.1%

Jurisdiction*	Total Replacement Cost Value (RCV)	Estimated Building Stock Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Fuel Hazard Areas			
		Total Replacement Cost Value of Buildings Located in the WUI Interface Wildfire Hazard Area	Percent of Total	Total Replacement Cost Value of Buildings Located in the WUI Intermix Wildfire Hazard Area	Percent of Total
Litchfield (T)	$274,972,000	$14,322,025	5.2%	$123,747,932	45.0%
Little Falls (C)	$1,054,936,000	$0	0.0%	$123,412,122	11.7%
Little Falls (T)	$248,266,000	$56,112,301	22.6%	$99,571,910	40.1%
Manheim (T)	$217,981,000	$64,181,071	29.4%	$36,470,994	16.7%
Middleville (V)	$105,595,000	$28,607,010	27.1%	$76,252,264	72.2%
Mohawk (V)	$433,485,000	$405,313,009	93.5%	$14,206,000	3.3%
Newport (T)	$180,332,000	$45,908,208	25.5%	$68,519,042	38.0%
Newport (V)	$98,222,000	$68,747,003	70.0%	$29,321,010	29.9%
Norway (T)	$134,191,000	$6,454,980	4.8%	$46,818,821	34.9%
Ohio (T)	$272,235,000	$13,996,760	5.1%	$147,665,923	54.2%
Poland (V)	$100,894,000	$86,216,835	85.5%	$12,524,866	12.4%
Russia (T)	$318,980,000	$47,547,150	14.9%	$183,860,312	57.6%
Salisbury (T)	$258,689,000	$28,438,270	11.0%	$165,300,191	63.9%
Schuyler (T)	$467,196,000	$187,368,347	40.1%	$98,306,139	21.0%
Stark (T)	$82,011,000	$26,935,864	32.8%	$16,076,212	19.6%
Warren (T)	$230,094,000	$0	0.0%	$26,304,988	11.4%
Webb (T)	$1,396,251,000	$230,198,151	16.5%	$899,289,639	64.4%
West Winfield (V)	$194,977,000	$0	0.0%	$50,897,993	26.1%
Winfield (T)	$195,070,000	$0	0.0%	$13,642,959	7.0%
Herkimer County	**$12,216,050,000**	**$3,769,194,923**	**30.9%**	**$3,246,781,759**	**26.6%**

Source: *Census 2010, 2020; Radeloff et al. 2017*
Notes: *(C) = City, (T) = Town, (V) = Village*

Impact on the Environment

Wildfire can lead to ancillary impacts such as landslides in steep ravine areas and flooding caused by the impacts of silt in local watersheds. According to the USGS, post-fire runoff polluted with debris and contaminants can be extremely harmful to ecosystem and aquatic life. Studies show that urban fires in particular are more harmful to the environment compared to forest fires (USGS 2018). Wildfires that impact developed areas can exacerbate consequences on the environment because of the increased amount of chemicals and contaminants that would be released from burning infrastructure. These chemicals, such as iron lead, and zinc, may leach into the stormwater, contaminate nearby streams, and impair aquatic life.

Future Changes That May Impact Vulnerability

Understanding future changes that impact vulnerability in the County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development

- Projected changes in the population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Areas targeted for potential future growth and development within the next five years have been identified across Herkimer County at the jurisdiction level. Refer to the jurisdictional annexes in Volume II of this HMP. Any new development and new residents within the WUI are expected to be exposed to the wildfire hazard. Refer to the jurisdictional annexes in Volume II of this HMP for maps which include new development project areas and their proximity to the wildland-urban interface/intermix hazard areas.

Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 6.8 percent since 2010. The County's population is anticipated to decrease over the next decade by 6.6 percent decrease by 2030). A decrease in the population in the WUI in Herkimer County may decrease the County's risk to wildfire events. Refer to section 4 (County Profile), which includes a more thorough discussion about population trends for the County.

Climate Change

According to the USDA Forest Service, climate change will likely alter the atmospheric patterns that affect fire weather. Changes in fire patterns will, in turn, impact carbon cycling, forest structure, and species composition (US EPA 2020). Climate change associated with warmer temperatures, changes in rainfall, and increased periods of drought may create an atmospheric and fuel environment that is more conductive to large, severe fires. Under a changing climate, wildfires exceeding 50,000 acres have increased over the past 30 years (USDA 2012a). Understanding the climate/fire/vegetation interactions is essential for addressing issues associated with climate change that include:

- Effects on regional circulation and other atmospheric patterns that affect fire weather
- Effects of changing fire regimes on the carbon cycle, forest structure, and species composition, and
- Complications from land use change, invasive species, and an increasing WUI.

As discussed earlier, average temperatures are anticipated to increase in New York; therefore, the suitability of habitats for specific types of trees will potentially change, altering the fire regime and resulting in more frequent fire events and changes in intensity. Prolonged and more frequent heat waves have the potential to increase the likelihood of a wildfire. The increased potential combined with stronger winds may make it harder to contain fires and thus will increase the County's vulnerability to this hazard.

Change of Vulnerability Since the 2017 HMP

Overall, the entire County remains vulnerable to wildfires. While the occurrence of events has historically been low, the vulnerability of Herkimer County to damages from wildfires remains high due to exposure in the WUI.

5.4.9 Severe Winter Storm

This section provides a profile and vulnerability assessment of the severe winter storm hazard for Herkimer County.

Hazard Profile

This section provides information regarding the description, extent, location, previous occurrences and losses, climate change projections and the probability of future occurrences for the severe winter storm hazard.

Hazard Description

A winter storm is a weather event in which the main types of precipitation are snow, sleet, or freezing rain. They can be a combination of heavy snow, blowing snow, and dangerous wind chills. According to the National Severe Storms Laboratory (n.d.), the three basic components needed to make a winter storm include the following:

- Below freezing temperatures (cold air) in the clouds and near the ground to make snow and ice.
- Lift, something to raise the moist air to form clouds and cause precipitation, such as warm air colliding with cold air and being forced to rise over the cold dome or air flowing up a mountainside (oliographic lifting).
- Moisture to form clouds and precipitation, such as air blowing across a large lake or the ocean (NOAA 2021).

Some winter storms can immobilize an entire region, while others might only affect a single community. Winter storms typically are accompanied by low temperatures, high winds, freezing rain or sleet, and heavy snowfall. The aftermath of a winter storm can have an impact on a community or region for days, weeks, or even months; potentially causing cold temperatures, flooding, storm surge, closed and blocked roadways, downed utility lines, and power outages. Herkimer County's winter storms include blizzards, snowstorms, and ice storms. Extreme cold temperatures and wind chills are associated with winter storms. For more information on extreme cold temperatures, refer to the Section 5.4.4. (Extreme Temperature).

Heavy Snow

According to the National Snow and Ice Data Center (NSIDC), snow is precipitation in the form of ice crystals. Snow originates in clouds when temperatures are below the freezing when water vapor in the atmosphere condenses directly into ice without going through the liquid stage. Once an ice crystal has formed, it absorbs and freezes additional water vapor from the surrounding air, growing into a snow crystal or snow pellet. The

> According to NOAA heavy snow is defined as an accumulation to a depth of four inches or more within 12 hours or less, or six inches or more within 24 hours.

severity of a winter storm depends on temperature, wind speed, type of precipitation, accumulation rate, and timing which include (New York State 2019):

Heavy snow and ice can be widespread, effectively immobilizing vital community services and systems. Snow accumulation damages structures, trees, and power lines. Winter weather may isolate residents in rural areas for extended periods of time. Communications and power may be disrupted for days until damages are repaired and services are restored. Even small accumulations of ice are extremely hazardous to motorists and may disrupt delivery of necessary goods and supplies. Herkimer County experiences multiple winter storms annually. Like most New York communities, jurisdictions are prepared to respond rapidly for de-icing roads, snow removal, and opening shelters and warming stations.

Blizzards

A blizzard is a severe weather condition characterized by high winds and reduced visibilities due to falling or blowing snow. The NWS specifies a blizzard as sustained wind or frequent gusts of 16 miles per second (35 miles per hour) or greater, accompanied by falling and/or blowing snow, frequently reducing visibility to less than 0.25 miles for three hours or longer. Earlier definitions included a condition of low temperatures, on the order of 20°F or lower, 10°F or lower (severe blizzard) (American Meteorological Society 2014).

Ice Storm

An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous. Significant ice accumulations are usually of ¼" or greater (National Weather Service 2009).

Freezing rain

Freezing rain is precipitation that falls as rain, but freezes on contact with a surface, forming a glaze of ice. that precipitate from the atmosphere (usually from clouds) and undergo changes on the Earth's surface.

Sleet

Sleet is made up of drops of rain that freeze into ice as they fall through colder air layers. They are usually smaller than 0.30 inches in diameter (NSSL 2021).

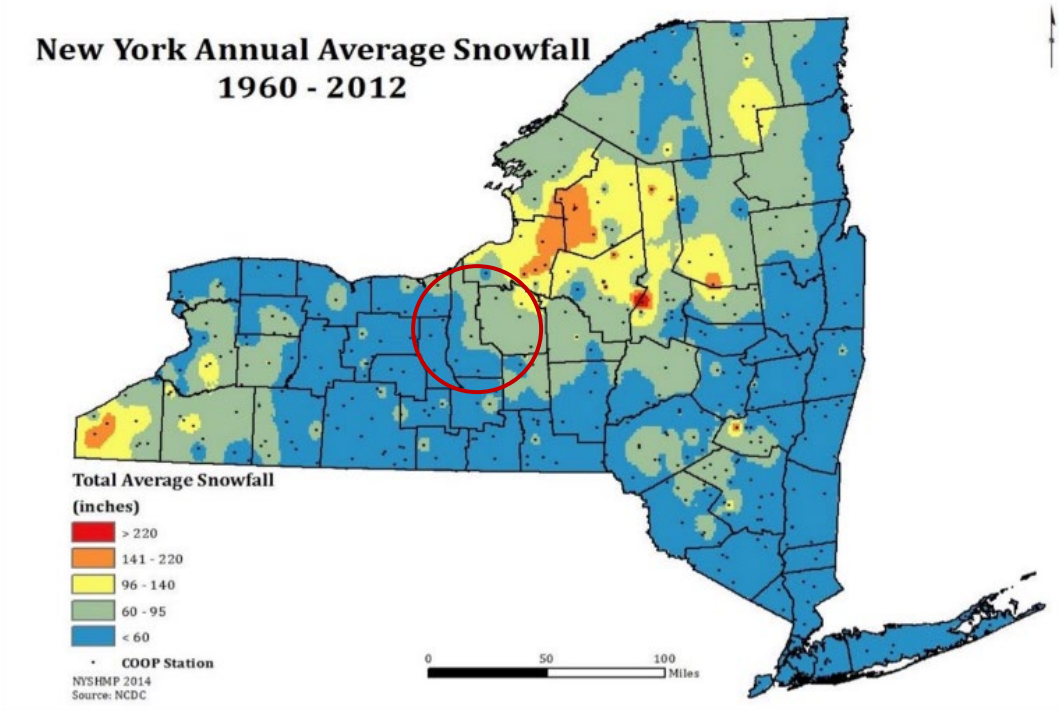
Location

The climate of New York State is marked by abundant snowfall. Winter weather can reach New York State as early as October and is usually in full force by late November with average winter temperatures between 20 and 40 F. The inland regions of New York State receive more snow than most other communities in the nation. Although the entire state is subject to winter storms, the easternmost and west-central portions of the state are more likely to suffer under winter storm

occurrences than any other location (NYS DHSES 2019). Except for coastal New York State, the state receives an average seasonal amount of 40 inches of snow or more. The average annual snowfall is greater than 70 inches over 60 percent of New York State's area, with Herkimer County's averaging 96 inches annually.

Figure 5.4.9-1, an annual average snowfall map, illustrates the annual average snowfall totals over a 50-year period for New York State.

Figure 5.4.9-1. New York Annual Average Snowfall, 1960-2012



Source: NYS DHSES 2014
Note: The red circle indicates the location of Herkimer County

All of Herkimer County is vulnerable to severe winter weather, including extreme cold/ wind chill, ice storms, winter storms, and blizzards. Higher elevations in the northern region are likely to experience more extreme conditions.

Extent

The magnitude or severity of a severe winter storm depends on several factors, including snowfall rates, regional climatological susceptibility to snowstorms, snowfall amounts, wind speeds, temperatures, visibility, storm duration, topography, time of occurrence during the day and week (e.g., weekday versus weekend), and time of season.

The extent of a severe winter storm can be classified both by meteorological measurements and by evaluating societal impacts. The National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Data Center (NCDC) is currently producing the Regional Snowfall Index (RSI) for

significant snowstorms that impact the eastern two-thirds of the United States. The RSI ranks snowstorm impacts on a scale from 1 to 5 and is based on the spatial extent of the storm, the amount of snowfall, and the interaction of the extent and snowfall totals with population. The NCDC has analyzed and assigned RSI values to over 500 storms since 1900 (NOAA n.d.). Table 5.4.9-1 presents the five RSI ranking categories.

Table 5.4.9-1. RSI Ranking Categories

Category	Description	RSI Value
1	Notable	1–3
2	Significant	3–6
3	Major	6–10
4	Crippling	10–18
5	Extreme	18.0+

Source: NOAA 2020
Note: RSI = Regional Snowfall Index

The NWS operates a widespread network of observing systems, such as geostationary satellites, Doppler radars, and automated surface observing systems that feed into the current state-of-the-art numerical computer models to provide a look into what will happen next, ranging from hours to days. The models are then analyzed by NWS meteorologists who then write and disseminate forecasts. According to NWS (NWS 2021), the magnitude of a severe winter storm can be qualified into five main categories by event type an noted in Figure 5.4.9-2.

Figure 5.4.9-2. Winter Storm Category Thresholds

Heavy Snowstorm	Accumulations of 4 inches or more of snow in a 6 hour period, or 6 inches of snow in a 12-hour period.
Sleet Storm	Significant accumulations of solid pellets that form from the freezing of raindrops or partially melted snowflakes causing slippery surfaces, posing a hazard to pedestrians and motorists.
Ice Storm	Significant accumulation of rain or drizzle freezing on objects (trees, power lines, roadways) as it strikes them, causing slippery surfaces and damage from sheer weight of ice accumulations.
Blizzard	Wind velocity of 35 mph or more, temperatures below freezing, considerable blowing snow with visibility frequently below one-quarter mile prevailing over an extended period.
Severe Blizzard	Wind velocity of 45 mph, temperatures of 10 °F or lower, a high density of blowing snow with visibility frequently measured in feet prevailing over an extended period.

Source: NWS 2021

Additionally, the NWS uses winter weather watches, warnings, and advisories to help people anticipate what to expect in the days and hours prior to an approaching storm (NWS 2021). Refer to Figure 5.4.9-3 for the warning thresholds.

Figure 5.4.9-3. Winter Storm Warning Thresholds

Source: NWS 2021

Previous Occurrences

FEMA Major Disasters and Emergency Declarations

Between 1954 and 2022, Herkimer County was included in 3 disaster (DR) or emergency (EM) declarations for Snow-related events (EM-3107-NY, EM-3173-NY and DR-4322-NY). Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 4 (County Profile).

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2012 and 2022, Herkimer County was included in three winter storm-related (snow, blizzard, ice, frost, freeze) agricultural disaster declarations.

Previous Events

For this 2023 HMP update, known Snow events that impacted Herkimer County between 2017 and 2022 are noted in Table 5.4.9-2. For events prior to 2017, refer to Appendix E (Supplementary Data).

Table 5.4.9-2. Hazard Events in Herkimer County (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
January 17, 2017	Winter Weather	N/A	N/A	A light and spotty wintry mix began which took down trees and power lines. This caused some localized power outages across parts of southern Herkimer County. Ice had accreted up to a half inch in diameter in some areas.
March 14, 2017	Winter Storm	DR-4322-NY	Yes	This snowstorm was regarded as the largest snowstorm to impact upstate New York since the 2007 Snowstorm/Blizzard. Most areas saw 15-25 inches. According to media reports, total statewide government costs for response and recovery from the storm were $31.4 million
January 19-20, 2019	Winter Storm	N/A	N/A	The largest snowstorm to date in the 2018-19 winter occurred on January 19th and 20th across eastern New York and western New England. Snowfall totals were heaviest from the central Mohawk Valley into the southern Adirondacks and Lake George-Saratoga region where 1.5-2 foot totals were common. Three to six inches of snow and sleet along with some ice occurred over the Mid- Hudson Valley, Litchfield Hills, and southern Berkshires. The remainder of the region saw between 6 and 18 inches. Snowfall totals in Herkimer County ranged from 10.2 inches in Ilion to 14 inches in Newport.
December 1-3, 2019	Winter Storm	N/A	N/A	A major winter storm impacted eastern New York and western New England December 1-3, 2019. Snowfall rates of 1-2" per hour occurred from the afternoon into the evening, with the heaviest along the I-90 corridor. Storm total snowfall amounts were heaviest in the central Mohawk Valley, Helderbergs, northeastern Catskills, Capital District, southern Vermont, and the Berkshires. Amounts of 8-18" were common elsewhere, except for southern portions of Dutchess and Litchfield Counties due to warmer temperatures and mixed precipitation, and northern portions of Herkimer, Hamilton, Warren, and Washington Counties which were on the fringe of the heavier precipitation. Overall, Herkimer County experienced between nine inches and 16 inches of snow.
December 16-17, 2020	Heavy Snow	N/A	N/A	Snow moved across eastern New York State and western New England, bringing heavy bands of snow. Some areas saw snowfall rates of up to six inches per hour. In Herkimer County, snowfall totals ranged from 13 inches in Ilion to 19 inches in Dolgeville.
February 3-4, 2022	Winter Storm	N/A	N/A	In New York, portions of the western Mohawk Valley and Adirondacks into portions of far northern Washington County saw mostly heavy snow from this event with

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Herkimer County included in Declaration?	Description
				accumulations ranging from 9 to 18 inches. Snowfall totals in Herkimer County ranged from 8 inches in Herkimer to 13 inches in Ilion.
April 18-19, 2022	Winter Storm	N/A	N/A	A late season Nor'Easter moved up the east coast, resulting in widespread precipitation in New York State. The heaviest snow fell across areas west of the Hudson Valley in New York state (i.e., Adirondacks, western Mohawk Valley and eastern Catskills) where snowfall amounts were mainly in the 7 to 14 inch range with a few localized amounts up to 18 inches. The combination of heavy snow and strong winds downed trees and power lines, causing widespread outages. Over 50-percent of customers in Herkimer and Hamilton Counties were without power during this storm.
December 15-17, 2022	Nor'Easter	N/A	N/A	This storm brought rain, sleet, snow, and wind to New York State. The heavy snow caused downed trees and power lines, resulting in power outages. Snowfall totals in Herkimer County ranged from five inches in Ilion to nine inches in Salisbury Center.

Sources: FEMA 2022; NWS 2023; NOAA-NCEI 2023

Notes: NOAA-NCEI and NWS incidents are based on events with snowfall totals exceeding 12 inches or resulting in property damages of $10,000 or larger.

Climate Change Impacts

Climate change is beginning to affect both people and resources in New York State, and these impacts are projected to increase. The impacts related to increasing temperatures and sea level rise are already causing complications in the state. *ClimAID: The Integrated Assessment for Effective Climate Change in New York State (ClimAID)* was undertaken to provide decision-makers with information on the state's vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge (NYSERDA 2011/2014).

Temperatures in New York State are warming, with an average rate of warming over the past century of 0.25° F per decade. Average annual temperatures are projected to increase across New York State by 2–3.4 °F by the 2020s, 4.1–6.8 °F by the 2050s, and 5.3–10.1 °F by the 2080s. By the end of the century, the greatest warming is projected to be in the northern section of the state (NYSERDA 2011/2014).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change. Herkimer County is part of Region 5 (East Hudson and Mohawk River Valleys) where temperatures are estimated to increase by 4.5 to 6.2°F by the 2050s and 5.6 to 9.7°F by the 2080s (baseline of 47.6°F, middle range projection). Precipitation totals are estimated to increase between four to twelve percent by the 2050s and five to fifteen percent by the 2080s (baseline of 38.6 inches, middle range projection). Table 5.4.9-3 displays the projected seasonal precipitation change for the region for 2050 (NYSERDA 2011/2014). The winter season is projected to have a precipitation increase of 5-15 percent.

Table 5.4.9-3. Projected Seasonal Precipitation Change in Region 5, 2050s (% change)

Winter	Spring	Summer	Fall
+5 to +15	-5 to +10	-5 to +5	-5 to +10

Source: NYSERDA 2014

New York State already is experiencing the effects of climate change during the winter season. By mid-century, however, lake-effect snow will generally decrease as temperatures below freezing become less frequent. Winter snow cover is decreasing, and spring comes, on average, about a week earlier than it did a few years ago. Nighttime temperatures are measurably warmer, even during the colder months. Overall winter temperatures in New York State are almost 5 degrees warmer than in 1970 (NYSERDA 2011/2014). The state has experienced a decrease in the number of cold winter days (below 32 °F) and can expect to see a decrease in snow cover by as much as 25–50 percent by end of the next century. The lack of snow cover may jeopardize opportunities for skiing, snowmobiling, and other types of winter recreation; and natural ecosystems will be affected by the changing snow cover (Cornell University College of Agriculture and Life Sciences 2011).

As the century progresses, snowfall is likely to become less frequent, with the snow season decreasing in length. It is uncertain if there will be changes in the intensity of snowfall during each storm; however, it is possible that higher temperatures in colder parts of New York State could support higher snowfall totals during snowstorm events (NYSERDA 2011/2014).

Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of winter weather events for the County. Based on geography, location, past event history, and climate projections, Herkimer County will continue to experience winter storm events.

Table 5.4.9-4 summarizes data regarding the probability of occurrences of severe winter storm events in Herkimer County based on the historic record. Winter weather events and lake effect snow are the most common winter events in Herkimer County. The information used to calculate the probability of occurrences is based solely on NOAA-NCEI storm events database results.

Table 5.4.9-4. Probability of Future Winter Weather Events in Herkimer County

Hazard Type	Number of Occurrences Between 1950 and 2022	Percent Chance of Occurring in Any Given Year
Blizzard	2	2.7%
Heavy Snow	36	49.3%
Ice Storm	4	5.5%
Lake Effect Snow	56	76.7%
Winter Storm	79	100%
Winter Weather	117	100%
TOTAL	**294**	**100%**

Sources: NOAA NCEI 2022, Herkimer County, 2022

Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and severe winter storm events as reported by NWS. Due to changes in the data collection and periods of record availability depending on the event type, not all severe winter storm events occurring between 1950 and 2022 are accounted for in the tally of occurrences. As a result, the probability of future occurrences may be underestimated.

Section 5.3 ranks the identified hazards of concern for Herkimer County. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Steering Committee, the probability of occurrence for severe winter storms in the County is considered 'frequent' (100 percent annual probability; a hazard event may occur multiple times per year).

Climate Change Projections

Climate change is beginning to affect both people and resources in Herkimer County, and these impacts are projected to continue growing. The Integrated Assessment for Effective Climate Change in New York State (ClimAID) was undertaken to provide decision-makers with information on the state's vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge (NYSERDA 2011).

New York State is already experiencing the effects of climate change during the winter season. Winter snow cover is decreasing, and spring comes, on average, about a week earlier than it did a few years ago. Nighttime temperatures are measurably warmer, even during the colder months. Overall winter temperatures in New York State are almost 5 degrees warmer than in 1970 (NYSERDA 2011; NYSDEC, n.d.). The state has experienced a decrease in the number of cold winter days (below 32 °F) and can expect to see a decrease in snow cover by as much as 25–50 percent by end of the next century. The lack of snow cover may jeopardize opportunities for skiing, snowmobiling, and other types of winter recreation; and natural ecosystems will be affected by the changing snow cover (Cornell University College of Agriculture and Life Sciences 2011). As the century progresses, snowfall is likely to become less frequent, with the snow season decreasing in length. It is uncertain if there will be changes in the intensity of snowfall during each storm; however, it is possible that higher temperatures in colder parts of New York State could support higher snowfall totals during snowstorm events (NYSERDA 2014).

When planning adaptations for local and regional scales, uncertainties are further increased for two additional reasons:

- Climate variability (which is mostly unpredictable) can be especially large over small regions, partially masking more uniform effects of climate change.
- Changes in local physical processes that operate at fine scales, such as land/sea breezes, are not captured by the global climate models used to make projections (New York State 2014).

Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For the severe winter storm hazard, all of Herkimer County has been identified as the hazard area. Therefore, all assets in the County (population, structures, critical facilities and lifelines), as described in the County Profile (Section 4), are vulnerable to a winter storm event.

Impact on life, Health, and Safety

The entire population of Herkimer County (60,136) is exposed to severe winter storm events (US Census 2020). According to the NOAA National Severe Storms Laboratory (NSSL); every year, winter weather indirectly and deceptively kills hundreds of people in the U.S., primarily from automobile accidents, overexertion and exposure. Winter storms are often accompanied by strong winds creating blizzard conditions with blinding wind-driven snow, drifting snow and extreme cold temperatures and dangerous wind chill. They are considered deceptive killers because most deaths and other impacts or losses are indirectly related to the storm. People can die in traffic accidents on icy roads, heart attacks while shoveling snow, or of hypothermia from prolonged exposure to cold (NSSL 2021).

The homeless and elderly are considered most susceptible to this hazard. The elderly are considered susceptible to this hazard due to their increased risk of injuries and death from falls and overexertion

and/or hypothermia from attempts to clear snow and ice. According to the 2021 American Community Survey 5-Year population estimate, there are 12,538 persons over 65 years old (20.7% of the County population) that reside in the County that are considered vulnerable to severe winter weather (16.9 percent of the County population). In addition, severe winter storm events can reduce the ability of these populations to access emergency services.

Impact on General Building Stock

The entire general building stock inventory is exposed and vulnerable to the severe winter storm hazard. In general, structural impacts include damage to roofs and building frames, rather than building content. Current modeling tools are not available to estimate specific losses for this hazard. As an alternate approach, this plan considers percent damages that could result from severe winter storm conditions. This allows planners and emergency managers to select a range of potential economic impact based on an estimate of the percent of damage to the general building stock. Given professional knowledge and the currently available information, the potential loss for this hazard is many times considered to be overestimated because of varying factors (building structure type, age, load distribution, building codes in place, etc.). Therefore, the following information should be used as estimates only for planning purposes with the knowledge that the associated losses for severe winter storm events vary greatly.

> Structures may be vulnerable to snow-loaded roof failure, or damage to exposed mechanical systems. Structures at higher elevations, where snowfall is typically heavier, are at a higher risk for impacts from winter weather.

Impact on Critical Facilities and Community Lifelines

Critical infrastructure (power and communication lines) is at a high risk for damage or failure during severe winter weather due to downed trees and power lines from storm-related winds and ice accumulation.

Full functionality of critical facilities such as police, fire, and medical facilities is essential for response during and after a severe winter storm event. These critical facility structures are largely constructed of concrete and masonry; therefore, they should only suffer minimal structural damage from severe winter storm events. Because power interruption can occur, backup power is recommended. Infrastructure at risk for this hazard includes roadways that could be damaged from the application of salt and intermittent freezing and warming conditions that can damage roads over time. Severe snowfall requires clearing of roadways and alerting of citizens to dangerous conditions; following the winter season, resources for road maintenance and repair are required.

Impact on the Economy

Depending on the severity and duration of the severe winter weather event, damage to the general building stock, critical facilities, and community lifelines can include roof damage from heavy snow loads, structural damage from downed trees, and power outages.

The cost of snow and ice removal and repair of roads from the freeze/thaw process can drain local financial resources. In addition to snow removal costs, severe winter weather affects the ability of persons to commute into and out of the area for work or school. The loss of power and closure of roads prevents the commuter population traveling to work within and outside of the County and may cause a loss in economic productivity.

Impact on the Environment

Severe winter weather can have a major impact on the environment. Not only does winter weather create changes in natural processes, the residual impacts of a community's methods to maintain its infrastructure through winter weather maintenance may also have an impact on the environment. For example, an excess amount of snowfall and earlier warming periods may affect natural processes such as flow within water resources (USGS 2020). Rain-on-snow events can also exacerbate runoff rates with warming winter weather. Consequentially, these flow rates and excess volumes of water can erode banks, tear apart habitat along the banks and coastline, and disrupt terrestrial plants and animals.

Cascading Impacts on Other Hazards

Severe winter weather events may exacerbate flooding. As discussed, the freezing and thawing of snow and ice associated with winter weather events can create major flooding issues in the County. Maintaining winter weather hazards through snow and ice removal could minimize the potential risk of flooding during a warming period. Refer to Section 5.4.5 (Flood) for more information about the flood hazard of concern.

Future Changes That May Impact Vulnerability

Understanding future changes that impact vulnerability in the County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

As discussed in Section 4 (County Profile), areas targeted for future growth and development have been identified across the County.

Any areas of growth could potentially create issues related to transportation during a winter weather event if mitigation and emergency management measures are not considered. Therefore, it is the intention of the County to provide current information to its agencies and the public related to

forecasted winter weather events. Current New York State land use and building codes incorporate standards that address and mitigate snow accumulation. Some local municipalities in the State have implemented the following activities to eliminate loss of life and property and infrastructure damages during winter storm events:

- Removal of snow from roadways
- Removal of dead trees and trim trees/brush from roadways to lessen falling limbs and trees
- Ensure proper road signs are visible and installed properly
- Bury electrical and telephone utility lines to minimize downed lines
- Removal of debris/obstructions in waterways and develop routine inspections/maintenance plans to reduce potential flooding
- Replace substandard roofs of critical facilities to reduce exposure to airborne germs resulting from leakage
- Purchase and install backup generators in evacuation facilities and critical facilities to essential services to residents
- Install cell towers in areas where limited telecommunication is available to increase emergency response and cell phone coverage (NYS DHSES 2019).

Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 6.8 percent since 2010 and the County's population is anticipated to decrease by 2040 2.7%. However, changes in the density of population within county communities should be evaluated to determine if high population densities can create issues for local residents during a winter storm event. Any changes population density may impact the ability of persons in the County to mobilize or receive essential services during severe winter storm events. Historically, winter weather events with associated snowfall and ice accumulation have severely impacted transportation corridors as well as infrastructure. Refer to Section 4 (County Profile), which includes a more thorough discussion about population trends for the County.

Climate Change

Climate change impacts winter weather by the unequal distribution of precipitation across the globe. In addition, climate change also is producing stronger, more intense storms that may lead to more environmental and economic damage, as well as more injuries and potential deaths. According to In New York, winters have warmed three times faster than summers. Warmer winter temperatures, with fewer days below freezing, are bringing more winter precipitation to New York as rain, less snow, reduced snow cover, and earlier spring snowmelt. Less snowfall and earlier snowmelt are already having and will continue to have increasing economic impacts on New York's winter recreation industry. Reduced snow cover will increase the vulnerability of certain plants that depend on snow for insulation, and wildlife that depend on snow for protection from predators during the winter. Less snowfall in the winter can also cause drier summer soil conditions, increasing the risk of wildfires.

Snowfall in New York is likely to decrease. Due to warming global temperatures, many regions are seeing a decrease in winter precipitation falling as snow and an increase in winter rain. The combination of less early winter snowfall and earlier snowmelt will lead to a shorter snow season. This results in fewer days with snow on the ground, decreased snow depth, and earlier snowmelt, impacting ecosystems and industries in New York that depend on snow. (NY DEC 2023).

As discussed above, most studies project that the State of New York will see an increase in average annual temperatures and precipitation. Annual precipitation amounts in the region are projected to increase, primarily in the form of heavy rainfalls, which have the potential to freeze into heavy snowfall and icing. This increase in snow and ice could result in an increased risk to life and health, an increase in structural losses, a diversion of additional resources to response and recovery efforts, and an increase in business closures affected by severe winter events due to loss of service or access.

Change of Vulnerability Since the 2017 HMP

Although the Impacts of climate change including warmer temperature, lower snow pack, and earlier snowmelt may have decreased the vulnerability of New York State since 2017, the overall vulnerability of Herkimer County to severe winter weather has not noticeably decreased in that time period.

Herkimer County remains vulnerable to severe winter storm events. Since the 2017 analysis, population statistics have been updated using the 2020 US Census. Additionally, this updated analysis estimated exposure and losses at the structure level with updated building stock data. The general building stock was updated using building stock data provided by the County to update the user-defined facility inventory and critical facility inventory dataset.

SECTION 6. CAPABILITIES AND MITIGATION STRATEGY

6.1 OVERVIEW

This section presents mitigation strategies for Herkimer County to reduce potential exposure and losses identified as concerns in the Risk Assessment portion of this plan. The Steering Committee reviewed the Risk Assessment to identify and develop these mitigation actions, which are presented herein.

This section includes:

Background and Past Mitigation Accomplishments
General Mitigation Planning Approach
Review and Update of Mitigation Goals and Objectives
Capability Assessment
Mitigation Strategy Development and Update

Hazard mitigation reduces the potential impacts of, and costs associated with, emergency and disaster-related events. Mitigation actions address a range of impacts, including impacts on the population, property, the economy, and the environment.

Mitigation actions can include activities such as: revisions to land-use planning, training and education, and structural and nonstructural safety measures.

6.2 BACKGROUND AND PAST MITIGATION ACCOMPLISHMENTS

In accordance with the requirements of the Disaster Mitigation Act of 2000, detailed on Page 1-1 in Section 1 (Introduction), a discussion regarding past mitigation activities and an overview of past efforts is provided as a foundation for understanding the mitigation goals, objectives, and activities outlined in this plan update. Herkimer County, through previous and ongoing hazard mitigation activities, has demonstrated that it is proactive in protecting its physical assets and citizens against losses from natural hazards. Examples of previous and ongoing actions and projects include the following:

- The County facilitated the development of the original 2017 "Herkimer County All Hazards Mitigation Plan Update". The current planning process represents the regulatory five-year plan update process, which includes participation of all municipal governments in the County, along with key county and regional stakeholders.
- The County and municipalities have implemented mitigation actions to protect critical facilities and infrastructure throughout the planning area. As an example,
- All municipalities participate in the National Flood Insurance Program (NFIP), which requires the adoption of FEMA floodplain mapping and certain minimum construction standards for building within the floodplain.

- Herkimer County works closely with the New York Canal Corporation/New York Power Authority to identify data needs to improve the identification and mitigation of risk due to the Erie Canal. The Erie Canal, which joins the Mohawk River for much of its course through Herkimer County, serves as a transportation corridor for commercial boats and is widely used for cruises and water sports. Two of it 36 locks are in Herkimer County. Dam safety and NYPA manage water flow controls which can affect the flood mitigation. The county and the NYPA are partnering on a canal crisis management plan. They also coordinate on potential funding available through FEMA's Building Resilient Infrastructure and Communities Program (BRIC)
- Herkimer County has implemented numerous stormwater system improvements as part of the performance of scheduled maintenance programs. The programs consist of ditching, sodding road edges & catch basin clean outs on a 4- or 5-year rotation around the entire county in quadrants/areas based upon the surface type of highway and include increased capacity as needed and repairs from storm/flooding events damages as necessary. Both types of work may involve small culvert (less than 5' diameter) replacement due to deterioration, damage, or site need for upsize infrastructure. Upgraded or repaired locations include:
    - Large Culvert (5' to 20' diameter pipes/structures) replacement (including upsizing) projects performed within last 5 years:
    - Spinnerville Gulf Rd CR 15, Town of German Flatts (LC015-10)
    - (2) Old State Road CR 200, Town of Newport (LC200-10 & LC200-20)
    - Military Road CR 113, Town of Russia (LC113-10)
    - Newport Road CR 154, Town of Schuyler (LC154-20)
    - Summit Road CR 58, Town of Newport (LC058-20)
    - South Shore Road CR 118, Town of Webb (LC118-10)
    - Welshbush Road CR 37, Town of Frankfort (LC013-10)
    - Newport Road CR 154, Town of Schuyler (LC154-10)
    - Wiltse Hill Road CR 95, Town of Stark (LC095-10)
- Studies conducted by Federal, State, County, and local agencies/entities to examine natural hazards affecting Herkimer County and have been reviewed and incorporated into this plan update as appropriate (see Section 3 and References).

6.3 GENERAL MITIGATION PLANNING APPROACH

The overall approach used to update the County and local hazard mitigation strategies are based on FEMA and NYS regulations and guidance regarding local mitigation plan development, including the following:

- DMA 2000 regulations, specifically 44 CFR 201.6 (local mitigation planning).
- FEMA *Local Mitigation Planning Handbook*, March 2013.
- FEMA *Local Mitigation Plan Review Guide*, October 1, 2011.
- FEMA *Integrating Hazard Mitigation into Local Planning*, March 1, 2013.

- FEMA *Plan Integration: Linking Local Planning Efforts*, July 2015.
- FEMA *Mitigation Planning How-To Guide #3, Identifying Mitigation Actions, and Implementing Strategies* (FEMA 386-3), DATE.
- FEMA *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*, January 2013.
- NYS DHSES *New York State Hazard Mitigation Planning Standards*, 2022.
- NYS DHSES *New York State Hazard Mitigation Planning Standards Guide*, 2022.

The mitigation strategy update approach includes the following steps that are further detailed in later subsections:

- 6.3 Review and update mitigation goals and objectives.
- 6.4 Identify mitigation capabilities and evaluate their capacity and effectiveness to mitigate and manage hazard risk.
- 6.5 Prepare an implementation strategy, including:
    - Identify progress on previous county and local mitigation strategies.
    - Develop updated county and local mitigation strategies.
    - Prioritize projects and initiatives in the updated mitigation strategy.

6.4 REVIEW AND UPDATE OF MITIGATION GOALS AND OBJECTIVES

This section documents the County's efforts to develop hazard mitigation goals and objectives that are established to reduce or avoid long-term vulnerabilities to the identified hazards.

6.4.1 Mission Statement

In order to provide a guiding principle to describe the overall duty and purpose of the planning process and in accordance with FEMA guidance (386-1), the Herkimer County Hazard Mitigation Plan Steering Committee chose to develop a Mission Statement for this plan. The intent of this statement is to focus the range of goals and objectives identified to support the over-arching purpose of the plan. This is provided as an enhancement to the 2017 plan which did not include a mission statement or guiding principle.

As a result of the committee deliberations, the 2023 Herkimer County Hazard Mitigation Mission Statement is as follows:

The mission of the Herkimer County Hazard Mitigation Plan is to protect and enhance the health, safety, property, and rich history of the communities within Herkimer County and to increase economic prosperity and resilience by partnering and planning to identify and reduce future vulnerability to natural and other emerging hazards in an efficient manner.

6.4.2 Goals and Objectives

According to CFR 201.6(c)(3)(i): "The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards." The mitigation goals have been developed based on the risk assessment results, discussions, research, and input from amongst the committee, existing authorities, polices, programs, resources, stakeholders, and the public.

For the purposes of this plan, goals and objectives are defined as follows:

Goals are general guidelines that explain what is to be achieved. They are usually broad, long-term, policy-type statements and represent global visions. Goals help define the benefits that the plan is trying to achieve. The success of the plan, once implemented, should be measured by the degree to which its goals have been met (that is, by the actual benefits in terms of hazard mitigation).

FEMA defines ***Goals*** as general guidelines that explain what should be achieved. Goals are usually broad, long-term, policy statements, and represent a global vision.

FEMA defines ***Objectives*** as strategies or implementation steps to attain mitigation goals. Unlike goals, objectives are specific and measurable, where feasible.

FEMA defines ***Mitigation Actions*** as specific actions that help to achieve the mitigation goals and objectives.

Objectives are short-term aims, which when combined form a strategy or course of action to meet a goal. Unlike goals, objectives are a stand-alone measurement of the effectiveness of a mitigation action, rather than as a subset for a goal. The objectives also are used to help establish priorities.

The goals and associated objectives for Herkimer County and municipalities included in the plan were developed based in part on a review of the hazard mitigation goals and objectives established in the 2019 NYS HMP, the 2017 Herkimer County HMP, as well as the current or expired municipal hazard mitigation plans within the county. Further, these goals were selected to be compatible with the needs and goals expressed in other available County and local community planning documents. Achievement of these goals helps to define the effectiveness of a mitigation strategy.

Table 6-1 presents the updated hazard mitigation planning goals and objectives established for this plan update.

Table 6-1. Herkimer County Hazard Mitigation Plan Goals and Objectives

Goal	Objective
Goal 1: Protect Life and Property	Objective 1.1: Implement mitigation activities that will assist in protecting lives and property by making homes, businesses, infrastructure, and critical facilities and lifelines more resilient to hazards.
	Objective 1.2: Encourage homeowners and businesses to take preventative actions in areas that are especially vulnerable to hazards, including purchase of insurance for damages caused by natural hazards.

Goal	Objective
	Objective 1.3: Review existing local ordinances, building codes, safety inspection procedures, and applicable rules to help ensure that they employ the most recent and generally accepted standards for the protection of buildings.
	Objective 1.4: Support the enforcement of local, state, and federal building codes to increase resilience of public and private facilities and promote mitigation actions that emphasize sustainable construction and design measures to help reduce or eliminate impacts of natural hazards both present and future.
	Objective 1.5: Provide continuity of and access to essential services to the population in the event that individuals are isolated due to a hazard event.
	Objective 1.6: Encourage the establishment of policies or plans at the county and local level to prioritize the implementation of mitigation strategies and/or projects to benefit essential facilities, services, and infrastructure with awareness and consideration of benefits to vulnerable populations.
	Objective 1.7: Address long-term vulnerabilities from High Hazard Dams and other protective infrastructure.
Goal 2: Increase Public Awareness	Objective 2.1: Develop and implement additional education and outreach programs to increase public awareness of the risks associated with hazards and to educate the public on specific, individual preparedness activities.
	Objective 2.2: Provide information on tools, partnership opportunities, funding, resources, and current government initiatives to assist in implementing mitigation. activities with awareness and consideration of benefits to vulnerable populations.
	Objective 2.2: Support the enhancement of technological capabilities to improve inter-agency and jurisdictional communication prior to and post hazard events.
Goal 3: Encourage Partnerships	Objective 3.1: Strengthen inter-jurisdiction and inter-agency communication, coordination, and partnerships to foster hazard mitigation strategies and/or projects designed to benefit multiple jurisdictions.
	Objective 3.2: Identify and implement ways to engage public agencies with individual citizens, non-profit organizations, business, and industry to implement mitigation activities more effectively.
	Objective 3.3: Integrate the recommendations of this plan into existing local and county programs and recommendations of federal, state, and county programs into local plans and daily municipal operations.
Goal 4: Promote sustainable mitigation actions that preserve or restore the	Objective 4.1: Incorporate hazard considerations into land-use planning and natural resource management and daily municipal operations.
	Objective 4.2: Implement mitigation activities that encourage environmental stewardship and protection of the environment.

