Seneca County, New York

Hazard Mitigation Plan

Volume I – Basic Plan




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TETRA TECH

Seneca County Hazard Mitigation Plan

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EXECUTIVE SUMMARY

Hazard Mitigation Overview

Hazard mitigation is the use of long-term and short-term policies, programs, projects, and other activities to minimize the loss of life, injury, and property damage that can result from a disaster. Communities, residents, and businesses across the United States have been faced with continually increasing costs associated with natural and human-caused hazards. Hazard mitigation is the first step in reducing risk and is the most effective way to reduce costs associated with hazards.

Seneca County has developed a hazard mitigation plan (HMP) to reduce risks from disasters to the people, property, economy, and environment within the County's planning area. Seneca County and 14 participating local jurisdictions (the Planning Partners) prepared this plan as an update to the 2018 Seneca County HMP. The updated 2025 HMP includes countywide analysis and assessment of hazards, risk, and capabilities.

The plan complies with federal and state hazard mitigation planning requirements to establish the Planning Partners' eligibility for funding under Federal Emergency Management Agency (FEMA) grant programs. FEMA has issued guidelines for the development of multi-jurisdictional HMPs. The federal Disaster Mitigation Act of 2000 requires state and local entities to implement pre-disaster mitigation planning and develop HMPs. The New York Division of Homeland Security and Emergency Services (NYS DHSES) supports plan development for jurisdictions in New York.

The Planning Process

This HMP update documents the process and outcomes of the mitigation efforts of Seneca County and its jurisdictions. Development of the HMP followed the four-phase planning process recommended by FEMA. To support the planning process, Seneca County and the participating jurisdictions accomplished the following:

- Developed a Steering Committee consisting of key stakeholders and a countywide Planning Partnership, inclusive of the Steering Committee members, with participating jurisdictions and regional stakeholders
- Reviewed the 2018 HMP
- Identified and reviewed hazards of greatest concern to Seneca County (hazards of concern) to be included in the update
- Profiled hazards of concern
- Estimated the inventory at risk and potential losses associated with these hazards
- Reviewed and updated the mitigation goals and objectives
- Reviewed mitigation strategy and actions outlined in the 2018 HMP to indicate progress
- Developed new mitigation actions to reduce the vulnerability of assets from 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

Involvement by Stakeholders and the Public

The Planning Partners kept stakeholders and the general public informed throughout the planning process and provided opportunities for public comment and input. In addition, numerous agencies and stakeholders participated as core or support members of the Steering Committee or Planning Partnership, providing input and expertise throughout the planning process.

Participating Jurisdictions Involved in the Mitigation Planning Effort

The following are the local governments in Seneca County that participated as Planning Partners in this HMP update:

- Seneca County
- Town of Covert
- Town of Fayette
- Village of Interlaken
- Town of Junius
- Town of Lodi
- Village of Lodi
- Town of Ovid
- Village of Ovid
- Town of Romulus
- Town of Seneca Falls
- Town of Tyre
- Town of Varick
- Town of Waterloo
- Village of Waterloo

The participating jurisdictions provided significant input into the preparation of the plan, in particular the preparation of jurisdiction-specific annexes included in Volume II.

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. In New York, 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.

In updating the HMP, the participating jurisdictions fully coordinated with and solicited participation from Seneca County and local governments, relevant organizations and groups, state and federal agencies, and the general public. This coordination ensured that stakeholders had established communication channels and relationships to support mitigation planning and mitigation actions included in the plan.

Additional input and support for this planning effort was obtained from a wide range of agencies as well as through public involvement. Under the project management of the Seneca County Emergency Management Office (EMO), the Seneca County Hazard Mitigation Steering Committee provided oversight for the preparation of this plan. The Steering Committee includes representatives from the following:

- Seneca County Emergency Management Office

- Seneca County Health Department
- Seneca County Division of Human Services
- Seneca County Highway Department
- Seneca County Mental Health Services
- Seneca County Soil and Water District
- Cornell Cooperative Extension of Seneca County
- Town of Seneca Falls
- New York State Division of Homeland Security and Emergency Services

Risk Assessment for Local Hazards of Concern

The Planning Partners evaluated each jurisdiction's risk and vulnerability due to each of the hazards of concern, based on past events, past and predicted future losses, and the expected probability of future occurrence. From these evaluations, hazards were ranked as high, medium, or low risk to each jurisdiction. The hazard rankings were used to focus and prioritize individual jurisdictional mitigation strategies. Summary overall hazard rankings for all of Seneca County are presented in Table ES-1.