Goal	Objective
functions of natural systems	Objective 4.3: Build upon past efforts to characterize flood events by conducting additional flood studies and creating flood models.
Goal 5: Address Long-Term Vulnerabilities from High Hazard Dams	Objective 5.1: Ensure dam and other protective infrastructure is maintained.
	Objective 5.2: Ensure Emergency Action Plans are developed and updated.
	Objective 5.3: Support the identification and access to funding to repair/replace dams and other protective infrastructure.
	Objective 5.4: Communicate with owners and operators of dams and other protective infrastructure to address local concerns.

6.5 CAPABILITY ASSESSMENT

According to FEMA's *Mitigation Planning How-To Guide #3*, a capability assessment is an inventory of a community's missions, programs, and policies and an analysis of its capacity to carry them out. This assessment is an integral part of the planning process. The assessment process enables identification, review, and analysis of current local and state programs, policies, regulations, funding, and practices that could either facilitate or hinder mitigation (FEMA 2013).

During the original planning process, the County and participating municipalities identified and assessed their capabilities in the areas of existing programs, policies, and technical documents. By completing this assessment, each jurisdiction learned how or whether they would be able to implement certain mitigation actions by determining the following:

- Limitations that may exist on undertaking actions;
- The range of local and/or state administrative, programmatic, regulatory, financial, and technical resources available to assist in implementing their mitigation actions;
- Action is currently outside the scope of capabilities;
- Types of mitigation actions that may be technically, legally (regulatory) administratively, politically, or fiscally challenging or infeasible;
- Opportunities to enhance local capabilities to support long term mitigation and risk reduction.

During the plan update process, all participating jurisdictions were tasked with developing or updating their capability assessment, paying particular attention to evaluating the effectiveness of these capabilities in supporting hazard mitigation, and identifying opportunities to enhance local capabilities.

County and municipal capabilities in the Planning and Regulatory, Administrative and Technical, and Fiscal arenas can be found in the Capability Assessment section of each jurisdictional annex in Section 9 (Jurisdictional Annexes). Within each annex, participating

jurisdictions identified integration of hazard risk management into their existing planning, regulatory, and operational/administrative framework ("integration capabilities") and intended integration promotion (*integration actions*). A further summary of these continued efforts to develop and promote a comprehensive and holistic approach to hazard risk management and mitigation is presented in Section 7 (Plan Maintenance).

A summary of the various federal, state, county, and local planning, and regulatory, administrative, and technical, and fiscal programs available to promote and support mitigation and risk reduction in Herkimer County are presented below.

6.5.1 Planning and Regulatory Capabilities - County and Local

Municipal Land Use Planning and Regulatory Authority

The County and municipalities have various land use planning mechanisms that can be leveraged to mitigate flooding and support natural hazard risk reduction. Municipalities have varying degrees of their ability to plan and administer and enforce codes and regulations. While smaller jurisdictions do not have internal capacity for all technical functions, many provide services through contractual arrangements or agreements with other local jurisdictions, outside agencies, or vendors. State and federal agencies also provide technical assistance to extend the range of available local capabilities. A review of the capabilities of each participating jurisdiction is provided in each of the jurisdictional annexes in Section 9, Volume II of this plan.

Most municipalities have limited administrative and technical capabilities, and a small number of employees who handle the duties of more than one position. Many land development and engineering functions of local government are carried out through contracted services. The regional Herkimer-Oneida Counties Comprehensive Planning Program (HOCCPP) has extensive growth management and land use planning capabilities and experience with previous local flood risks and mitigation studies. The HOCCPP staff works under contractual agreements with many local governments to enhance planning capabilities and support development and implementation of mitigation actions. (Herkimer County, 2017) However a number of mitigation implementation tools available to the communities as noted in the following table and in the jurisdictional annexes.

Figure 6.5.1-1. Mitigation Implementation Tools

Policy/Planning Process	Description	Applicability	Effectiveness
Building Codes	The State has adopted the IBC code. Local governments can adopt and enforce this code.	The adoption and enforcement of building codes relates the design and construction of structures to standards established for withstanding a variety of forces.	All structures built after 2002 must comply with the IBC code, which includes provisions for building in the floodplain. NYS set a freeboard standard of two feet above the base flood elevation.
Zoning	Laws and ordinances regulate development by dividing land into zones and setting development criteria for each. Zoning decisions are delegated to local government.	Zoning keeps inappropriate development away from hazard-prone areas and designates areas for conservation, public use, or agriculture.	Communities can designate areas as "open space" to reducing the effect of flooding by allowing spaces for water to flow unimpeded.
Land Use Planning	Comprehensive land use planning prevents development in hazardous areas and allows development that minimizes hazard damage.	Local governments can use land use planning to identify those areas subject to damage from hazards and keep inappropriate development out of these areas. Land use planning can also be used regionally when governments can collaborate.	Communities can incorporate a mitigation review into the land use planning process, thereby potentially minimizing development in identified hazard areas.
Policy/Planning Process	*Description*	Applicability	*Effectiveness*

Policy/Planning Process	Description	Applicability	Effectiveness
Subdivision Regulations	*Sets construction and location standards for subdivision layout and infrastructure.*	Contains standards for such things as stormwater management, erosion control, and subdivision size.	*Urban flooding is often a result of building residential or commercial developments without adequate stormwater drainage. These regulations have the potential to reduce the impact of urban flooding on a community.*
Capital Improvement Planning	*Identifies where major public expenditures will be made over the next five to ten years.*	Secure hazard-prone areas for low-risk uses; strengthen, replace or realign roads and utilities; and prescribe standards for the design and construction of new facilities.	*Reduce the level of public funding spent on construction in hazard-prone areas.*
Building Codes	*The State has adopted the IBC code. Local governments can adopt and enforce this code.*	The adoption and enforcement of building codes relates the design and construction of structures to standards established for withstanding a variety of forces.	*All structures built after 2002 must comply with the IBC code, which includes provisions for building in the floodplain. NYS set a freeboard standard of two feet above base flood elevation.*
Zoning	*Divides the community into zones and set development criteria for each. Zoning decisions are delegated to local government.*	Zoning keeps inappropriate development away from hazard-prone areas and designates areas for conservation, public use, or agriculture.	*Communities can designate areas as "open space" to reducing the effect of flooding by allowing spaces for water to flow unimpeded.*
Land Use Planning	*Prevents development in hazardous areas and allows development that minimizes hazard damage.*	Identify areas subject to hazard damage and avoid inappropriate development here. Land use planning can also be used regionally when governments collaborate.	*Incorporate mitigation review into the land use planning process, thereby potentially minimizing development in identified hazard areas.*

Policy/Planning Process	Description	Applicability	Effectiveness
Subdivision Regulations	*Sets construction and location standards for subdivision layout and infrastructure.*	Contains standards for such things as stormwater management, erosion control, and subdivision size.	*Urban flooding often results from building without adequate storm water drainage. Regulations reduce the impact of urban flooding.*
Capital Improvement Planning	*Identifies where major public expenditures will be made over the next five to ten years.*	Secure hazard-prone areas for low-risk uses; identify roads or utilities that need strengthening, replacement, or realignment; and can prescribe standards for the design and construction of new facilities.	*Reduce the level of public funding spent on construction in hazard-prone areas.*

Source: Herkimer County HMP (2017)

National Flood Insurance Program (NFIP)

The U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968 (FEMA's 2002 National Flood Insurance Program (NFIP): Program Description). The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages.

There are three components to the NFIP: flood insurance, floodplain management and flood hazard mapping. Communities participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these communities. Community participation in the NFIP is voluntary. Flood 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 floods. Flood damage in the U.S. is reduced by nearly $1 billion each year through communities implementing sound floodplain management requirements and property owners purchasing flood insurance. Additionally, buildings constructed in compliance with NFIP building standards suffer approximately 80% less damage annually than those not built in compliance (FEMA, 2008).

Flood Insurance Rate Maps (FIRMs)

Herkimer County effective map are dates range from 1980 to 2002 and preliminary map products are dated 2018 to 2019. Due to a variety of issues, the preliminary maps have not been adopted. Currently new maps are being prepared to better reflect the flood risk in the County.

On 9/29/2020 an appeal was initiated for Herkimer County, NY., FEMA gave copies of either the initial or the revised FIRM and FIS report to all communities involved. Copies are also online at https://msc.fema.gov/portal/search and https://msc.fema.gov/fmcv. FEMA encourages local officials to widely share their copies with residents, business owners, elected officials, and others in the community. This helps in adding to or correcting non-technical information such as layout and labeling of roads, bridges, and streams, and other features. Requests to change such information can be made during the community review period, at a community meeting, and during the 90-day appeal period. Approved changes will be shown on the final FIRM and in the final FIS report (FEMA, 2023).

Many communities have Flood Insurance Rate Maps (FIRMs), that do not acknowledge infrastructure upgrades and development. The Flood Insurance Study (FIS) was conducted in September 2011 but is still preliminary; the FIRMs for Herkimer County jurisdictions were updated to Digital FIRMs (DFIRMS) in 2011 but are also preliminary. (Herkimer County, 2017) .

Effective FIRMs are used by communities to administer floodplain management regulations and mitigate flood damage. Local citizens use them to determine the flood zone for their property or structure. Lending institutions use them to determine whether flood insurance is required. Insurance rates may be affected for property owners once a FIRM becomes effective. To view the effective FIRMs, please visit the Map Service Center at https://msc.fema.gov/portal/search (FEMA, 2023).

National Flood Insurance Program (NFIP)

The majority of municipalities in Herkimer County actively participate in the NFIP. As of February 2023, there were 406 NFIP policyholders in Herkimer County. There have been 414 claims made to date, totaling approximately $6.0 million for damages to structures and contents. There are2 NFIP Repetitive Loss (RL) properties and 3 NFIP Severe Repetitive Loss (SRL)properties in the County. Further details on the flood vulnerability within the County may be found in the flood hazard profile (Section 5.4.3).

Municipal participation in and compliance with the NFIP is supported at the federal level by FEMA Region II and the Insurance Services Organization (ISO), at the state-level by the New York State Department of Environmental Conservation (NYSDEC) and New York State Office of Emergency Management (NYS DHSES). Additional information on the NFIP program and its implementation throughout the county may be found in the flood hazard profile (Section 5).

The state and municipalities within it may adopt higher regulatory standards when implementing the provisions of the NFIP. Specifically identified are the following:

Freeboard: By law, NYS requires Base Flood Elevation plus 2 feet (BFE+2) for all single- and two-family residential construction, and BFE+1 for all other types of construction. Communities may go beyond this requirement, providing for additional freeboard or requiring BFE+2 for all types of construction. A number of Herkimer municipalities have supported property owners meeting and exceeding freeboard requirements through the site plan review and zoning board of approvals process; for instance, allowing overall structure heights to be determined from BFE+2 rather than grade within NFIP floodplains.

Cumulative Substantial Improvements/Damages: The NFIP allows improvements valued at up to 50% of the building's pre-improvement value to be permitted without meeting the flood protection requirements. Over the years, a community may issue a succession of permits for different repairs or improvement to the same structures. This can greatly increase the overall flood damage potential for structures within a community. The community may wish to deem "substantial improvement" cumulatively so that once a threshold of improvement within a certain length of time is reached, the structure is considered to be substantially improved and must meet flood protection requirements.

NFIP Community Rating System (CRS)

As an additional component of the NFIP, the Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance (FEMA, 2012). Municipalities and the county as a whole could expect significant cost savings on premiums if enrolled in the CRS program.

Currently no Herkimer County communities participate in the CRS program.

Local Waterfront Revitalization Program

The Waterfront Revitalization of Coastal Areas and Inland Waterways Act offers local governments the opportunity to participate in the State's Coastal Management Program (CMP) on a voluntary basis by preparing and adopting a Local Waterfront Revitalization Program (LWRP), providing more detailed implementation of the State's CMP through use of such existing broad powers as zoning and site plan review. The City of Little Falls is a Local Waterfront Revitalization Program community.

When an LWRP is approved by the New York State Secretary of State, State agency actions are required to be consistent with the approved LWRP to the maximum extent practicable.

When the federal government concurs with the incorporation of an LWRP into the CMP, federal agency actions must be consistent with the approved addition to the CMP. Title 19 of NYCRR Part 600, 601, 602, and 603 provide the rules and regulations that implement each of the provisions of the Waterfront Revitalization of Coastal Areas and Inland Waterways Act including but not limited to the required content of an LWRP, the processes of review and approval of an LWRP, and LWRP amendments.

The Local Waterfront Revitalization Program (LWRP) serves as the Office of Planning and Development's primary program for working in partnership with waterfront communities across the State to address local and regional (coastal or inland) waterway issues, improve water quality and natural areas, guide development to areas with adequate infrastructure and services away from sensitive resources, promote public waterfront access, and provide for redevelopment of underutilized waterfronts.

A Local Waterfront Revitalization Program consists of a planning document prepared by a community, and the program established to implement the plan. An LWRP may be comprehensive and address all issues that affect a community's entire waterfront, or it may address the most critical issues facing a significant portion of its waterfront.

An LWRP follows a step-by-step process by which a community can advance community planning from a vision to implementation, which is described in the Making the Most of Your Waterfront Guidebook developed by the Department of State. Additionally, the Opportunities Waiting to Happen Guidebook, developed by the Department of State, provides help to assist all New Yorkers to redevelop abandoned buildings as part of the overall vision for their community.

In addition to landward development, water uses are subject to an ever-increasing array of use conflicts. These include conflicts between passive and active types of recreation, between commercial and recreational uses, and between all uses and the natural resources of a harbor. Increases in recreational boating, changes in waterfront uses, coastal hazards what to do with dredged materials, competition for space, climate change, and multiple regulating authorities, all make effective harbor management complex. These conflicts and a lack of clear authority to solve them have resulted in degraded natural and cultural characteristics of many harbors, and their ability to support a range of appropriate uses. As part of an LWRP, a harbor management plan can be used to analyze and resolve these conflicts and issues.

An approved LWRP reflects community consensus and provides a clear direction for appropriate future development. It establishes a long-term partnership among local government, community-based organizations, and the State. Also, funding to advance preparation, refinement, or implementation of Local Waterfront Revitalization Programs is

available under Title 11 of the New York State Environmental Protection Fund Local Waterfront Revitalization Program (EPF LWRP) among other sources.

In addition, State permitting, funding, and direct actions must be consistent, to the maximum extent practicable, with an approved LWRP. Within the federally defined coastal area, federal agency activities are also required to be consistent with an approved LWRP. This "consistency" provision is a strong tool that helps ensure all government levels work in unison to build a stronger economy and a healthier environment.

Herkimer County Comprehensive Emergency Management Plan

This Plan results from the recognition on the part of Herkimer County government and New York State officials that a comprehensive plan is needed to enhance this County's ability to manage the range of emergency/disaster situations to which we are exposed. It was prepared by County officials working as a team in a planning process recommended by the New York State Office of Emergency Management (NYSOEM). This Plan constitutes an integral part of a statewide emergency management program and contributes to its effectiveness. Authority to undertake this effort is provided by both Article 2-B of State Executive Law and the New York State Defense Emergency Act.

The development process of this Plan included an analysis of potential hazards that could affect the County and an assessment of the capabilities existing in the County to manage potential hazards.

Preparing for and responding to disasters is an ongoing and complex undertaking. Through implementation of Risk Reduction measures before a disaster or emergency occurs; Preparedness efforts to include planning, training and exercises; timely and effective Response during an actual occurrence; and provision of both short- and long-term Recovery assistance after the occurrence of a disaster, lives can be saved, and property damage minimized. This process is called Comprehensive Emergency Management to emphasize the interrelationship of activities, functions, and expertise necessary to deal with emergencies.

This comprehensive plan is organized according to the recognized methodology of emergency management. It is organized according to the necessary "all hazard" response functions needed to respond to any disaster. Accordingly, this plan addresses the four basic principles which include: mitigation, preparedness, response, and recovery operations.

6.5.2 Planning and Regulatory Capabilities – State and Federal

New York State Floodplain Management

There are two departments that have statutory authorities and programs that affect floodplain management at the local jurisdiction level in New York State: the New York State Department of Environmental Conservation (NYSDEC) and the Department of State's Division of Code Enforcement and Administration (DCEA).

In 1992, the New York State Legislature amended an existing law, finding that "it is in the interests of the people of this state to provide for participation" in the NFIP (New York Laws, Environmental Conservation, Article 36). Although the Legislature recognized that "land use regulation is principally a matter of local concern" and that local governments "have the principal responsibility for enacting appropriate land use regulations," the law requires all local governments with land use restrictions over SFHAs to comply with all NFIP requirements. The law clearly advises local governments that failure to qualify for the NFIP may result in sanctions under Federal law and specifies that the State "will cooperate with the federal government in the enforcement of these sanctions."

The 1992 law that provides for local government participation in the NFIP also requires state agencies to "take affirmative action to minimize flood hazards and losses in connection with state-owned and state-financed buildings, roads and other facilities, the disposition of state land and properties, the administration of state and state-assisted planning programs, and the preparation and administration of state building, sanitary and other pertinent codes." In particular, the commissioner of the NYSDEC is to assist state agencies in several respects, including reviewing potential flood hazards at proposed construction sites.

The NYSDEC is charged with conserving, improving, and protecting the state's natural resources and environment, and preventing, abating, and controlling water, land, and air pollution. Programs that have bearing on floodplain management are managed by the Bureau of Flood Protection and Dam Safety, which cooperates with federal, state, regional, and local partners to protect lives and property from floods, coastal erosion, and dam failures. These objectives are accomplished through floodplain management and both structural and nonstructural means.

The Coastal Management Section works to reduce coastal erosion and storm damage to protect lives, natural resources, and properties through structural and nonstructural means. The Dam Safety Section is responsible for "reviewing repairs and modifications to dams and assuring [sic] that dam owners operate and maintain dams in a safe condition through inspections, technical reviews, enforcement, and emergency planning." The Flood Control Projects Section is responsible for reducing flood risk to life and property through construction, operation, and maintenance of flood control facilities.

The Floodplain Management Section is responsible for reducing flood risk to life and property through management of activities, such as development in flood hazard areas, and for reviewing and developing revised flood maps. The Section serves as the NFIP State Coordinating Agency and in this capacity is the liaison between FEMA and New York communities that elect to participate in the NFIP. The Section provides a wide range of technical assistance.

NY Canal Corporation

The Canal Corporation runs the New York State Canal System, which includes the Erie, Champlain, Oswego and Cayuga-Seneca canals. Spanning 524 miles, the waterway links the Hudson River with the Great Lakes, the Finger Lakes and Lake Champlain. In 2017, the Canal Corporation celebrated the 200th anniversary of the groundbreaking for the Erie Canal, which occurred in the city of Rome on July 4, 1817. The Canal System includes the Erie Canalway Trail, a multi-use trail designed to accommodate pedestrians, bicyclists, and cross-country skiers. Together, the canals and trail create a world-class recreation way that is a vibrant, scenic and unique New York resource. (NYS.gov, 2023)

The Canal Corporation, which was originally created as a subsidiary of the Department of Transportation, then moved to the New York State Thruway Authority in 1992, was continued and reconstituted as a subsidiary corporation of the New York Power Authority (NYPA) in 2016. (NY Canal Corporation, 2023)

The Canal Corporation provides Emergency Action Plans (EAP) for the Canal Corporation owned High Hazard dams/water impounding structures to effected public and private entities for that specific structure. Within each EAP is an inundation map (s) delineating the potential flood levels and areas if there was an emergency at a specific dam structure. These inundation maps are part of each respective EAP for that dam structure. Annually the list of EAP plan holders, emergency contacts, and the inundation maps are reviewed by the Canal Corporation and the New York Power Authority Dam Safety section. Any updates to the plans, emergency contacts, and inundation map (s) are completed prior to the annual outreach meeting, which is conducted by the Canal Corporation and the New York Power Authority for the EAP plan holders.

Requests to review EAP plan(s) effecting Herkimer County should be made to the Herkimer County Director of Emergency Management.

NY Power Authority

The New York Power Authority is America's largest state power organization, with 16 generating facilities and more than 1,400 circuit-miles of transmission lines. State and federal regulations shape NYPA's diverse customer base, which includes large and small businesses, not-for-profit organizations, community-owned electric systems and rural electric cooperatives and government entities. NYPA provides the lowest-cost electricity in New York State and we're the only statewide electricity supplier. (NY Power Authority, 2023)

Adirondack Park Agency (APA)

The Adirondack Park Agency (APA) was created in 1971 by the New York State Legislature to develop long-range land use plans for both public and private lands within the boundary of the Park. The APA is a New York State governmental agency with an eleven-member Hudson

Riverboard, and a staff consisting of 54 people. The Agency Board meets monthly to act on Park policy issues and permit applications.

The APA is responsible for maintaining the protection of the forest preserve and overseeing development proposals of the privately owned lands. The Agency prepared the State Land Master Plan, which was signed into law in 1972, followed by the Adirondack Park Land Use and Development Plan in 1973. Both plans are periodically revised to reflect the changes and current trends and conditions of the Park. The mission of the APA is to protect the public and private resources of the Park through the exercise of the powers and duties provided by law. This mission is rooted in three statutes administered by the Agency in the Park, they are:

- The Adirondack Park Agency Act
- The New York State Freshwater Wetlands Act and
- The New York State Wild, Scenic, and Recreational Rivers System Act.

(Adirondack Park Agency, 2023)

6.5.3 Administrative and Technical Capabilities - County and Local

Herkimer County Department of Emergency Services – Office of Emergency Management

The Herkimer County Office of Emergency Services (EOS) is composed of three separate offices: The Office of Emergency Management, The Office of Emergency Communications E911, and The Office of the County Fire Coordinator. The Office of Emergency Services is led by the Director of Emergency Services, Deputy Director, and Communications Supervisor.

The Fire Coordinators Office is assisted by several Volunteer Deputy Fire Coordinators who represent the Fire Coordinator at multiple incidents throughout the County.

The Herkimer County Office of Emergency Services is responsible for coordinating Herkimer County's response to requests for emergency disaster assistance from municipalities throughout the county. This assistance can include:

- On-scene support to local incident commanders during emergencies
- Use of the county's Emergency Operations Center to manage assets and resources deployed in a large-scale disaster
- Serving as a conduit for acquiring assistance and support at the state and federal levels
- Dam Safety – The OEM works with local dam owners to ensure dam safety and ensures the availability of copies of the Emergency Action Plans for all high hazard dams in Herkimer County.

Additionally, EOS is responsible for Herkimer County's preparedness activities. EOS works with local, state, federal and private sector partners in emergency management to plan and prepare for large-scale, multi-jurisdictional responses to all natural or man-made disasters.

Herkimer Oneida Counties Comprehensive Planning Program (HOCCPP)

The HOCCPP conducts a comprehensive work program and shapes and influences growth and development in Herkimer County in order to improve quality of life and protect the environment, resulting in more livable and sustainable communities. The HOCCPP leads and participates in many water resource program activities such as

Mohawk Greenway Project

In cooperation with the NYS DEC, NYS DOT, Oneida County Department of Planning and many other agencies, HOCCPP developed a Comprehensive Greenway Plan for the Mohawk River Corridor within Oneida County.

Oneida County Water Resources Strategy

This is a comprehensive plan that identifies water resource priorities within the county; lists federal, state, and private sources of potential funding programs; and identifies key contacts and agencies within the water resources field.

Groundwater Monitoring Program

Although currently discontinued, this groundwater monitoring program evaluated and monitored drought conditions throughout the region. Monitoring points within each county were monitored regularly to provide a greater understanding of how the aquifers react to different conditions.

Local Wellhead Protection Studies

This is a study of twenty-one community water systems that rely exclusively on ground water as a source of supply. The study provides an in-depth inventory of resources and potential threats, defines multiple wellhead protection areas, and provides recommendations on wellhead protection alternatives.

Local Groundwater and Wellhead Protection Implementation Program

This report summarizes assistance in developing and implementing wellhead and/or groundwater protection regulations based on recommendations and information contained in the Local Wellhead Protection Study.

Oneida Lake Watershed Management Project

HOCCPP assisted the CNY RPDB in many aspects of the Oneida Lake Watershed Management planning project. The key elements of the project include the development of a State of the Basin Report and a Lake and Watershed Management Plan. HOCCPP provided

technical assistance with the development of the plan framework, by-laws, and formation of the Oneida Lake Watershed Advisory Council, and GIS mapping.

Sauquoit Creek Basin Watershed Management Program

This report provides an intermunicipal and basin wide approach to water resources management and incorporates all water resource issues, discusses issue interrelationships, and identifies common solutions.

Herkimer County Soil & Water Conservation District (SWCD)

The SWCD is a special purpose district created to develop and carry out a program of soil, water, and related natural resources conservation. Environmental planners and other WCDP staff provide support to the seven-member citizen Board of Directors. The SWCD offers natural resources programs and services, including technical assistance to farmers and landowners, training programs, and environmental education programs. Staff provides assistance to property owners, agricultural groups, and government agencies on soil and water conservation practices. Work involves the responsibility of planning, survey and design of conservation projects. The SWCD supports planning and construction of best management practices. Drainage, erosion, and flooding issues are all assessed on-site with determinations made to help correct or enhance these troubled areas.

Herkimer County Highway Department

The Herkimer County Highway Department is responsible for the operation and maintenance of 574 miles of roads, 66 bridges (5 co-owned with adjoining Fulton & Oneida counties), 128 large culverts (5′ to 20′), approximately 2,000 roadway culverts. The department has 44 full-time employees and 53 seasonal (including temporary) employees. The department also has a student program that provides jobs during the summer months for up to 17 students.

Maintenance operations and programs performed by the department include:

- Road rehabilitation
- Pavement striping
- Slurry seal
- Guide rail replacement/repair
- Chip seal (oil & stone)
- Roadside mowing
- Sodding
- Road sweeping
- Cleaning ditches
- Roadside garbage/trash pick up
- Culvert replacement/repair
- Sign installation, inspection, replacement & repair
- Paving/patching/pothole repair
- Hauling gravel/stone
- Shoulder repair/installation
- Highway equipment maintenance & repair
- Bridge maintenance/repair
- Facility snow & ice control
- Catch basin clean-out/repair
- Guide rail spraying
- Tree & brush removal
- Misc. work for other departments & municipalities

Capital projects and maintenance programs are supported by the highway department's engineering staff that provides a variety of engineering services including, but not limited to pavement & roadway asset inventory, maintenance program management, surveying, highway design, construction inspection, management of files and records, etc. The department is equipped with equipment, computers and software for design/drafting, survey data collection/processing, geographic information systems (GIS) data collection & processing and sign retro-reflectivity testing.

The repair and maintenance of machinery/equipment is performed at the County Highway Department. Department mechanics perform preventative maintenance, repairs and inspection on all motorized equipment and motor vehicles. Department mechanics also provide support for construction equipment repair and fueling at project sites. The department also manages a complete body repair shop and on-site fuel management system.

The plowing and sanding of county roads is accomplished under contract with towns and villages for county roads within their municipality. Herkimer County also subcontracts with seven towns and one village for state snow and ice removal on approximately 89 miles of state highways.

The capital construction program is funded through the county road fund, state funding (CHIPS) and federal highway funding.

The county maintains a full-time traffic department that is responsible for the maintenance and installation of traffic signs. More than 10,650 signs are inspected tri-annually for condition and verification of installation.

A computer-generated record of inspection and sign inventory is maintained. New signs are installed for reconstruction projects and speed zones or other changing roadside conditions. Approximately 700 temporary signs are installed during a year for construction projects, maintenance programs and road closures.

Herkimer County Sewer District

The Herkimer County Sewer District ("HCSD") provides Wastewater Management to the residents of the Towns of German Flatts and Frankfort and the Villages of Ilion, Mohawk and Frankfort.

Herkimer County Office of Aging

The Herkimer County Office for the Aging (OFA) plans, funds, and delivers services to people aged 60 and older in Herkimer County. Our goal is to help older adults remain in their homes, independently, for as long as possible, while giving priority to those with the greatest economic and social needs. Herkimer County OFA is also a NY Connects provider. NY

Connects provides information and assistance to anyone of any age that needs assistance with Long Term Services and Supports so that they can remain independent in their homes. Herkimer County OFA/NY Connects does not provide direct services to anyone under the age of 60 years of age.

Herkimer County OFA/NY Connects is a member of the Herkimer Oneida Organizations Active in Disaster. These organization assists individuals with disaster preparedness trainings and provide assistance to those impacted by a disaster. Herkimer County OFA/NY Connects is also an active partner with the Emergency Manager and the Public Health Department to ensure that any older adult who needs assistance before, during, and after a disaster receive assistance.

In 2020 the Herkimer County Office for the Aging was awarded a grant from the New York State Office for the Aging in collaboration with the New York State Departments of Health and State. The grant is designed to assist counties with incorporating healthy, age-friendly community principles into all relevant policies, plans, ordinances, and programs. Herkimer County's aim in pursuing this initiative is to develop and promote resources that will contribute to healthier living environments in communities throughout the County and help improve the quality of life for residents of all ages. Toward those ends, the Office for the Aging worked with other regional agencies and organizations, including the Herkimer County Administrator, Herkimer County HealthNet, Catholic Charities of Herkimer County, Herkimer County Chamber of Commerce, Herkimer Industrial Development, Herkimer County DSS, Herkimer Working Solutions, and Herkimer County Community College to form the Herkimer County Age Friendly Coalition. the past year the Coalition has been meeting to discuss ideas and strategies for developing communities that meet AARP's and the World Health Organization's definition of "age friendly." HCOFA/NY Connects is currently in the process of developing an Age Friendly Action plan. This action plan will be developed to implement programs that will assist in creating a community that supports individuals of all ages.

Herkimer County Office of Public Health

The Herkimer County Public Health team is dedicated to the protection and promotion of our residents' health through the provision of high quality, comprehensive, individualized services, in all phases of the life cycle. The office aspires to:

- Create a team of skilled, caring, compassionate individuals shall strive to meet the needs and expectations of the people in Herkimer County;
- Utilize all available resources to ensure the mission statement is carried out.
- Provide staff and patient/family education;
- Encourage and provide open and continuous quality improvement.

Herkimer County IDA

The Herkimer County IDA is the County's lead agency for economic development. The mission of the Herkimer County Industrial Development Agency is to deliver economic incentives to businesses and industries to diversify and strengthen Herkimer County's tax base and enhance community vitality by supporting job creation, business and industrial development, and community revitalization. We strive to develop the local economy in an organized, sustainable, and environmentally beneficial manner.

6.5.4 Administrative and Technical Capabilities - State and Federal

New York State Division of Homeland Security and Emergency Services (NYS DHSES)

For more than 50 years, NYS DHSES (formerly New York State Office of Emergency Management – NYS DHSES) and its predecessor agencies have been responsible for coordinating the activities of all State agencies to protect New York's communities, the State's economic well-being, and the environment from natural and man-made disasters and emergencies. NYS DHSES routinely assists local governments, voluntary organizations, and private industry through a variety of emergency management programs including hazard identification, loss prevention, planning, training, operational response to emergencies, technical support, and disaster recovery assistance.

NYS DHSES administers the FEMA mitigation grant programs in the state and supports local mitigation planning in addition to developing and routinely updating the State Hazard Mitigation Plan. NYS DHSES prepared the current State Hazard Mitigation Plan working with input from other State agencies, authorities, and organizations. It was approved by FEMA in 2019 and it keeps New York eligible for recovery assistance in all Public Assistance Categories A through G, and Hazard Mitigation assistance in each of the Unified Hazard Mitigation Assistance Program's five grant programs. The 2019 New York State HMP was used as guidance in completing the Herkimer County HMP Update.

New York State Department of Environmental Conservation (NYSDEC) – Division of Water - Bureau of Flood Protection and Dam Safety

Within the NYSDEC – Division of Water, the Bureau of Flood Protection and Dam Safety cooperates with federal, state, regional, and local partners to protect lives and property from floods, coastal erosion and dam failures through floodplain management and both structural and non-structural means; and provides support for information technology needs in the Division. The Bureau consists of the following Sections:

- Coastal Management: Works to reduce coastal erosion and storm damage to protect lives, natural resources, and properties through structural and non-structural means.

- Dam Safety: Is responsible for reviewing repairs and modifications to dams and assuring that dam owners operate and maintain dams in a safe condition through inspections, technical reviews, enforcement, and emergency planning.
- Flood Control Projects: Is responsible for reducing flood risk to life and property through construction, operation, and maintenance of flood control facilities.
- Floodplain Management: Is responsible for reducing flood risk to life and property through proper management of activities including, development in flood hazard areas and review and development of revised flood maps.

Grant funding is available to assist eligible dam owners with infrastructure repair costs. Funding is provided through the Federal Emergency Management Agency's (FEMA) High Hazard Potential Dam grant program. DEC accepts applications for grants to assist with technical, planning, design, and other pre-construction activities associated with the rehabilitation of eligible dams classified as High Hazard dams.

Department of State's Division of Building Codes and Standards

Technical Bulletins for the 2020 Codes of New York State

The Division of Building Codes and Standards (DBSC) publishes 14 technical bulletins including two recent bulletins with guidance related to flood hazard areas: Electrical Systems and Equipment in Flood-damaged Structures and Accessory Structures. One archived bulletin from October 31, 2017, Flood Venting in Foundations and Enclosures Below Design Flood Elevation, t provides clarification on the requirements for flood vents in foundations and enclosures located below the design flood elevation and in flood hazard areas.

Forms and Publications

The Department of State Division of Building Standards and Codes (DBSC) in conjunction with the Division of Homeland Security & Emergency Services – Office of Fire Prevention and Control (OFPC) has implemented a joint outreach program that is intended to guide and educate code users. The program will provide concise, easily digestible information on:

- New topics that code users must be aware of;
- Frequently overlooked or misunderstood code requirements; and
- Concerns relating to the administration and enforcement of the Uniform Code and Energy Code.

The DBSC and OFPC hope the program will continue to foster professional growth and support the efforts of the code enforcement community and provide helpful guidance to all code users.

The Code Outreach Program publications are expected to be distributed at the beginning of every month. If you have ideas for future topics to be addressed by the Code Outreach Program, email Cop.Codes@dos.ny.gov.

The DBSC posts several model reporting forms and related publications on its web page. The Building Permit Application requests the applicant to indicate whether the site is or is not in a floodplain and advises checking with town clerks or NYSDEC. The General Residential Code Plan Review form includes a reminder to "add 2' freeboard." Sample Flood Hazard Area Review Forms, including plan review checklists and inspection checklists for Zone A and Zone V, are based on the forms in Reducing Flood Losses through the International Code Series published by International Code Council and FEMA (2008).

6.5.5 Fiscal Capabilities – County and Local

Municipal Fiscal Capabilities

Herkimer County municipalities are able to fund mitigation projects though existing local budgets, local appropriations (including referendums and bonding), and through a variety of federal and state loan and grant programs. Many municipalities, in particular the City of Little Falls, and the Villages of Herkimer, Ilion, Frankfort, and Mohawk are faced with increasing fiscal constraints, including decreasing revenues and budget constraints. In an effort to overcome these fiscal challenges, municipalities have continued to leverage the sharing of resources and combining available funding with grants and other sources and note that plans and inter-municipal cooperation are beneficial in obtaining grants.

6.5.6 Fiscal Capabilities – State and Federal

New York Rising Community Reconstruction Program

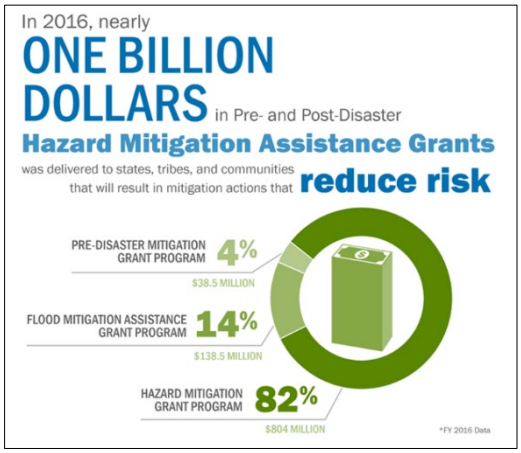
The NY Rising Community Reconstruction program was established to provide additional rebuilding and revitalization assistance to communities severely damaged by Hurricanes Sandy and Irene and Tropical Storm Lee. The NY Rising Community Reconstruction program enables communities to identify resilient and innovative reconstruction projects and other needed actions based on community-driven plans that consider current damage, future threats, and the communities' economic opportunities. Communities successfully completing a recovery plan are eligible to receive funds to support the implementation of projects and activities identified in the plans.

Each NY Rising Community has a Planning Committee that includes, among others, a representative from the County, Town, or Village, elected legislative representatives, local residents, and leaders of other organizations and businesses in the community. The Planning Committee will take the lead in developing the content of the plan. The State provided each NY Rising Community with a planning team to help prepare a plan. Consultants hired through

a State process administered by New York State Homes and Community Renewal (NYS HCR) through its Office of Community Renewal (OCR) and the Housing Trust Fund Corporation (HTFC). Planning experts from the Department of State and Department of Transportation were assigned to each community to provide assistance to the community and help oversee the planning consultants.

The NYRCR Program is a planning and implementation process established to provide rebuilding and resiliency assistance to communities heavily damaged by Hurricane Irene, Tropical Storm Lee, Superstorm Sandy, and the severe summer storms of 2013. Drawing on lessons learned from past recovery efforts, the NYRCR Program is a unique combination of bottom-up community participation and State-provided technical expertise. This powerful combination recognizes that community members are best positioned to assess the needs and opportunities of the places where they live and work. Up to $3 million was committed by the Governor for each of five counties. In Herkimer, Oneida, and Montgomery Counties, consultants were retained by the NYS Department of Transportation in consultation with the NYS Department of Environmental Conservation to assess 13 watersheds that ultimately empty into the Mohawk River. The completed engineering assessment provided the Counties with a better understanding of the way water moves across the landscape, enabling the NYRCR Planning Committees to better understand critical areas subject to flood risk. The counties and communities along these creeks were provided recommendations on how to address problems incrementally and begin to mitigate severe flooding. Each NYRCR County Planning Committee has incorporated recommendations into their plan and proposed projects, making sure short term recovery actions are compatible with the actions needed to implement long-term resiliency recommendations.

Federal Hazard Mitigation Funding Opportunities



Source: FEMA, 2018

The *NYS Capabilities* section of the 2019 New York State Hazard Mitigation Plan features a section on mitigation-related funding administered by state agencies that eligible jurisdictions can use to find mitigation actions. A list of funding opportunities can be accessed here: https://mitigateny.availabs.org/strategies/funding

As noted on the FEMA hazard mitigation assistance website (https://www.fema.gov/hazard-mitigation-assistance), FEMA administers five programs that provide funding for eligible mitigation planning and projects that reduces disaster losses and protect life and property from future disaster damages. The programs are the Hazard Mitigation Grant Program (HMGP), and the HMGP Post

Fire Grant, the Flood Mitigation Assistance (FMA) Program, the Pre-Disaster Mitigation (PDM) Program, and the new Building Resilient Infrastructure & Communities (BRIC) Program.

HMGP assists in implementing long-term hazard mitigation planning and projects following a Presidential major disaster declaration. PDM provides funds for hazard mitigation planning and projects on an annual basis. FMA provides funds for planning and projects to reduce or eliminate risk of flood damage to buildings that are insured under the National Flood Insurance Program (NFIP) on an annual basis. BRIC supports jurisdictions in hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The BRIC program will replace the existing Pre-Disaster Mitigation (PDM) program. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency (FEMA 2020).

HMGP funding is generally 15% of the total amount of Federal assistance provided to a State, Territory, or federally-recognized tribe following a major disaster declaration. PDM and FMA funding depends on the amount congress appropriates each year for those programs. BRIC is funded by a 6% ($500 million) set-aside from federal post-disaster grant funding.

Individual homeowners and business owners may not apply directly to FEMA. Eligible local governments may apply on their behalf (FEMA 2020).

Table 6-2 provides an overview of program funding eligibility and cost share.

Table 6-2. FEMA HMA Grant Cost Share Requirements

Programs	Cost Share (Percent of Federal / Non-Federal Share)
HMGP	75 / 25
FMA – insured properties and planning grants	75 / 25
FMA – repetitive loss property(2)	90 / 10
FMA – severe repetitive loss property(2)	100 / 0
BRIC (3)	75 / 25
BRIC – subrecipient is small and impoverished community (3)	90 / 10

Source: FEMA HMA Guidance 2015; Regulations.gov; FEMA 2020

(1) Sub applicants should consult their State Hazard Mitigation Officer (SHMO) for the amount of percentage of HMGP subrecipient management cost funding their State has determined to be passed through subrecipients.

(2) To be eligible for an increased federal cost share, a FEMA-approved state or tribal (standard or enhanced) mitigation plan that addressed repetitive loss properties must be in effect at the time of award, and the property is being submitted for consideration must be a repetitive loss property.

(3) The proposed BRIC program is in the public comment period as of May 2020 and is expected to have an open grant period and be finalized by the Fall of 2020.

Federal Hazard Mitigation Funding Opportunities

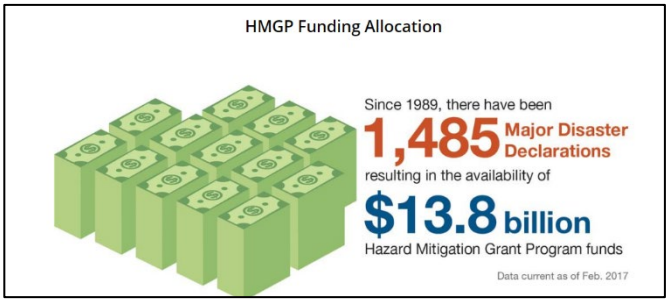
Federal mitigation grant funding is available to all communities with a current HMP (this plan); however, most of these grants require a "local share" in the range of 10-25 percent of

the total grant amount. Details about grant programs and further descriptions of these opportunities can be found at: https://www.fema.gov/hazard-mitigation-assistance. The FEMA mitigation grant programs are described below.

Hazard Mitigation Grant Program (HMGP)

The HMGP is a post-disaster mitigation program. FEMA makes these grants available to states by after each federal disaster declaration. The HMGP can provide up to 75 percent funding for hazard mitigation measures and can be used to fund cost-effective projects that will protect public or private property or that will reduce the likely damage from future disasters in an area covered by a federal disaster declaration. Examples of projects include acquisition and demolition of structures in hazard prone areas, flood-proofing, or elevation to reduce future damage, minor structural improvements, and development of state or local standards. Projects must fit into an overall mitigation strategy for the area identified as part of a local planning effort. All applicants must have a FEMA-approved HMP (this plan).