Table ES-1. Countywide Ranking for Seneca County Hazards of Concern

Hazard of Concern	Hazard Ranking
Dam Failure	Medium
Drought	Low
Earthquake	Medium
Extreme Temperature	Medium
Flood	Medium
Landslide	Low
Severe Weather	High
Severe Winter Weather	High

Capability Assessment and Plan Integration into Other Local 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. It is critical that this HMP integrate, complement, and reference those plans and programs to the extent practical in order for it to be a comprehensive resource for hazard mitigation.

The HMP includes a capability assessment to review relevant local mechanisms for each participating jurisdiction. This assessment identifies where each jurisdiction is currently able to implement hazard mitigation measures and where each would benefit from improved capabilities for such measures. The capability assessment also 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 in the County. In the jurisdictional annexes, each participating jurisdiction identifies how it has integrated hazard risk management into its existing planning, regulatory and operational/administrative framework, and how it intends to continue to promote this integration.

Mitigation Strategy

HMP Goals and Objectives

It is a federal requirement for hazard mitigation plans to include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards of concern.

The Seneca County HMP planning process included a review and update of the prior mitigation goals and objectives to guide the selection of mitigation actions addressing all hazards of concern. Mitigation goals were updated based on a risk assessment, discussions, research, and input plan participants and stakeholders. The goal development process considered the goals expressed in the 2023 New York State HMP as well as other relevant Seneca County and local planning documents.

2025 Seneca County HMP Goals

Goal 1: Protect life, property, and the environment from current and future impacts.

Goal 2: Coordinate hazard mitigation programs and other planning efforts that affect the County.

Goal 3: Increase public preparedness and awareness of natural hazards.

Goal 4: Enhance mitigation capabilities to reduce hazard vulnerabilities.

Goal 5: Support continuity of operations before, during, and after hazard events.

Goal 6: Reduce the risk of natural hazards for socially vulnerable populations and underserved communities.

Goal 7: Address long-term vulnerabilities from high hazard dams.

Implementation of the 2018 HMP

The status of the mitigation projects identified in the 2018 HMP was reviewed for this HMP. Numerous projects and programs have been implemented that have reduced hazard vulnerability to assets in the planning area. Uncompleted projects have been revaluated, modified as necessary, and incorporated into this plan update. The Planning Partners' annexes describe these mitigation activities in more detail, and plan maintenance procedures have been developed to encourage thorough integration with local decisions and processes and regular review of implementation progress.

2025 Mitigation Strategy

Jurisdictional actions included in the mitigation strategy had a strong focus on education and outreach for the general population and socially vulnerable populations; training and education of municipal officials, including the Floodplain Administrators; ensuring continuity of operations for critical facilities through the installation of emergency backup generators; the reduction of flood risk through the increase in capacity of stormwater infrastructure, including culverts, drainage systems, and catch basins; and working to identify safety measures and procedures of dams within the various jurisdictions.

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1. INTRODUCTION

Seneca County has developed a hazard mitigation plan (HMP) to reduce risks from disasters to the people, property, economy, and environment within the County. Developed by Seneca County and 14 participating local jurisdictions (the Planning Partners), this HMP updates the 2018 Seneca County HMP. The updated 2025 HMP includes countywide analysis and assessment of hazards, risk, and capabilities.

1.1 OVERVIEW TO HAZARD MITIGATION PLANNING

1.1.1 What Is Hazard Mitigation?

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk and effects that can result from hazards. The Federal Emergency Management Agency (FEMA) defines an HMP as the documentation of a state or local government's evaluation of natural hazards and strategies to mitigate them.

Effective mitigation planning helps people, organizations, and government agencies better prepare for and respond when disasters occur. It also allows local governments to remain eligible for FEMA grant funding for mitigation projects that will reduce the impact of future disaster events. The long-term benefits of mitigation planning and implementation include the following:

- An increased understanding of hazards faced by Seneca 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 to human health and structures
- Reduced costs associated with response and recovery efforts, including repairs

The **Federal Emergency Management Agency** (FEMA) estimates that for every dollar spent on damage prevention (mitigation), twice that amount is saved by not having to perform post-disaster repairs.

1.1.2 Regulatory Framework

In the early 1990s, a new federal policy regarding disasters began to evolve. Rather than simply reacting whenever disasters strike, the federal government began encouraging communities to assess their vulnerability to various hazards before disaster strikes, and then take actions to reduce or eliminate potential risks. The policy is based on the understanding that a disaster-resistant community can rebound from a natural disaster with less loss of property or human injury, at much lower cost and, consequently, more quickly.

The federal Disaster Mitigation Act of 2000 (DMA 2000) encouraged states, tribes, and local governments to take a new and revitalized approach to mitigation planning. DMA 2000 defined new requirements to

replace the mitigation planning provisions of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Under the new requirements, communities seeking certain hazard-related federal funding must have a plan that identifies potential risks from natural hazards to the health, safety, and well-being of their residents, along with actions the community can take to mitigate those hazards before disaster strikes.