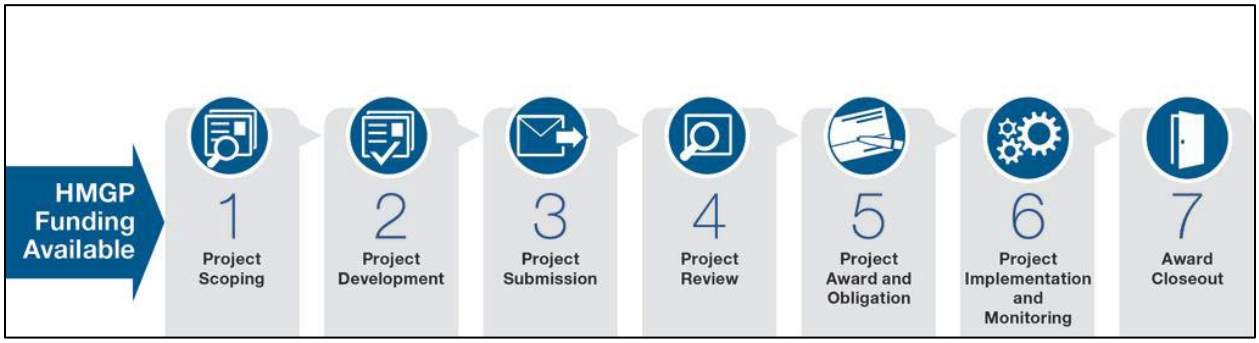
Figure 6.5.6-1. FEMA HMGP Funding Allocation



Source: FEMA 2018

Applicants who are eligible for the HMGP are state and local governments, certain nonprofit organizations or institutions that perform essential government services, and Indian tribes and authorized tribal organizations. Individuals or homeowners cannot apply directly for the HMGP; a local government must apply on their behalf. Applications are submitted to NYS DHSES, placed in rank order for available funding, and submitted to FEMA for final approval. Eligible projects not selected for funding are placed in an inactive status and could be considered as additional HMGP funding becomes available. Additional information regarding the HMGP is available on the FEMA website: https://www.fema.gov/hazard-mitigation-grant-program.

Figure 6.5.6-2. FEMA HMGP Applicant/Sub applicant Process



Source: FEMA 2018

Flood Mitigation Assistance (FMA) Program

The FMA program combines the previous Repetitive Flood Claims and Severe Repetitive Loss Grants into one grant program. The FMA provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The FMA is funded annually; no federal disaster declaration is required. Only NFIP insured homes and businesses are eligible for mitigation in this program. Funding for FMA is very limited and, as with the HMGP, individuals cannot apply directly for the program. Applications must come from local governments or other eligible organizations. The federal cost share for an FMA project is at least 75 percent. For the nom-federal share, at most 25 percent of the total eligible costs must be provided by a non-federal source; of this 25 percent, no more than half can be provided as in-kind contributions from third parties. At minimum, a FEMA-approved local flood mitigation plan is required before a project can be approved. The FMA funds are distributed from FEMA to the state. The NYS DHSES serves as the grantee and program administrator for the FMA program.

The FMA program is detailed on the FEMA website: https://www.fema.gov/flood-mitigation-assistance-grant-program

Building Resilient Infrastructure and Communities (BRIC) Program

Building Resilient Infrastructure and Communities (BRIC) will support states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the existing Pre-Disaster Mitigation (PDM) program.

The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency.

For additional information regarding the BRIC program, please refer to: https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities.

Rehabilitation of High Hazard Potential Dams (HHPD) Program

The Rehabilitation of High Hazard Potential Dams (HHPD) grant program provides technical, planning, design, and construction assistance for eligible rehabilitation activities that reduce dam risk and increase community preparedness.

The HHPD Grant Program will provide assistance for technical, planning, design, and construction activities toward:

- Repair
- Removal
- Structural/nonstructural rehabilitation of eligible high hazard potential dams

For additional information regarding the HHPD program, please refer to: https://www.fema.gov/emergency-managers/risk-management/dam-safety/grants/resources.

Extraordinary Circumstances

For FMA project subawards, the FEMA Region might apply extraordinary circumstances when justification is provided and with concurrence from FEMA Headquarters (Risk Reduction and Risk Analysis Divisions) prior to granting an exception. If this exception is granted, a local mitigation plan must be approved by FEMA within 12 months of the award of the project subaward to that community.

For HMGP, BRIC, and FMA, extraordinary circumstances exist when a determination is made by the applicant and FEMA that the proposed project is consistent with the priorities and strategies identified in the State (Standard or Enhanced) Mitigation Plan and that the jurisdiction meets at least one of the criteria below. If the jurisdiction does not meet at least one of these criteria, the region must coordinate with FEMA Headquarters (Risk Reduction and Risk Analysis Divisions) for HMGP; however, for BRIC and FMA the region must coordinate and seek concurrence prior to granting an exception. The criteria are as follows:

- The jurisdiction meets the small, impoverished community criteria (see Part VIII, B.2 of HMA Unified Guidance).
- The jurisdiction has been determined to have had insufficient capacity due to lack of available funding, staffing, or other necessary expertise to satisfy the mitigation planning requirement prior to the current disaster or application deadline.
- The jurisdiction has been determined to have been at low risk from hazards because of low frequency of occurrence or minimal damage from previous occurrences as a result of sparse development.
- The jurisdiction experienced significant disruption from a declared disaster or another event that impacts its ability to complete the mitigation planning process prior to award or final approval of a project award.
- The jurisdiction does not have a mitigation plan for reasons beyond the control of the state, federally-recognized tribe, or local community, such as Disaster Relief Fund restrictions that delay FEMA from granting a subaward prior to the expiration of the local or tribal mitigation plan.

For HMGP, BRIC, and FMA, the applicant must provide written justification that identifies the specific criteria or circumstance listed above, explains why there is no longer an impediment to satisfying the mitigation planning requirement, and identifies the specific actions or circumstances that eliminated the deficiency.

When an HMGP project funding is awarded under extraordinary circumstances, the recipient shall acknowledge in writing to the Regional Administrator that a plan will be completed within

12 months of the subaward. The recipient must provide a work plan for completing the local or tribal mitigation plan, including milestones and a timetable, to ensure that the jurisdiction will complete the plan in the required time. This requirement shall be incorporated into the award (both the planning and project subaward agreements if a planning subaward is also awarded).

Federal and State Disaster and Recovery Assistance Programs

Following a disaster, various types of assistance could be made available by local, state, and federal governments. The types and levels of disaster assistance depend on the severity of the damage and the declarations that result from the disaster event. The following sections detail the general types of assistance that might be provided should the President of the United States declare the event a major disaster.

Individual Assistance (IA)

Individual Assistance (IA) provides help for homeowners, renters, businesses, and some non-profit entities after disasters occur. This program is largely funded by the U.S. Small Business Administration. For homeowners and renters, those who suffered uninsured or underinsured losses could be eligible for a Home Disaster Loan to repair or replace damaged real estate or personal property. Renters are eligible for loans to cover personal property losses. Individuals are allowed to borrow up to $200,000 to repair or replace real estate, $40,000 to cover losses to personal property, and an additional 20 percent for mitigation. For businesses, loans could be made to repair or replace disaster damages to property owned by the business, including real estate, machinery and equipment, inventory, and supplies. Businesses of any size are eligible. Non-profit organizations, such as charities, churches, and private universities are eligible. An Economic Injury Disaster Loan provides necessary working capital until normal operations resume after a physical disaster but are restricted by law to small businesses only. IA is detailed on the FEMA website: https://www.fema.gov/individual-disaster-assistance.

Public Assistance (PA)

Public Assistance (PA) provides cost reimbursement aid to local governments (state, county, local, municipal authorities, and school districts) and certain non-profit agencies that were involved in disaster response and recovery programs or that suffered loss or damage to facilities or property used to deliver government-like services. This program is largely funded by FEMA with both local and state matching contributions required. PA is detailed on the FEMA website: https://www.fema.gov/public-assistance-local-state-tribal-and-non-profit.

Small-Business Administration (SBA) Loans

SBA provides low-interest disaster loans to homeowners, renters, business of all sizes, and most private nonprofit organizations. SBA disaster loans can be used to repair or replace the

following items damaged or destroyed in a declared disaster: real estate, personal property, machinery and equipment, and inventory and business assets.

Homeowners could apply for up to $200,000 to replace or repair their primary residence. Renters and homeowners could borrow up to $40,000 to replace or repair personal property-such as clothing, furniture, cars, and appliances that were damaged or destroyed in a disaster. Physical disaster loans of up to $2 million are available to qualified businesses or most private nonprofit organizations. Additional information regarding SBA loans is available on the SBA website: https://www.sba.gov/managing-business/running-business/emergency-preparedness/disaster-assistance.

Social Services Block Grant Program (SSBG)

To address the needs of critical health and human service providers and the populations they serve, the State of New York will receive a total of $235.4 million in federal Superstorm Sandy SSBG funding. The state will distribute $200,034,600 through a public and transparent solicitation for proposals and allocate $35.4 million in State Priority Projects, using the SSBG funding. Sandy SSBG resources are dedicated to covering necessary expenses resulting from Superstorm Sandy, including social, health, and mental health services for individuals, and for repair, renovation, and rebuilding of health care facilities, mental hygiene facilities, childcare facilities, and other social services facilities. Additional information regarding the SSBG program is available on the website: https://www.acf.hhs.gov/ocs/programs/ssbg.

Department of Homeland Security Grant Program (HSGP)

The HSGP plays an important role in the implementation of the National Preparedness System by supporting the building, sustainment, and delivery of core capabilities essential to achieving the National Preparedness Goal of a secure and resilient nation. The FY 2020 HSGP supports efforts to build and sustain core capabilities across the Prevention, Protection, Mitigation, Response, and Recovery mission areas. This includes two priorities: building and sustaining law enforcement terrorism prevention capabilities and maturation and enhancement of state and major urban area fusion centers (HSGP 2020). HSGP is comprised of three interconnected grant programs including the State Homeland Security Program (SHSP), Urban Areas Security Initiative (UASI), and the Operation Stonegarden (OPSG). Together, these grant programs fund a range of preparedness activities, including planning, organization, equipment purchase, training, exercises, and management and administration. Additional information regarding HSGP is available on the website: https://www.fema.gov/homeland-security-grant-program.

Community Development Block Grants (CDBG)

CDBG are federal funds intended to provide low and moderate-income households with viable communities, including decent housing, a suitable living environment, and expanded economic opportunities. Eligible activities include community facilities and improvements,

roads and infrastructure, housing rehabilitation and preservation, development activities, public services, economic development, and planning and administration. Public improvements could include flood and drainage improvements. In limited instances and during the times of "urgent need" (e.g., post disaster) as defined by the CDBG National Objectives, CDBG funding could be used to acquire a property located in a floodplain that was severely damaged by a recent flood, demolish a structure severely damaged by an earthquake, or repair a public facility severely damaged by a hazard event. Additional information regarding CDBG is available on the website: https://www.hudexchange.info/programs/cdbg-entitlement/. In 2018, the Community Development Block Grant Mitigation Program was created to fund resilience projects in qualifying areas struck by disaster in 2015-2017.

U.S. Economic Development Administration

The U.S. Economic Development Administration (USEDA) is an agency of the U.S. Department of Commerce that supports regional economic development in communities around the country. It provides funding to support comprehensive planning and makes strategic investments that foster employment creation and attract private investment in economically distressed areas of the United States. Through its Public Works Program, USEDA invests in key public infrastructure, such as traditional public works projects, including water and sewer systems improvements, expansion of port and harbor facilities, brownfields, multitenant manufacturing and other facilities, business and industrial parks, business incubator facilities, redevelopment technology-based facilities, telecommunications facilities, and development facilities. Through its Economic Adjustment Program, USEDA administers its Revolving Loan Fund Program, which supplies small businesses and entrepreneurs with the gap financing needed to start or expand their business in areas that have experienced or are under threat of serious structural damage to the underlying economic base. Additional information is available on the USEDA website: https://www.eda.gov/.

Federal Highway Administration - Emergency Relief

The Federal Highway Administration Emergency Relief is a grant program that can be used for repair or reconstruction of Federal-aid highways and roads on Federal lands which have suffered serious damage as a result of a disaster. NYS is serving as the liaison between local municipalities and FHWA. The program is appropriated $100 million annually. For information regarding the FHWA Emergency Relief Program, please refer to: https://www.fhwa.dot.gov/programadmin/erelief.cfm

Federal Transit Administration - Emergency Relief

The Federal Transit Authority Emergency Relief is a grant program that funds capital projects to protect, repair, reconstruct, or replace equipment and facilities of public transportation systems. Administered by the Federal Transit Authority at the U.S. Department of

Transportation and directly allocated to MTA and Port Authority, this transportation-specific fund was created as an alternative to FEMA PA. Currently, a total of $5.2 Billion has been allocated to NYS-related entities related to Hurricane Sandy. IN the wake of the COVID-19 outbreak in 2020, the program provided emergency-related capital and operating expenses to transit providers. Additional information regarding the FTA Emergency Relief Program is available on the website: https://www.transit.dot.gov/funding/grant-programs/emergency-relief-program/emergency-relief-program.

State Hazard Mitigation Funding Opportunities

Empire State Development

Empire State Development offers a wide range of financing, grants, and incentives to promote business and employment growth and real estate development throughout the state. Several programs address infrastructure construction associated with project development, acquisition, and demolition associated with project development and brownfield remediation and redevelopment. Additional information regarding Empire State Development is available on the website: https://esd.ny.gov/.

New York State Department of Transportation (NYSDOT)

Damaged Roads and Signals

High winds, storm tidal surge and flooding caused significant damage to NYSDOT facilities, roads and local transportation infrastructure in the Hudson Valley, Long Island and New York City. Repair and replacement will be necessary for these facilities and infrastructure. In some cases, municipalities will be direct applicants; therefore, not all FEMA-eligible costs are included for damaged infrastructure.

Scour Critical/Floodprone Bridge Program

The Scour Critical/Flood Prone Bridge Program is an initiative developed to harden New York State's at-risk bridges to withstand extreme weather events. In the past three years, the state has suffered 9 presidentially declared disasters due to extreme weather, many involving severe flooding (NYSDOT 2014).

For this initiative, 105 scour critical/flood prone bridges throughout New York State were identified as most at-risk from repeated flooding and are located in the Capital District, Long Island, Mid-Hudson, Mohawk Valley, North Country, Finger Lakes, Central/Western and Southern Tier regions. The locations encompass 78 communities within 30 counties across the State (NYSDOT 2014). Additional information of the list of bridges is available on the website: https://www.dot.ny.gov/main/business-center/cbow/repository/CBOW_list_2014.pdf.

All the bridges included in this program were built to the codes and standards of their time and remain safe and open for everyday traffic; however, due to a variety of natural severe

weather events and the increasing frequency of major storms and floods, they are vulnerable to scour and flooding caused by the intensity and velocity of water from extreme natural events. Bridge scour erodes and carries away foundation materials, such as sand and rocks from around and beneath bridge abutments, piers, foundations, and embankments (NYSDOT 2014).

This program encompasses a variety of bridge improvement work, including upgrading concrete bridge abutments and/or piers by adding steel or concrete pile foundations, increasing the size of waterway openings to meet 100-year flood projections, and reducing or eliminating the number of bridge piers in the water to prevent debris and ice jams that can flood surrounding areas. Completion of the program will ensure continual access to critical facilities and essential personnel during emergency events. Adverse impacts to travel throughout the state will be greatly reduced during severe weather events, as well (NYSDOT 2014).

This program aims to increase the state's resiliency and mitigate the risks of loss and damage associated with future disasters. The total cost of the program, including all 105 bridges across the state, is $518 million. It will be paid for with a mix of funding from FEMA and the U.S. Department of Housing and Urban Development. No state funding will be required (NYSDOT 2014).

Emergency Watershed Protection Program

The purpose of the Emergency Watershed Protection Program (EWP) was established by Congress to respond to emergencies created by natural disasters. The EWP Program is designed to help people and conserve natural resources by relieving imminent hazards to life and property caused by floods, fires, drought, windstorms, and other natural occurrences. The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) administers the EWP Program, EWP-Recovery, and EWP–Floodplain Easement. Additional information regarding the EWP is detailed below and available on the website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/.

EWP - Recovery

The EWP Program is a recovery effort program aimed at relieving imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences. Public and private landowners are eligible for assistance but must be represented by a project sponsor that must be a legal subdivision of the state, such as a city, county, township, or conservation district, and Native American Tribes or Tribal governments. NRCS will pay up to 75 percent of the construction cost of emergency measures. The remaining 25 percent must come from local sources and can be in the form of cash or in-kind services.

EWP work is not limited to any one set of measures. It is designed for installation of recovery measures to safeguard lives and property as a result of a natural disaster. NRCS completes a

Damage Survey Report, which provides a case-by-case investigation of the work necessary to repair or protect a site.

Watershed impairments that the EWP Program addresses are debris-clogged stream channels, undermined and unstable streambanks, jeopardized water control structures and public infrastructures, wind-borne debris removal, and damaged upland sites stripped of protective vegetation by fire or drought.

EWP - Floodplain Easement (FPE)

Privately-owned lands or lands owned by local and state governments might be eligible for participation in EWP-FPE. To be eligible, lands must meet one of the following criteria:

- Lands that have been damaged by flooding at least once within the previous calendar year or have been subject to flood damage at least twice within the previous 10 years.
- Other lands within the floodplain are eligible, provided the lands would contribute to the restoration of the flood storage and flow, provide for control of erosion, or that would improve the practical management of the floodplain easement.
- Lands that would be inundated or adversely impacted as a result of a dam breach.

EWP-FPE easements are restored to the extent practicable to the natural environment and can include both structural and nonstructural practices to restore the flood storage and flow, erosion control, and improve the practical management of the easement.

Structures, including buildings, within the floodplain easement must be demolished and removed or relocated outside the 100-year floodplain or dam breach inundation area.

New York State Department of Environmental Conservation Climate Smart Communities (CSC) Program

The CSC program is jointly sponsored by the following six New York State agencies: DEC; Energy Research and Development Authority; Public Service Commission; Department of State; NYSDOT; and the Department of Health. The program encourages municipalities to minimize the risks of climate change and reduce long-term costs through actions which reduce greenhouse gas emissions and adapt to a changing climate. The program offers free technical support on energy and climate and guidance tailored to New York State communities. As of August 2023, 390 communities, representing 9.5 million New Yorkers in every region of the state, have committed to acting on climate through New York State's Climate Smart Communities program.

Benefits of participating in the program include saving taxpayer dollars, improving operations and infrastructure, increasing energy independence and security, demonstrating leadership, and positioning for economic growth. Registered Climate Smart Communities receive notification of state and federal assistance that they can leverage to help adopt low-carbon

technologies and of programs and support for efficiency improvements and energy conservation. Further, those communities receive an advantage in accessing some state assistance programs, can call on the help of other local governments that already have adopted climate smart practices and policies, and receive statewide recognition for their climate-smart accomplishments. Key elements of the Climate Smart Communities program are described below.

Additional information regarding the CSC program is available on the website: http://www.dec.ny.gov/energy/50845.html.

Climate Smart Communities Pledge

Any city, town, village, or county in New York can join the program by adopting the Climate Smart Communities Pledge. To become a registered Climate Smart Community, the municipality's governing body must adopt a resolution that includes all ten elements of the pledge and inform DEC of the passage of the resolution. The required ten elements of the pledge are as follows:

- Pledge to be a Climate Smart Community.
- Set goals, inventory emissions, plan for climate action.
- Decrease community energy use.
- Increase community use of renewable energy.
- Realize benefits of recycling and other climate-smart solid waste management practices.
- Reduce greenhouse gas emissions through use of climate-smart land-use tools.
- Enhance community resilience and prepare for the effects of climate change.
- Support development of a green innovation economy.
- Inform and inspire the public.
- Commit to an evolving process of climate action.

Climate Smart Communities Certification (CSC) Program

The CSC program enables high-performing registered communities to achieve recognition for their leadership. Designed around the existing ten pledge elements, the certification program recognizes communities achieving any on over 130 total possible actions through a rating system leading to four levels of award: Certified, Bronze, Silver, and Gold. Recertification of completed actions is required every five years. Details of the program and the specific documentation required for each action are described in the CSC Certification Manual at http://www.dec.ny.gov/docs/administration_pdf/certman.pdf. At the time of this plan update, no communities in the County have achieved certification.

Climate Smart Communities Grant Program

In April 2016, DEC announced an expansion of the Environmental Protection Fund to support communities ready to reduce greenhouse gas emissions and prepare for the effects of

climate change. Climate Smart Community Implementation grants support mitigation and adaptation projects and range from $100,000 to $2 million. Competitive grants ranging from $25,000 to $100,000 will provide support for local governments to become certified Climate Smart Communities. All counties, cities, towns, and villages of the State of New York are eligible to receive funding. The CSC grant program will provide 50/50 matching grants for eligible projects in the following categories.

Funding is available for **implementation projects** that advance a variety of climate adaptation and mitigation actions, including the following:

- Construction of natural resiliency measures.
- Relocation or retrofit of climate-vulnerable facilities.
- Conservation or restoration of riparian areas and tidal marsh migration areas.
- Reduction of flood risk.
- Clean transportation.
- Reduction or recycling of food waste.

Funding is available for **certification projects** that advance several specific actions aligned with Climate Smart Communities Certification requirements, including the following:

- Right-sizing of government fleets.
- Developing natural resource inventories.
- Conducting vulnerability assessments.
- Developing climate adaptation strategies.
- Updating hazard mitigation plans to address changing conditions and reduce climate vulnerability.

In scoring grant applications, increasing points are awarded to communities who have already taken the CSC pledge and to those that have achieved certification status. All grant recipients must take the Climate Smart Communities Pledge within the term of their grant contract. For climate mitigation projects, grant recipients must provide a report of estimates of emissions reduction. Certification actions must adhere to the requirements and standards described in the Climate Smart Communities Certification Manual that is available on the website: http://www.dec.ny.gov/energy/96511.html. For implementation projects involving property (construction, improvements, restoration, rehabilitation), grant recipients that do not have ownership of the property must obtain a climate change mitigation easement.

The Climate Smart Communities Toolkit was developed to educate New York communities on recommended practices that will help to reduce greenhouse gas emissions and adapt to the effects of climate change, specifically in the areas of land-use, transportation policy, green buildings, infrastructure investment, green infrastructure, housing policy, adaptation, and resilience. The Climate Smart Communities Guide to Local Action contains overviews of

possible community actions, how-to's and case studies to help communities implement the CSC pledge. The Climate Smart Communities Land Use Toolkit allows New York communities to find recommended practices that will help to reduce greenhouse gas emissions in the areas of land use, transportation policy, green building, infrastructure investment, green infrastructure, and housing policy.

New York State Department of Environmental Conservation (NYSDEC)

Water Quality Improvement Project (WQIP) Program

The WQIP program is a competitive, reimbursement grant program that funds projects that directly address documented water quality impairments. The competitive, statewide grant program is open to local governments and not-for-profit corporations. Grant recipients can receive up to 75 percent of the project costs for high priority wastewater treatment improvement, non-agricultural nonpoint source abatement and control, land acquisition for source water protection, aquatic habitat restoration, and municipal separate storm sewer system projects; up to 50 percent for salt storage projects; and up to 40 percent for general wastewater infrastructure improvement projects. Additional information regarding this program is available on the website: https://www.dec.ny.gov/pubs/4774.html. Eligible activities for the WQIP Program include the following:

- Wastewater treatment improvement.
- Non-agricultural nonpoint source abatement and control.
- Land acquisition for source water protection.
- Salt storage.
- Aquatic habitat restoration.
- MS4s.

New York State DEC/ Environmental Facilities Corporation (EFC) Wastewater Infrastructure Engineering Planning Grant (EPG)

The DEC, in conjunction with the New York State EFC, offers grants to municipalities to help pay for the initial planning of eligible Clean Water State Revolving Fund (CWSRF) water quality projects.

The Wastewater Infrastructure EPG assists municipalities with the engineering and planning costs of CWSRF-eligible water quality projects. Eligible municipalities have a median household income (MHI) of $65,000 or less in the Regional Economic Development Council (REDC) regions of Capital District, Southern Tier, North Country, Mohawk Valley, Central NY, Finger Lakes, or Western NY OR an MHI of $85,000 or less in REDC regions of Long Island, New York City, or Mid-Hudson. Grants with a 20 percent required local match could finance activities, including engineering and consultant fees for engineering and planning services for the production of an engineering report.

The goal of the EPG program is to advance water quality projects to construction, so successful applicants can use the engineering report funded by the grant to seek financing through the CWSRF program, WQIP program, or other funding entities to further pursue the identified solution. Details regarding this program can be found on the website: https://www.dec.ny.gov/pubs/81196.html. Funding priorities go to projects that have one of the following qualities:

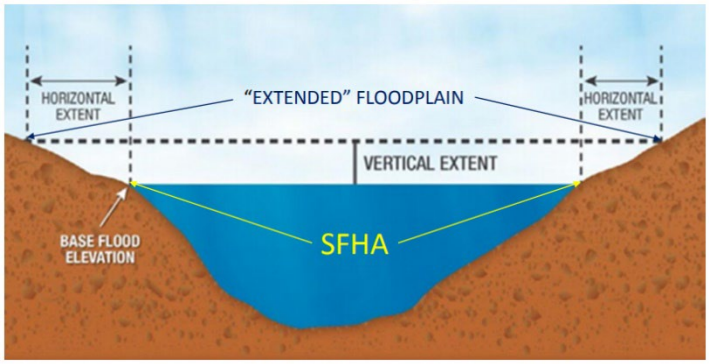
- Required by an executed Order on Consent.
- Required by a draft or final State Pollutant Discharge Elimination System (SPDES) permit.
- Upgrading or replacing an existing wastewater system.
- Constructing a wastewater treatment and/or collection system for an area with failing onsite septic systems.
- Identified in a Total Maximum Daily Load (TMDL) Implementation Plan.

New York State Department of Transportation

BRIDGE NY

The BRIDGE NY program, administered by the NYSDOT, is open to all municipal owners of bridges and culverts. Projects are awarded through a competitive process and support all phases of project development. Projects selected for funding under the BRIDGE NY Initiative are evaluated based on the resiliency of the structure, including such factors as hydraulic vulnerability and structural resiliency; the significance and importance of the bridge, including traffic volumes, detour considerations, number and types of businesses served, and impacts on commerce; and the current bridge and culvert structural conditions. Information regarding the program can be found on the website: https://www.dot.ny.gov/BRIDGENY.

Community Risk and Resiliency Act (CRRA)



On September 22, 2014, Governor Andrew Cuomo signed bill A06558/S06617-B, the CRRA. The purpose of the bill is to ensure that certain state monies, facility-siting regulations, and permits include consideration of the effects of climate risk and extreme-weather events. According to NYSDEC (2018), CRRA's five major provisions include the following:

- Official Sea-level Rise Projections—CRRA requires the DEC to adopt science-based sea-level rise projections into regulation.

- Consideration of Sea-Level Rise, Storm Surge and Flooding—CRRA requires applicants for permits or funding in a number of specified programs to demonstrate that future physical climate risk due to sea-level rise, storm surge, and flooding have been considered and that DEC considered incorporating these factors into certain facility-siting regulations.
- Smart Growth Public Infrastructure Policy Act Criteria—CRRA adds mitigation of risk due to sea-level rise, storm surge, and flooding to the list of smart-growth criteria to be considered by state public-infrastructure agencies.
- Guidance on Natural Resiliency Measures—CRRA requires DEC, in consultation with the Department of State, to develop guidance on the use of natural resources and natural processes to enhance community resiliency.
- Model Local Laws Concerning Climate Risk—CRRA requires the Department of State, in cooperation with DEC, to develop model local laws that include consideration of future risk due to sea-level rise, storm surge, and flooding. These model local laws must be based on available data predicting the likelihood of extreme-weather events, including hazard-risk analysis.

CRRA requires NYSDEC, in consultation with the Department of State, to prepare guidance on implementation of the statute. To meet its obligation to develop guidance for the implementation of CRRA, DEC is proposing a new document, State Flood Risk Management Guidance (SFRMG). The SFRMG is intended to inform state agencies as they develop program-specific guidance to require that applicants demonstrate consideration of sea-level rise, storm surge, and flooding, as permitted by program-authorizing statutes and operating regulations. The SFRMG incorporates possible future conditions, including the greater risks of coastal flooding presented by sea-level rise and enhanced storm surge and of inland flooding expected to result from increasingly frequent extreme-precipitation events (NYSDEC 2018). Additional details on the CRRA are provided on the website: https://www.dec.ny.gov/energy/102559.html.

Homeownership Repair and Rebuilding Fund

The Homeownership Repair and Rebuilding Fund provides grants of up to an additional $10,000 to eligible homeowners who have already qualified for FEMA housing assistance's maximum grant ($31,900) and will not receive other assistance from private insurance or government agencies that would duplicate the grant's funding. The HRRF includes $100 million dedicated to help homeowners affected by Sandy and was provided directly from the State of New York.

6.5.7 Potential Mitigation Funding Sources

While it is important to recognize the mitigation strategies for each jurisdiction to help achieve the mitigation goals and objectives of the (HMP, it is also important to provide

sources for funding to implement these strategies. The table below provides a list of programs, descriptions, and links for those seeking funding sources. Please note that this table is not intended to be a comprehensive list, but rather a starting point to help identify potential sources of funding for the identified mitigation strategies.

Table 6-2. Mitigation Funding Sources

Program	Description	Lead Agency	Website
Federal			
Hazard Mitigation Assistance (HMA)	Grants to provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages – includes FMA, HMGP, PDM	FEMA	https://www.fema.gov/hazard-mitigation-assistance
Flood Mitigation Assistance (FMA)	Program Grants to States and communities for pre-disaster mitigation planning and projects to help reduce or eliminate the long-term risk of flood damage to structures insurable under the National Flood Insurance Program	FEMA	https://www.fema.gov/flood-mitigation-assistance-grant-program
Hazard Mitigation Grant Program (HMGP)	Grants to States and communities for planning and projects providing long-term hazard mitigation measures following a major disaster declaration	FEMA	https://www.fema.gov/hazard-mitigation-grant-program
Building Resilient Infrastructure and Communities (BRIC)	Replacement program for PDM that will invest in local mitigation projects and promote capacity-building	FEMA	https://www.fema.gov/bric
Public Assistance: Hazard Mitigation Funding Under Section 406	Hazard mitigation discretionary funding available under Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act following a Presidentially declared disaster	FEMA	https://www.fema.gov/news-release/2017/05/03/4309/fema-hazard-mitigation-grants-404-and-406
Assistance to Firefighters Grant Program	The primary goal of the Assistance to Firefighters Grants (AFG) is to enhance the safety of the public and firefighters with respect to fire-related hazards by providing direct financial assistance to eligible fire departments, nonaffiliated Emergency Medical Services organizations, and State Fire Training Academies. This funding is for critically needed resources to equip and train emergency personnel to recognized standards, enhance operations efficiencies, foster interoperability, and support community resilience.	FEMA	https://www.fema.gov/welcome-assistance-firefighters-grant-program
Disaster Housing Program	Emergency assistance for housing, including minor repair of home to establish livable conditions, mortgage, and rental assistance	HUD	https://www.hud.gov/program_offices/public_indian_housing/publications/dhap
HOME Investment Partnerships Program	Grants to local and state government and consortia for permanent and transitional housing, (including financial support for property acquisition and rehabilitation for low-income persons)	HUD	https://www.hud.gov/program_offices/comm_planning/affordablehousing/programs/home/
HUD Disaster Recovery Assistance	Grants to fund gaps in available recovery assistance after disasters (including mitigation)	HUD	https://www.hud.gov/info/disasterresources

Program	Description	Lead Agency	Website
Section 108 Loan Guarantee	Enables states and local governments participating in the Community Development Block Grant (CDBG) program to obtain federally guaranteed loans for disaster-distressed areas	HUD	https://www.hudexchange.info/programs/section-108/
Smart Growth Implementation Assistance (SGIA) program	The SGIA program focuses on complex or cutting-edge issues, such as stormwater management, code revision, transit-oriented development, affordable housing, infill development, corridor planning, green building, and climate change. Applicants can submit proposals under 4 categories: community resilience to disasters, job creation, the role of manufactured homes in sustainable neighborhood design or medical and social service facilities siting.	EPA	https://www.epa.gov/smartgrowth
Partners for Fish and Wildlife	Financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats	U.S. Fish and Wildlife Service	https://www.fws.gov/partners/
FHWA Emergency Relief Program	Fund for the repair or reconstruction of Federal-aid highways that have suffered serious damage as a result of (1) natural disasters or (2) catastrophic failures from an external cause	U.S. Department of Transportation (DOT)	https://www.fhwa.dot.gov/programadmin/erelief.cfm
Better Utilizing Investments to Leverage Development (BUILD)	Investing in critical road, rail, transit, and port projects across the nation	U.S. DOT	https://www.transportation.gov/BUILDgrants/about
Community Facilities Direct Loan & Grant Program	This program provides affordable funding to develop essential community facilities in rural areas. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area, and does not include private, commercial, or business undertakings.	USDA	https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program
Emergency Loan Program	USDA's Farm Service Agency (FSA) provides emergency loans to help producers recover from production and physical losses due to drought, flooding, other natural disasters, or quarantine	USDA	https://www.fsa.usda.gov/programs-and-services/farm-loan-programs/emergency-farm-loans/index
Emergency Watershed Protection (EWP) program	Provide assistance to relieve imminent hazards to life and property caused by floods, fires, drought, windstorms, and other natural occurrences	NRCS	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/
Financial Assistance	Financial assistance to help plan and implement conservation practices that address natural resource concerns or opportunities to help save energy, improve soil, water, plant, air, animal and related resources on agricultural lands and non-industrial private forest land	NRCS	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/
Emergency Management	Assist local, tribal, territorial, and state governments in enhancing and sustaining all-hazards emergency management capabilities	U.S. DHS	https://www.fema.gov/emergency-management-performance-grant-program

Program	Description	Lead Agency	Website
Performance Grants (EMPG) Program			
Land & Water Conservation Fund	Matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities (as well as funding for shared federal land acquisition and conservation strategies)	National Park Service	https://www.nps.gov/subjects/lwcf/index.htm
State			
Local Government Records Management Improvement Fund (LGRMIF) Disaster Recovery Grants	Grants for disaster recovery projects related to damage caused by a sudden, unexpected event involving fire, water, man-made or natural phenomena where a timely response is necessary to prevent the irretrievable loss of vital or archival records, or to ensure reasonable, timely access to vital records	New York State Archives / New York State Education Department	http://www.archives.nysed.gov/grants/grants_lgrmif.shtml
The New York State Emergency Services Revolving Loan	Repair of firefighting apparatus, ambulances, or rescue vehicles; Renovation, rehabilitation, or repair of facilities that house firefighting equipment, ambulances, rescue vehicles, and related equipment	NYS DHSES	http://www.dhses.ny.gov/ofpc/services/loan/
Environmental Protection Fund (EPF)	Matching grants for the acquisition, planning, development, and improvement of parks, historic properties	New York State Parks, Recreation & Historic Preservation (NYSOPRHP)	https://www.dec.ny.gov/about/92815.html
Recreational Trails (RTP)	Program Matching grants for the acquisition, development, rehabilitation and maintenance of trails and trail-related projects	NYSOPRHP	https://parks.ny.gov/grants/recreational-trails/default.aspx
Environmental Protection & Improvement Grants	Competitive grants for environmental protection and improvement; available for municipalities, community organizations, not-for-profit organizations, and others	New York State Department of Environmental Conservation	https://www.dec.ny.gov/about/92815.html
Volunteer Fire Assistance Grants	The grant is a 50/50 matching funds program. Its purpose is to make funds available to rural fire companies for the purchase of wildland firefighting equipment such as portable backpack pumps, Nomex protective clothing, hand tools, hard hats, hose, portable radios, and dry hydrants.	NYSDEC	https://www.dec.ny.gov/regulations/2364.html
Clean Water Act Section 604(b)	Provide funding to implement regional comprehensive water quality management planning activities as described in Section 604(b) of	NYSDEC	https://www.dec.ny.gov/lands/53122.html

Program	Description	Lead Agency	Website
Water Quality Planning Grants	the federal Clean Water Act. 604(b) funds are to be used for water quality management planning activities, including tasks to determine the nature, extent and causes of point and nonpoint source water pollution problems, and to develop plans to resolve these problems.		
Water Quality Improvement Project (WQIP) Program	The Water Quality Improvement Project (WQIP) program is a competitive, reimbursement grant program that funds projects that directly address documented water quality impairments. Applications are typically available each spring through the Consolidated Funding Application.	NYSDEC	https://www.dec.ny.gov/pubs/4774.html
New York State DEC/EFC Wastewater Infrastructure Engineering Planning Grant (EPG)	The New York State Department of Environmental Conservation (DEC), in conjunction with the New York State Environmental Facilities Corporation (EFC), will offer grants to municipalities to help pay for the initial planning of eligible Clean Water State Revolving Fund (CWSRF) water quality projects. The ultimate goal of the EPG program is to advance water quality projects to construction, so successful applicants can use the engineering report funded by the grant to seek financing through the CWSRF program, Water Quality Improvement Project program, or other funding entities to further pursue the identified solution.	NYSDEC	https://www.dec.ny.gov/pubs/81196.html
Climate Smart Communities Grant Program	The CSC Grant program was established in 2016 to provide 50/50 matching grants to cities, towns, villages, and counties (or boroughs of New York City) of the State of New York for eligible climate adaptation and mitigation projects.	NYSDEC	https://www.dec.ny.gov/energy/109181.html
BRIDGE NY	The State is making funding available for local governments to rehabilitate and replace bridges and culverts statewide.	NYS DOT	https://www.dot.ny.gov/BRIDGENY

6.6 MITIGATION STRATEGY DEVELOPMENT AND UPDATE

6.6.1 Update of Municipal Mitigation Strategies

To evaluate progress on local mitigation actions, each jurisdiction with actions in previous DMA2000 or related plans, was provided with a Mitigation Action Plan Review Worksheet. Each worksheet was pre-populated with those actions identified for their jurisdiction in the prior plan. For each action, municipalities were asked to indicate the status of each action ("No Progress/Unknown", "In Progress/Not Yet Complete", "Continuous", "Completed", "Discontinued") and provide review comments on each. Municipalities were requested to quantify the extent of progress and provide reasons for the level of progress or why actions were discontinued. Each jurisdictional annex provides a table identifying their prior mitigation strategy, the status of those actions and initiatives, and their disposition within their updated strategy.

Local mitigation actions identified as "Complete", and those actions identified as "Discontinued", have been removed from the updated strategies. Those local actions that municipalities identified as "No Progress/Unknown", "In Progress/Not Yet Complete" as well as certain actions/initiatives identified as "Continuous", have been carried forward in their local updated mitigation strategies. Municipalities were asked to provide further details on these projects to help better define the projects, identify benefits and costs, and improve implementation.

Certain continuous or ongoing strategies represent programs that are, or since prior and existing local hazard mitigation plans have become, fully integrated into the normal operational and administrative framework of the community. Such programs and initiatives have been identified within the Capabilities section of each annex and removed from the updated mitigation strategy.

At the Kick-Off and subsequent planning meetings, all participating municipalities were provided support in identifying mitigation activities completed, ongoing and potential/proposed. As new additional potential mitigation actions, projects or initiatives became evident during the plan update process, including as part of the risk assessment update and as identified through the public and stakeholder outreach process (see Section 3), communities were made aware of these either through direct communication (local meetings, email, phone) or via their draft municipal annexes.

To help support the selection of an appropriate, risk-based mitigation strategy, each annex provides a summary of hazard vulnerabilities identified during the plan update process, either directly by municipal representatives, through review of available county and local plans and reports, and through the hazard profiling and vulnerability assessment process.

Beginning in May 2023, members of the Planning Committee and contract consultants worked directly with each jurisdiction (phone, email, local support meetings) to assist with the development and update of their annex and include mitigation strategies, focusing on identifying well-defined,

implementable projects with a careful consideration of benefits (risk reduction, losses avoided), costs, and possible funding sources (including mitigation grant programs).

Concerted efforts were made to assure that municipalities develop updated mitigation strategies that included activities and initiatives covering the range of mitigation action types described in recent FEMA planning guidance (FEMA "Local Mitigation Planning Handbook" March 2013), specifically:

- Local Plans and Regulations – These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.

- Structure and Infrastructure Project- These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.

- Natural Systems Protection – These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.

- Education and Awareness Programs – These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as the National Flood Insurance Program and Community Rating System, StormReady (NOAA) and Firewise (NFPA) Communities.

In consideration of federal and state mitigation guidance, the Planning Committee recognized that municipalities would benefit from the inclusion of certain mitigation initiatives. These include initiatives to address vulnerable public and private properties, including RL and SRL properties; initiatives to support continued and enhanced participation in the NFIP; improved public education and awareness programs; and initiatives to support countywide and regional efforts to build greater local mitigation capabilities. Municipalities have included such initiatives as appropriate, typically amended with specific details to best meet the needs and interests of their community and promote implementation.

On April 24, 2023, the contract consultant, Tetra Tech, presented two sessions of an interactive mitigation strategy workshop was conducted with commentary provided NYSDHSES representatives for all participating jurisdictions to support the identification, evaluation, and prioritization of local mitigation strategies, as well as how to present and document this process within the plan. Based on FEMA's guidance and recommendations provided at this workshop and

otherwise, the following significant modifications to the mitigation strategy identification and update process and documentation was made:

- An overarching effort has been made to better focus local mitigation strategies to clearly defined, readily actionable projects and initiatives that meet the definition or characteristics of mitigation. Broadly defined mitigation objectives have been eliminated from the updated strategy unless accompanied by discrete actions, projects, or initiatives.
- Certain continuous or ongoing strategies that represent programs that are, or since prior and existing plans have become, fully integrated into the normal operational and administrative framework of the community have been identified within the Capabilities section of each annex and removed from the updated mitigation strategy.

As discussed within the hazard profiles in Section 5.4, the long-term effects of climate change are anticipated to exacerbate the impacts of weather-related hazards including extreme temperatures, flood, severe storm, severe winter storm and wildfire. By way of addressing these climate change-sensitive hazards within their local mitigation strategies and integration actions, communities are working to evaluate and recognize these long-term implications and potential impacts, and to incorporate in planning and capital improvement updates.

Municipalities included mitigation actions to address vulnerable critical facilities. These actions have been proposed in consideration of protection against 500-year events, or worst-case scenarios. When determined to be feasible and practical, mitigation planning for critical facilities identified as previously sustaining flooding and/or located in a FEMA floodplain will be developed to achieve protection to the 500-year flood event or the actual worst-damage scenario, whichever is greater.

It is recognized, however, that in the case of projects being funded through Federal mitigation programs, the level of protection may be influenced by cost-effectiveness as determined through a formal benefit-cost analysis. In the case of "self-funded" projects, municipal discretion must be recognized. Further, it must be recognized that the County and municipalities have limited authority over privately-owned critical facility owners regarding mitigation at any level of protection.

6.6.2 Update of County Mitigation Strategy

The update of the County-level mitigation strategies included a review of progress on the actions/initiatives identified in the 2017 Herkimer County Hazard Mitigation Plan, using a process like that used to review municipal mitigation strategy progress. The County, through their various department representatives, were provided with a Mitigation Action Plan Review Worksheet identifying all the county-level actions/initiatives from the 2017 plan. For each action, relevant county representatives were asked to indicate the status of each action ("No Progress/Unknown",

"In Progress/Not Yet Complete", "Continuous", "Completed", "Discontinued"), and provide review comments on each.

Projects/initiatives identified as "Complete", as well as though actions identified as "Discontinued", have been removed from this plan update. Those actions the county has identified as "No Progress/Unknown", "In Progress/Not Yet Complete" or "Continuous" have been carried forward in the County's updated mitigation strategy.

Throughout the course of the plan update process, additional regional and county-level mitigation actions have been identified. These were identified through:

- Review of the results and findings of the updated risk assessment.
- Review of available regional and county plans, reports, and studies.
- Direct input from County departments and other county and regional agencies, including:
    - Herkimer County Department of Emergency Services
    - Herkimer County Highway Department
    - Herkimer Oneida Counties Comprehensive Planning Program
    - Herkimer County Office of the Administrator
    - Herkimer County Sheriff Department
    - Herkimer County Department of Health
    - Herkimer County Office of the Aging
    - Herkimer County Industrial Development Agency
    - NYS Canals Corporation
    - Herkimer County Soil & Water Conservation District
    - Herkimer-Fulton-Hamilton-Otsego BOCES
    - Herkimer ARC
    - Catholic Charities of Herkimer County
- Input received through the public and stakeholder outreach process.

As discussed within the hazard profiles in Section 5.4, the long-term effects of climate change are anticipated to exacerbate the impacts of weather-related hazards including extreme temperatures, flood, severe storm, severe winter storm and wildfire. As such, the County has included mitigation actions and initiatives, including continuing and long-term planning and emergency management support, to address these long-term implications and potential impacts.

Various County departments and agencies have included mitigation actions to address vulnerable critical facilities. These actions have been proposed in consideration of protection against 500-year events, or worst-case scenarios. These actions have been proposed in consideration of protection against 500-year events, or worst-case scenarios. When determined to be feasible and practical, mitigation planning for critical facilities identified as previously sustaining flooding and/or being located in a FEMA floodplain will be developed to achieve protection to the 500-year flood event or the actual worst-damage scenario, whichever is greater.

It is recognized, however, that in the case of projects being funded through Federal mitigation programs, the level of protection may be influenced by cost-effectiveness as determined through a formal benefit-cost analysis. In the case of "self-funded" projects, local government authority must be recognized. Further, it must be recognized that the County has limited authority over privately-owned critical facility owners with regard to mitigation at any level of protection.

6.6.3 Mitigation Strategy Evaluation and Prioritization

Section 201.c.3.iii of 44 CFR requires an action plan describing how the actions identified will be prioritized.

Recent FEMA planning guidance (March 2013) identifies a modified STAPLEE (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) mitigation action evaluation methodology that uses a set of 10 evaluation criteria suited to the purposes of hazard mitigation strategy evaluation. This method provides a systematic approach that considers the opportunities and constraints of implementing a particular mitigation action. The October mitigation workshop presented by FEMA representatives further amplified these evaluation criteria and indicated that communities may want to consider other factors.

Based on this guidance, the Steering and Planning Committees have developed and applied an action evaluation and prioritization methodology which includes an expanded set of fourteen (14) criteria to include the consideration of cost-effectiveness, availability of funding, anticipated timeline, and if the action addresses multiple hazards.

The fourteen (14) evaluation/prioritization criteria used in the 2023 update process are:

1. Life Safety – How effective will the action be at protecting lives and preventing injuries?
2. Property Protection – How significant will the action be at eliminating or reducing damage to structures and infrastructure?
3. Cost-Effectiveness – Are the costs to implement the project or initiative commensurate with the benefits achieved?
4. Technical – Is the mitigation action technically feasible? Is it a long-term solution? Eliminate actions that, from a technical standpoint, will not meet the goals.

5. Political – Is there overall public support for the mitigation action? Is there the political will to support it?
6. Legal – Does the municipality have the authority to implement the action?
7. Fiscal - Can the project be funded under existing program budgets (i.e., is this initiative currently budgeted for)? Or would it require a new budget authorization or funding from another source such as grants?
8. Environmental – What are the potential environmental impacts of the action? Will it comply with environmental regulations?
9. Social – Will the proposed action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?
10. Administrative – Does the jurisdiction have the personnel and administrative capabilities to implement the action and maintain it or will outside help be necessary?
11. Multi-hazard – Does the action reduce the risk to multiple hazards?
12. Timeline - Can the action be completed in less than 5 years (within our planning horizon)?
13. Local Champion – Is there a strong advocate for the action or project among the jurisdiction's staff, governing body, or committees that will support the action's implementation?
14. Other Local Objectives – Does the action advance other local objectives, such as capital improvements, economic development, environmental quality, or open space preservation? Does it support the policies of other plans and programs?

Participating jurisdictions were asked to use these criteria to assist them in evaluating and prioritizing mitigation actions identified in the 2023 update. Specifically, for each mitigation action, the jurisdictions were asked to assign a numeric rank (-1, 0, or 1) for each of the 14 evaluation criteria, defined as follows:

- 1 = Highly effective or feasible
- 0 = Neutral
- -1 = Ineffective or not feasible

Further, jurisdictions were asked to provide a brief summary of the rationale behind the numeric rankings assigned, as applicable. The numerical results of this exercise were then used by each jurisdiction to help prioritize the action or strategy as "Low", "Medium," or "High." While this provided a consistent, systematic methodology to support the evaluation and prioritization of mitigation actions, jurisdictions may have additional considerations that could influence their overall prioritization of mitigation actions.

It is noted that jurisdictions may be carrying forward mitigation actions and initiatives from prior mitigation strategies that were prioritized using different, but not necessarily contrary, approaches. Mitigation actions in a number of the existing and prior Herkimer County municipal HMPs were prioritized according to the following criteria:

- **High Priority:** A project that meets multiple plan goals and objectives, benefits exceed cost, has funding secured under existing programs or authorizations, or is grant-eligible, and can be completed in 1 to 5 years (short-term project) once project is funded.
- **Medium Priority:** A project that meets at least one plan goal and objective, benefits exceed costs, funding has not been secured and would require a special funding authorization under existing programs, grant eligibility is questionable, and can be completed in 1 to 5 years once project is funded.
- **Low Priority:** A project that will mitigate the risk of a hazard, benefits exceed costs, funding has not been secured, and project is not grant-eligible and/or timeline for completion is considered long-term (5 to 10 years).

It is important to note that certain initiatives from the 2017 Herkimer County HMP and other local single- and multi-jurisdictional HMPs within the County are being carried forward in their updated strategies, with or without modification. These initiatives were previously prioritized using approaches that may be different from that used in this update process; however, it is reasonable to assume that all evaluation and prioritization approaches included similar considerations (e.g., mitigation effectiveness, technical and administrative feasibility, cost-effectiveness, etc.).

At their discretion, jurisdictions carrying forward prior initiatives were encouraged to re-evaluate their priority, particularly if conditions that would affect the prioritization criteria had changed. Where communities have determined that their original priority ranking for "carry forward" initiatives remained valid, their earlier priority ranking is indicated on the prioritization table, however the plan update criteria ratings are indicated with a null "-" marking.

For the plan update there has been an effort to develop more clearly defined and action-oriented mitigation strategies. These local strategies include projects and initiatives that have been well-vetted and are seen by the community as the most effective approaches to advance their local mitigation goals and objectives within their capabilities. As such, many of the initiatives in the updated mitigation strategy were ranked as "High" or "Medium" priority, as reflective of the community's clear intent to implement, available resources not-withstanding. In general, initiatives that would have had "low" priority rankings were appropriately screened out during the local action evaluation process.

6.6.4 Benefit/Cost Review

Section 201.6.c.3iii of 44CFR requires the prioritization of the action plan to emphasize the extent to which benefits are maximized according to a cost/benefit review of the proposed projects and their associated costs. Stated otherwise, cost-effectiveness is one of the criteria that must be applied during the evaluation and prioritization of all actions comprising the overall mitigation strategy.

The benefit/cost review applied in for the evaluation and prioritization of projects and initiatives in this plan update process was qualitative; that is, it does not include the level of detail required by

FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) grant program. For all actions identified in the local strategies, jurisdictions have identified both the costs and benefits associated with project, action, or initiative.

Costs are the total cost for the action or project, and may include administrative costs, construction costs (including engineering, design and permitting), and maintenance costs.

Benefits are the savings from losses avoided attributed to the implementation of the project, and may include life-safety, structure and infrastructure damages, loss of service or function, and economic and environmental damage and losses.

When available, jurisdictions were asked to identify the actual or estimated dollar value for project costs and associated benefits. Having defined costs and benefits allows a direct comparison of benefits versus costs, and a quantitative evaluation of project cost-effectiveness. Often, however, numerical costs and/or benefits have not been identified or may be impossible to quantitatively assess.

For the purposes of this planning process, jurisdictions were tasked with evaluating project cost-effectiveness with both costs and benefits assigned to "High", "Medium" and "Low" ratings. Where quantitative estimates of costs and benefits were available, ratings/ranges were defined as:

Low = < $10,000 Medium = $10,000 to $100,000 High = > $100,000

Where quantitative estimates of costs and/or benefits were not available, qualitative ratings using the following definitions were used:

Table 6-2. Qualitative Cost and Benefit Ratings

Costs	
High	Existing funding levels are not adequate to cover the costs of the proposed project, and implementation would require an increase in revenue through an alternative source (e.g., bonds, grants, and fee increases).
Medium	The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
Low	The project could be funded under the existing budget. The project is part of or can be part of an existing, ongoing program.
High	Project will have an immediate impact on the reduction of risk exposure to life and property.
Medium	Project will have a long-term impact on the reduction of risk exposure to life and property or will provide an immediate reduction in the risk exposure to property.
Low	Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-effective.

For some of the Herkimer County initiatives identified, the Planning Committee may seek financial assistance under FEMA's HMGP or Hazard Mitigation Assistance (HMA) programs. These programs require detailed benefit/cost analysis as part of the application process. These analyses will be

performed when funding applications are prepared, using the FEMA BCA model process. The Planning Committee is committed to implementing mitigation strategies with benefits that exceed costs. For projects not seeking financial assistance from grant programs that require this sort of analysis, the Planning Committee reserves the right to define "benefits" according to parameters that meet its needs and the goals and objectives of this plan.

SECTION 7. PLAN MAINTENANCE

7.1 OVERVIEW

This section details the formal process that will ensure that the HMP remains an active and relevant document and that the Planning Partnership maintains their eligibility for applicable funding sources. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing an updated plan every five years. In addition, this section describes how public participation will be integrated throughout the plan maintenance and implementation process. It explains how the mitigation strategies outlined in this plan update will be incorporated into existing planning mechanisms and programs, such as comprehensive land use planning processes, capital improvement planning, and building code enforcement and implementation. The plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current and relevant.

The plan maintenance matrix shown in Table 7-1 provides a synopsis of responsibilities for plan monitoring, evaluation, and update, which are discussed in further detail in the sections below.

The overarching goal of the plan maintenance procedure is to ensure that all participating jurisdictions remain engaged in not only implementing the plan but in its continuous review and update, to ensure it is a relevant and living document. The county is committed to supporting municipalities in frequent communications regarding the status of mitigation projects and to communicating the mitigation successes amongst the county agencies and municipalities. This maintenance procedure is a springboard for each community to routinely use the plan as a resource and roadmap to fund and implement projects to increase the resiliency of their communities.

Table 7-1. Plan Maintenance Matrix

Task	Approach	Timeline	Lead Responsibility	Support Responsibility
Monitoring	Preparation of status updates and action implementation tracking as part of submission for Annual Progress Report.	January or upon major update to Comprehensive Plan or major disaster	Jurisdictional points of contact identified in Section 8 (Planning Partnership) and Section 9 (Jurisdictional Annexes)	Jurisdictional implementation lead identified in Section 8 (Planning Partnership) and Section 9 (Jurisdictional Annexes)
Integration	In order for integration of mitigation principles action to become an organic part of the ongoing county and municipal activities, the county will incorporate the distribution of the safe	January each year with interim email reminders to address integration in county and municipal activities.	HMP Coordinator and jurisdictional points of contact identified in Section 8 (Planning Partnership) and Section 9	HMP Coordinator

Task	Approach	Timeline	Lead Responsibility	Support Responsibility
	growth worksheet (see 7.1.2 below) for annual review and update by all participating jurisdictions.		(Jurisdictional Annexes)	
Evaluation	Review the status of previous actions as submitted by the monitoring task lead and support to assess the effectiveness of the plan; compile and finalize the Annual Progress Report	Finalized progress report completed by January 15 of each year	Steering Committee; Plan Maintenance element	Jurisdictional points of contacts identified in Section 9 (Jurisdictional Annexes)
Update	Reconvene the planning partners, at a minimum, every 5 years to guide a comprehensive update to review and revise the plan.	Every 5 years or upon major update to Comprehensive Plan or major disaster	Herkimer County HMP Coordinator	Jurisdictional points of contacts identified in Section 9 (Jurisdictional Annexes)

7.2 MONITORING, EVALUATING AND UPDATING THE PLAN

The procedures for monitoring, evaluating, and updating the plan are provided below.

The HMP Coordinator is assigned to manage the maintenance and update of the plan during its performance period. The HMP Coordinator will chair the Planning Committee and be the prime point of contact for questions regarding the plan and its implementation as well as to coordinate incorporation of additional information into the plan.

The Planning Committee shall fulfill the monitoring, evaluation and updating responsibilities identified in this section which is comprised of a representative from each participating jurisdiction. Each jurisdiction is expected to maintain a representative on the Planning Committee throughout the plan performance period (five years from the date of plan adoption). As of the date of this plan, primary and secondary mitigation planning representatives (points-of-contact) are identified in each jurisdictional annex in Section 9 (Jurisdictional Annexes).

Regarding the composition of the committee, it is recognized that individual commitments change over time, and it shall be the responsibility of each jurisdiction and its representatives to inform the HMP Coordinator of any changes in representation. The HMP Coordinator will strive to keep the committee makeup as a uniform representation of planning partners and stakeholders within the planning area.

Currently, the Herkimer County HMP Coordinator is designated as:

John J. Raymond, Director
Herkimer County Emergency Services
71 Reservoir Road
Herkimer, New York 13350

Office: (315) 867-1212
Email: jraymond@herkimercounty.org

7.2.1 Monitoring

The Planning Committee shall be responsible for monitoring progress on, and evaluating the effectiveness of, the plan, and documenting annual progress. Each year, beginning one year after plan development, Herkimer County and local Planning Committee representatives will collect and process information from the departments, agencies and organizations involved in implementing mitigation projects or activities identified in their jurisdictional annexes (Section 9) of this plan, by contacting persons responsible for initiating and/or overseeing the mitigation projects.

In the first year of the performance period, this will be accomplished by utilizing an online performance progress reporting system, the BATool[SM] which will enable municipal and county representatives of directly access mitigation initiatives to easily update the status of each project, document successes or obstacles to implementation, add or delete projects to maintain mitigation project implementation. It is anticipated that all participating partners will be prompted by the tool to update progress on a quarterly basis, providing an incentive for participants to refresh their mitigation strategies and to continue implementation of projects. It is expected that this reporting system will support the submittal of an increased number of project grant fund applications due to the functionality of the system which facilitates the sorting and prioritization of projects.

In addition to progress on the implementation of mitigation actions, including efforts to obtain outside funding; and obstacles or impediments to implementation of actions, the information that Planning Committee representatives shall be expected to document, as needed and appropriate include:

- Any grant applications filed on behalf of any of the participating jurisdictions
- Hazard events and losses occurring in their jurisdiction,
- Additional mitigation actions believed to be appropriate and feasible,
- Public and stakeholder input.

Plan monitoring for years 2 through 4 of the plan performance periods will be similarly addressed via the BATool[SM] or manually.

7.2.2 Integration Process of the HMP into Municipal Planning Mechanisms

Hazard mitigation is sustained action taken to reduce or eliminate the long-term risk to human life and property from natural hazards. Integrating hazard mitigation into a community's existing plans, policies, codes, and programs leads to development patterns that do not increase risk from known hazards or leads to redevelopment that reduces risk from known hazards. The Herkimer County Planning Partnership was tasked with identifying how hazard mitigation is integrated into existing

planning mechanisms. Refer to Section 9 (Jurisdictional Annexes) for how this is done for each participating municipality. During this process, many municipalities recognized the importance and benefits of incorporating hazard mitigation into future municipal planning and regulatory processes.

The Planning Partnership representatives will incorporate mitigation planning as an integral component of daily government operations. Planning Partnership representatives will work with local government officials to integrate the newly adopted hazard mitigation goals and actions into the general operations of government and partner organizations. Further, the sample adoption resolution (Section 2 – Plan Adoption) includes a resolution item stating the intent of the local governing body to incorporate mitigation planning as an integral component of government and partner operations. By doing so, the Planning Partnership anticipates that:

1. Hazard mitigation planning will be formally recognized as an integral part of overall planning and emergency management efforts;
2. The Hazard Mitigation Plan, Comprehensive Plans, Emergency Management Plans and other relevant planning mechanisms will become mutually supportive documents that work in concert to meet the goals and needs of County residents.

During the HMP annual review process, each participating municipality will be asked to document how they are utilizing and incorporating the Herkimer County HMP into their day-to-day operations and planning and regulatory processes. Additionally, each municipality will identify additional policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions and include these findings and recommendations in the Annual HMP Progress Report. The following checklist was adapted from FEMA's Local Mitigation Handbook (2013), Appendix A, Worksheet 4.2. This checklist will help a community analyze how hazard mitigation is integrated into local plans, ordinances, regulations, ordinances, and policies. By completing the checklist, it will help municipalities identify areas that integrate hazard mitigation currently and where to make improvements and reduce vulnerability to future development. In this manner, the integration of mitigation into municipal activities will evolve into an ongoing culture within the county and its municipalities.

Table 7-2. Safe Growth Check List

Planning Mechanisms	Do you Do This? Yes	No	Notes: How is it being done or how will this be utilized in the future?
Operating, Municipal and Capital Improvement Program Budgets			
• When constructing upcoming budgets, hazard mitigation actions will be funded as budget allows. Construction projects will be evaluated to see if they meet the hazard mitigation goals.			
• Annually, during adoption process, the municipality will review mitigation actions when allocating funding.			
• Do budgets limit expenditures on projects that would encourage development in areas vulnerable to natural hazards?			
• Do infrastructure policies limit extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards?			
• Do budgets provide funding for hazard mitigation projects identified in the County HMP?			
Human Resource Manual			
• Do any job descriptions specifically include identifying and/or implementing mitigation projects/actions or other efforts to reduce natural hazard risk?			
Building and Zoning Ordinances			
• Prior to, zoning changes, or development permitting, the municipality will review the hazard mitigation plan and other hazard analyses to ensure consistent and compatible land use.			
• Does the zoning ordinance discourage development or redevelopment within natural areas including wetlands, floodways, and floodplains?			
• Does it contain natural overlay zones that set conditions			

Planning Mechanisms	Do you Do This? Yes	No	Notes: How is it being done or how will this be utilized in the future?
• Does the ordinance require developers to take additional actions to mitigate natural hazard risk?			
• Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use?			
• Do the ordinances prohibit development within, of filling of, wetlands, floodways, and floodplains?			
Subdivision Regulations			
• Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?			
• Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?			
• Do the regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources?			
• Do the regulations allow density transfers where hazard areas exist?			
Comprehensive Plan			
• Are the goals and policies of the plan related to those of the County HMP?			
• Does the future land use map clearly identify natural hazard areas?			
• Do the land use policies discourage development or redevelopment with natural hazard areas?			
• Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas?			

Planning Mechanisms	Do you Do This? Yes	No	Notes: How is it being done or how will this be utilized in the future?
Land Use			
• Does the future land use map clearly identify natural hazard areas?			
• Do the land use policies discourage development or redevelopment with natural hazard areas?			
• Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas?			
Transportation Plan			
• Does the transportation plan limit access to hazard areas?			
• Is transportation policy used to guide growth to safe locations?			
• Are transportation systems designed to function under disaster conditions (e.g. evacuation)?			
Environmental Management			
• Are environmental systems that protect development from hazards identified and mapped?			
• Do environmental policies maintain and restore protective ecosystems?			
• Do environmental policies provide incentives to development that is located outside protective ecosystems?			
Grant Applications			
• Data and maps will be used as supporting documentation in grant applications.			
Municipal Ordinances			
• When updating municipal ordinances, hazard mitigation will be a priority			
Economic Development			
• Local economic development group will take into account			

Planning Mechanisms	Do you Do This? Yes	No	Notes: How is it being done or how will this be utilized in the future?
information regarding identified hazard areas when assisting new businesses in finding a location.			
Public Education and Outreach			
• Does the municipality have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events?			

7.2.3 Evaluating

The evaluation of the mitigation plan is an assessment of whether the planning process and actions have been effective, if the HMP goals are being achieved, and whether changes are needed. The HMP will be evaluated on an annual basis to determine the effectiveness of the programs, and to reflect changes that could affect mitigation priorities or available funding.

The status of the HMP will be discussed and documented at an annual plan review meeting of the Planning Committee, to be held either in person or via teleconference approximately one year from the date of local adoption of this update, and successively thereafter. At least two weeks before the annual plan review meeting, the Herkimer County HMP Coordinator will advise Planning Committee members of the meeting date, agenda and expectations of the members.

The Herkimer County HMP Coordinator will be responsible for calling and coordinating the annual plan review meeting and Soliciting input regarding progress toward meeting plan goals and objectives.. These evaluations will assess whether:

- Goals and objectives address current and expected conditions.
- The nature or magnitude of the risks has changed.
- Current resources are appropriate for implementing the HMP and if different or additional resources are now available.
- Actions were cost effective.
- Schedules and budgets are feasible.
- Implementation problems, such as technical, political, legal or coordination issues with other agencies are presents.
- Outcomes have occurred as expected.
- Changes in county, city, town or village resources impacted plan implementation (e.g., funding, personnel, and equipment)
- New agencies/departments/staff should be included, including other local governments as defined under 44 CFR 201.6.

Specifically, the Planning Committee will review the mitigation goals, objectives, and activities using performance-based indicators, including:

- New agencies/departments
- Project completion
- Under/over spending
- Achievement of the goals and objectives
- Resource allocation
- Timeframes
- Budgets
- Lead/support agency commitment

- Resources
- Feasibility

Finally, the Planning Committee will evaluate how other programs and policies have conflicted or augmented planned or implemented measures, and shall identify policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions ("Implementation of Mitigation Plan through Existing Programs" subsection later in this section discusses this process). Other programs and policies can include those that address:

- Economic development
- Environmental preservation
- Historic preservation
- Redevelopment
- Health and/or safety
- Recreation
- Land use/zoning
- Public education and outreach
- Transportation

The Planning Committee should refer to the evaluation forms, Worksheets #2 and #4 in the FEMA 386-4 guidance document, to assist in the evaluation process (see Appendix F – Plan Review Tools). Further, the Planning Committee should refer to any process and plan review deliverables developed by the county or participating jurisdictions as a part of the plan review processes established for prior or existing local HMPs within the county.

The Herkimer County HMP Coordinator shall be responsible for preparing an Annual HMP Progress Report for each year of the performance period, based on the information provided by the local Planning Committee members, information presented at the annual Planning Committee meeting, and other information as appropriate and relevant. These annual reports will provide data for the five-year update of this HMP and will assist in pinpointing any implementation challenges. By monitoring the implementation of the HMP on an annual basis, the Planning Committee will be able to assess which projects are completed, which are no longer feasible, and what projects should require additional funding.

The Annual HMP Progress Report shall be posted on the Herkimer County Department of Planning and Development website to keep the public apprised of the plan's implementation (https://www.herkimercountynyhmp.com/. Additionally, the website provides a general overview of the plan and its purpose and use in the community. For communities who might choose to join the NFIP CRS program, this report will also be provided to each CRS participating community in order to meet annual CRS recertification requirements. To meet this recertification timeline, the Planning

Committee will strive to complete the review process and prepare an Annual HMP Progress Report by January 15th of each year.

The HMP will also be evaluated and revised following any major disasters, to determine if the recommended actions remain relevant and appropriate. The risk assessment will also be revisited to see if any changes are necessary based on the pattern of disaster damages or if data listed in the Section 5.4 (Hazard Profiles) of this plan has been collected to facilitate the risk assessment. This is an opportunity to increase the community's disaster resistance and build a better and stronger community.

7.2.4 Updating

44 CFR 201.6.d.3 requires that local hazard mitigation plans be reviewed, revised as appropriate, and resubmitted for approval in order to remain eligible for benefits awarded under DMA 2000. It is the intent of the Herkimer County HMP Planning Committee to update this plan on a five-year cycle from the date of initial plan adoption.

To facilitate the update process, the Herkimer County HMP Coordinator, with support of the Planning Committee, shall use the second annual Planning Committee meeting to develop and commence the implementation of a detailed plan update program. The Herkimer County HMP Coordinator shall invite representatives from NYS DHSES to this meeting to provide guidance on plan update procedures. This program shall, at a minimum, establish who shall be responsible for managing and completing the plan update effort, what needs to be included in the updated plan, and a detailed timeline with milestones to assure that the update is completed according to regulatory requirements.

At this meeting, the Planning Committee shall determine what resources will be needed to complete the update. The Herkimer County HMP Coordinator shall be responsible for assuring that needed resources are secured.

Following each five-year update of the mitigation plan, the updated plan will be distributed for public comment. After all comments are addressed, the HMP will be revised and distributed to all planning group members and the New York State Hazard Mitigation Officer.

7.2.5 Grant Monitoring and Coordination

Herkimer County recognizes the importance of having an annual coordination period that helps each planning partner become aware of upcoming mitigation grant opportunities identifies multi-jurisdiction projects to pursue. Grant monitoring will be the responsibility of each municipal partner as part of their annual progress reporting.". The Herkimer County HMP Coordinator will keep the planning partners apprised of Hazard Mitigation Assistance grant openings and assist in developing letters of intent for grant opportunities when practicable.

Herkimer County intends to be a resource to the planning partnership in the support of project grant writing and development. The degree of this support will depend on the level of assistance requested by the partnership during open windows for grant applications. As part of grant monitoring and coordination, Herkimer County intends to provide the following:

- Notification to planning partners about impending grant opportunities.
- A current list of eligible, jurisdiction-specific projects for funding pursuit consideration.
- Notification about mitigation priorities for the fiscal year to assist the planning partners in the selection of appropriate projects.

Grant monitoring and coordination will be integrated into the annual progress report or as needed based on the availability of non-HMA or post-disaster funding opportunities.

7.3 IMPLEMENTATION OF MITIGATION PLAN THROUGH EXISTING PROGRAMS

Effective mitigation is achieved when hazard awareness and risk management approaches and strategies become an integral part of public activities and decision-making. Within the county there are many existing plans and programs that support hazard risk management, and thus it is critical that this hazard mitigation plan integrate and coordinate with, and complement, those existing plans, and programs.

The "Capability Assessment" section of Section 6 (Mitigation Strategy) provides a summary and description of the existing plans, programs, and regulatory mechanisms at all levels of government (federal, state, county and local) that support hazard mitigation within the county. Within each jurisdictional annex in Section 9 (Jurisdictional Annexes), the county and each participating jurisdiction identified how they have integrated hazard risk management into their existing planning, regulatory and operational/administrative framework ("existing integration"), and how they intend to promote this integration ("opportunities for future integration").

It is the intention of Planning Committee representatives to incorporate mitigation planning as an integral component of daily government operations. Planning Committee representatives will work with local government officials to integrate the newly adopted hazard mitigation goals and actions into the general operations of government and partner organizations. Further, the sample adoption resolution (Section 2 – Plan Adoption) includes a resolution item stating the intent of the local governing body to incorporate mitigation planning as an integral component of government and partner operations. By doing so, the Planning Committee anticipates that:

1) Hazard mitigation planning will be formally recognized as an integral part of overall emergency management efforts;

2) The Hazard Mitigation Plan, Comprehensive Plans, Emergency Management Plans and other relevant planning mechanisms will become mutually supportive documents that work in concert to meet the goals and needs of county residents.

Other planning processes and programs to be coordinated with the recommendations of the hazard mitigation plan include the following:

- Emergency response plans
- Training and exercise of emergency response plans
- Debris management plans
- Recovery plans
- Capital improvement programs
- Municipal codes
- Community design guidelines
- Water-efficient landscape design guidelines
- Stormwater management programs
- Water system vulnerability assessments
- Community Wildfire Protection Plans
- Comprehensive Flood Hazard Management Plans
- Resiliency plans
- Community Development Block Grant-Disaster Recovery action plans
- Public information/education plans

Some action items do not need to be implemented through regulation. Instead, these items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation.

During the annual plan evaluation process, the Planning Committee representatives will identify additional policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions and include these findings and recommendations in the Annual HMP Progress Report.

7.4 CONTINUED PUBLIC INVOLVEMENT

Herkimer County and participating jurisdictions are committed to the continued involvement of the public in the hazard mitigation process. This HMP update will continue to be posted on-line (https://www.herkimercountynyhmp.com/). In addition, public outreach, and dissemination of the HMP will include:

- Links to the plan on municipal websites of each jurisdiction with capability.

- Continued utilization of existing social media outlets (Facebook, Twitter) to inform the public of natural hazard events, such as floods and severe storms. Educate the public via the jurisdictional websites on how these applications can be used in an emergency situation.
- Development of annual articles or workshops on flood hazards to educate the public and keep them aware of the dangers of flooding.

Planning Committee representatives and the Herkimer County HMP Coordinator will be responsible for receiving, tracking, and filing public comments regarding this HMP. The public will have an opportunity to comment on the plan via the hazard mitigation website at any time. The HMP Coordinator will maintain this website, posting new information and maintaining an active link to collect public comments.

The public can also provide input at the annual review meeting for the HMP and during the next five-year plan update. The Herkimer County HMP Coordinator is responsible for coordinating the plan evaluation portion of the meeting, soliciting feedback, collecting, and reviewing the comments, and ensuring their incorporation in the five-year plan update as appropriate. Additional meetings might also be held as deemed necessary by the planning group. The purpose of these meeting would be to provide the public an opportunity to express concerns, opinions, and ideas about the mitigation plan.

The Planning Committee representatives shall be responsible to assure that:

- Public comment and input on the plan, and hazard mitigation in general, are recorded and addressed, as appropriate.
- Copies of the latest approved plan (or draft in the case that the five-year update effort is underway) are available for review, along with instructions to facilitate public input and comment on the Plan.
- Appropriate links to the Herkimer County Hazard Mitigation Plan website are included on municipal websites.
- Public notices are made as appropriate to inform the public of the availability of the plan, particularly during Plan update cycles.

The Herkimer County HMP Coordinator shall be responsible to assure that:

- Public and stakeholder comment and input on the plan, and hazard mitigation in general, are recorded and addressed, as appropriate.
- The Herkimer County HMP website is maintained and updated as appropriate.
- Copies of the latest approved plan are available for review at appropriate county facilities along with instructions to facilitate public input and comment on the plan.

Public notices, including media releases, are made as appropriate to inform the public of the availability of the plan, particularly during plan update cycles.

Acronyms and Abbreviations

%	Percent
AAA	American Avalanche Association
ACRES	Assessment, Cleanup and Redevelopment Exchange System
ACS	American Community Survey
ADA	American Disabilities Act
AFG	Assistance to Firefighters Grants
AFPB	Agricultural and Farmland Protection Board
AGM	Department of Agriculture and Markets
AML	Agriculture and Markets Law
ANSS	Advanced National Seismic System
APA	Approval Pending Adoption
APIPP	Adirondack Park Invasive Plant Program
APLUDP	Adirondack Park Land Use and Development Plan
ARC	American Red Cross
ARPA	American Rescue Plan Act
BCA	Benefit Cost Analysis
BCEGS	Building Code Effectiveness Grading Schedule
BFE	Base Flood Elevation
BOCA	Building Officials Code Administration
BR	Biennial Report
BRIC	Building Resilient Infrastructure and Communities Program
BUI	Buildup Index

BUILD	Better Utilizing Investments to Leverage Development
CAC	Community Advisory Committee
CAGR	Compound Annual Growth Rate
CARP	County Animal Response Plan
CAV	Community Assistance Visit
CBRN	Chemical, Biological, Radiological, and Nuclear
CBS	Chemical Bulk Storage
CDBG	Community Development Block Grant
CDBG-DR	Community Development Block Grant Disaster Recovery
CDC	Centers for Disease Control and Prevention
CDMS	Comprehensive Data Management System
CEHA	Coastal Erosion Hazard Areas
CEO	Chief Executive Officer
CEPA	County Emergency Preparedness Assessment
CEMP	Comprehensive Emergency Management Plan
CFM	Certified Floodplain Manager
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
CMP	Coastal Management Program
COG	Continuity of Operations/Continuity of Government
COOP	Continuity of Operations Plan
CRRA	Community Risk and Resiliency Act
CRREL	Cold Regions Research and Engineering Laboratory
CRS	Community Rating System

CSC	Climate Smart Communities (NYSDEC)
CT	Connecticut
CWICNY	Champlain Watershed Improvement Coalition of New York, Inc.
CWSRF	Clean Water State Revolving Fund
CY	Cubic Yards
DBSC	Department of State Division of Building Standards and Codes
DCEA	Division of Code Enforcement and Administration
DHS	Department of Homeland Security
DFIRM	Digital Flood Insurance Rate Map
DHSES	Division of Homeland Security and Emergency Services
DMA 2000	Disaster Mitigation Act of 2000
DOT	Department of Transportation
DPW	Department of Public Works
DR	Major Disaster Declaration (FEMA)
EAP	Emergency Action Plan
ECL	Environmental Conservation Law
EF	Enhanced Fujita Scale
EFC	New York State Environmental Facilities Corporation
EHS	Extremely Hazardous Substances
EM	Emergency Declaration (FEMA)
EM	Emergency Management
EMPG	Emergency Management Performance Grants Program
EMS	Emergency Medical Services
EOC	Emergency Operation Center

EOP	Emergency Operation Plan
EPA	Environmental Protection Agency
EPF	Environmental Protection Fund
EPZ	Emergency Planning Zone
EWP	Emergency Watershed Protection Program
FD	Fire Department
FDRA	Fire Danger Rating Areas
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FIA	Flood Insurance Administration
FIS	Flood Insurance Study
FM	Fuel Moisture
FMA	Flood Mitigation Assistance
FPA	Floodplain Administrator
FPE	Floodplain Easement
FPI	Fire Potential Index
GGFT	Greater Glens Falls Transit
GHGI	Greenhouse Gas Inventories
GIS	Geographic Information System
GSN	Global Seismographic Network
HAZMAT	Hazardous Material
HAZUS	Hazards U.S.

HHPD	Rehabilitation of High Hazard Potential Dams grant program
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HOC	Hazard of Concern
HRRF	Homeownership Repair and Rebuilding Fund
HSGP	Homeland Security Grant Program
HTFC	Housing Trust Fund Corporation
HUD	U.S. Department of Housing and Urban Development
HVAC	Heating, Ventilation, and Air Conditioning
IA	Individual Assistance
IBC	International Building Code
ICIS	Integrated Compliance Information System
IPCC	International Panel on Climate Change
ISO	Insurance Service Organization
IT	Information Technology
KBDI	Keetch-Byram Drought Index
LCSN	Lamon-Doherty Cooperative Seismographic Network
LEPC	Local Emergency Planning Committee
LGRMIF	Local Government Records Management Improvement Fund
LOIP	Letter of Intent to Participate
LWRP	Local Waterfront Revitalization Program
MARFC	Middle Atlantic River Forecast Center
MEF	Mission Essential Functions

MHI	Median Household Income
Mi	Mile
MMI	Modified Mercalli Intensity Scale
MMS	Moment Magnitude Scale
MNRR	Metro North Railroad
MOA	Memorandum of Agreement
Mph	Miles per Hour
MRCC	Midwestern Regional Climate Center
MRP	Mean Return Period
MSL	Mean Sea Level
MTA	Metropolitan Transportation Authority
N/A	Not Applicable
NA	Not Available
NASA	National Aeronautics and Space Administration
NAC-AAA	National Avalanche Center – American Avalanche Association
NAVD	North American Vertical Datum
NCDC	National Climate Data Center
NCEI	National Centers for Environmental Information
NDMC	National Drought Mitigation Center
NDSP	National Dam Safety Program
NEHRP	National Earthquake Hazard Reductions Program
NESEC	Northeast States Emergency Consortium
NESIS	Northeast Snowfall Impact Scale
NFDRS	National Fire Danger Rating System

NFIP	National Flood Insurance Program
NHC	National Hurricane Center
NHD	National Hydrography
NIC	National Influenza Centers
NID	National Inventory of Dams
NJAFM	New Jersey Association of Floodplain Managers
NJOEM	New Jersey Office of Emergency Management
NLCD	National Land Cover Database
NOAA	National Oceanic and Atmospheric Administration
NPCC	New York City Panel on Climate Change
NPDES	National Pollutant Discharge Elimination System
NPDP	National Performance of Dams Program
NPL	National Priorities List
NOUE	Notification of Unusual Event
NPS	National Park Service
NRC	Nuclear Regulatory Commission
NRCC	Northeast Regional Climate Center
NRCS	Natural Resources Conservation Service
NSIDC	National Snow and Ice Data Center
NSSL	National Severe Storms Library
NVRC	Northern Virginia Regional Commission
NWS	National Weather Service
NY	New York
NYC	New York City

NYCEM	New York City Area Consortium for Earthquake Loss Mitigation
NYCDEP	New York City Department of Environmental Protection
NYC OEM	New York City Office of Emergency Management
NYCRR	New York Codes, Rule, and Regulations
NYS	New York State
NYS DHSES	New York State Division of Homeland Security and Emergency Services
NYS DEC	New York State Department of Environmental Conservation
NYSDOS	New York State Department of State
NYSDPC	New York State Disaster Preparedness Commission
NYS GIS	New York State Geographic Information System
NYSGS	New York State Geologic Survey
NYS HCR	New York State Homes and Community Renewal
NYS OFP&C	New York State Office of Fire Prevention and Control
NYSOPRHP	New York State Parks, Recreation and Historic Preservation
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOS	New York State Department of State
NYSDOT	New York State Department of Transportation
NYSERDA	New York State Energy Research and Development Authority
NYSHMP	New York State Hazard Mitigation Plan
NYSOEM	New York State Office of Emergency Management
NYS OFP&C	New York State Office of Fire Prevention and Control
OCR	Office of Community Renewal
OEM	Office of Emergency Management

OES	Office of Emergency Services
OFPC	Office of Fire Prevention and Control
OPRHP	Office of Parks Recreation and Historic Preservation
OPSG	Operation Stonegarden
PA	Public Assistance
PAG	Protective Action Guides
PSAF	Pandemic Severity Assessment Framework
PBS	Petroleum Bulk Storage
PCDA	Property Condition Disclosure Act
PCS	Permit Compliance System
PD	Police Department
PDM	Pre-Disaster Mitigation Program
PDR	Purchase of Development Rights
PE	Professional Engineer
PGA	Peak Ground Acceleration
PIO	Public Information Officer
POC	Point of Contact
Pop.	Population
PPP	Paycheck Protection Program
PRISM	Partnership for Regional Invasive Species Management
PSI	Pandemic Severity Index
PUD	Planned Unit Development
PW	Public Works
RACES	Radio Amateur Civil Emergency Services

RCRAInfo	Resource Conservation and Recovery Act Information
RCV	Replacement Cost Value
RDD	Radiological Dispersion Devices
REDC	Regional Economic Development Council
RL	Repetitive Loss
RSI	Regional Snowfall Index
RTE	Route
RSZ	Ramapo Seismic Zone
SAE	Site Area Emergency
SBA	Small Business Administration
SC	Steering Committee
SDI	State Drought Index
SEMS	Superfund Enterprise Management System
SEQRA	State Environmental Quality Review Act
SF	Square Feet
SFHA	Special Flood Hazard Area
SFMRG	State Flood Risk Management Guidance
SHELDUS	Spatial Hazard Events and Losses Database for the United States
SHSP	State Homeland Security Program
SLOSH	Sea, Lake, and Overland Surges from Hurricanes
SLR	Sea Level Rise
SPC	Storm Prediction Center
SPDES	State Pollutant Discharge Elimination System
Sq. Mi.	Square mile

SRL	Severe Repetitive Loss
SPIA	Sperry-Piltz Ice Accumulation Index
SSBG	Social Services Block Grant Program
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, Environmental
SVI	Social Vulnerability Index
SWCD	Soil and Water Conservation District
SWMP	Storm Water Management Plan
SWOO	Strengths, Weaknesses, Obstacles and Opportunities
TBD	To Be Determined
TD	Tropical Depression
TDR	Transfer of Development Rights
THIRA	Threat & Hazard Identification & Risk Assessment
TIGER	Transportation Investment Generating Economic Recovery
TMDL	Total Maximum Daily Load
TNT	Trinitrotoluene
TORRO	The Tornado and Storm Research Organization
TRI	Toxic Release Inventory
TS	Tropical Storm
TSCA	Toxic Substances Control Act
TV	Television
UASI	Urban Areas Security Initiative
UE	Unusual Event
USACE	U.S. Army Corps of Engineers
USEDA	U.S. Economic Development Administration

USD	U.S. Dollar
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEDA	U.S. Economic Development Administration
USEPA	U.S. Environmental Protection Agency
USFA	U.S. Fire Administration
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey
VA	Vulnerability Assessment
VFD	Volunteer Fire District
WCT	Wind Chill Temperature
WFAS	Wildland Fire Assessment System
WHO	World Health Organization
WMD	Weapons of Mass Destruction
WNV	West Nile Virus
WQIP	Water Quality Improvement Project
WUI	Wildland Urban Interface

Section 1

None.

Section 2

None.

Section 3

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Section 5.4.1

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Sections 7, 8

None.