The HMP process enables local and state governments to better articulate accurate needs for mitigation, resulting in faster allocation of funding and more effective risk reduction projects. HMPs expire after five years, and communities must update them to maintain eligibility for hazard mitigation assistance from the federal government.

Regulations to implement DMA 2000 are included in Title 44 of the Code of Federal Regulations, Section 201 (44 CFR 201). One goal of the federal regulations is to facilitate cooperation between state and local authorities. In New York, responsibility for administering the FEMA Hazard Mitigation Program is delegated to the New York State Division of Homeland Security and Emergency Services (NYS DHSES). Table 1-1 summarizes the requirements outlined by DMA 2000 and where each is addressed in this HMP.

Table 1-1. FEMA Local Mitigation Plan Review Crosswalk

Plan Criteria	Primary Location in Plan
Prerequisites	
Adoption by the Local Governing Body: §201.6(c)(5)	Chapter 2; Appendix A
Planning Process	
Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)	Chapter 2
Risk Assessment	
Identifying Hazards: §201.6(c)(2)(i)	Chapter 5
Profiling Hazards: §201.6(c)(2)(i)	Chapters 6 – 13
Assessing Vulnerability: Overview: §201.6(c)(2)(ii)	Chapter 3; Chapters 6 – 13
Assessing Vulnerability: Identifying Structures: §201.6(c)(2)(ii)(A)	Chapter 3; Chapters 6 – 13
Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)	Chapter 3; Chapters 6 – 13
Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)	Chapter 3; Chapters 6 – 13; Volume II Annexes
Mitigation Strategy	
Local Hazard Mitigation Goals: §201.6(c)(3)(i)	Chapter 16; Volume II Annexes
Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)	Chapter 16; Volume II Annexes
Implementation of Mitigation Actions: §201.6(c)(3)(iii)	Chapter 16; Volume II Annexes
Multi-Jurisdictional Mitigation Actions: §201.6(c)(3)(iv)	Chapter 16; Volume II Annexes
Plan Maintenance Process	
Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(i)	Chapter 17
Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)	Chapter 17; Volume II Annexes
Continued Public Involvement: §201.6(c)(4)(iii)	Chapter 17

1.1.3 Specialized Terms and Concepts

Like any technical field, hazard mitigation has developed its own set of terms and concepts with particular meanings within the hazard mitigation practice. A full glossary and list of acronyms is provided in Acronyms and Definitions. The list below provides a quick reference for specialized terms whose use is especially prominent in this HMP:

- Adaptive capacity—the ability of a human or natural system to adjust to climate change by moderating potential damage, taking advantage of opportunities, or coping with the consequences (EPA 2023)
- Asset—anything that is important to the character and function of a community (e.g., people, structures, community lifelines, the economy, and natural, historic, and cultural resources) (FEMA 2023)
- Capability assessment—an evaluation of which authorities, policies, programs, funding, and resources a participant has to accomplish hazard mitigation (FEMA 2023)
- Cascading hazards—a primary event, such as heavy rainfall, seismic activity, or rapid snowmelt, followed by a chain of consequences that may range from modest (lesser than the original event) to substantial (National Academies of Sciences, Engineering, and Medicine 2022)
- Community lifelines—the most fundamental services in a community that, when stabilized, enable all other aspects of society to function (FEMA 2023)
- Extent—the range of anticipated intensities of the identified hazards within a community, most commonly expressed using various scientific scales (FEMA 2022)
- Hazard profile—a description of a hazard's location, extent, previous occurrences, and probability of future events within a community (FEMA 2023)
- Hazard ranking—the process of identifying the hazards that pose the greatest risk to a community based on how likely the hazard is to occur, the potential consequences if the hazard does occur, and other relevant local factors
- Impact—the consequences or effects of a hazard on a community's assets identified in the vulnerability assessment. (FEMA 2023)
- Integration—the inclusion of hazard mitigation principles, vulnerability information, and mitigation actions into other existing community planning to leverage activities that have co-benefits, reduce risk, and increase resilience (FEMA 2022)
- Mitigation action—measures, projects, plans, or activities proposed to reduce the current and future vulnerabilities identified in the risk assessment (FEMA 2023)
- Mitigation strategy— the long-term blueprint for reducing the potential hazard-related losses identified in the risk assessment; the strategy consists of mitigation goals, mitigation actions, and a plan for implementing the actions (FEMA 2023)
- Natural hazard—a source of harm or difficulty created by a meteorological, environmental, or geological event (FEMA 2023)
- Plan maintenance—monitoring and updating an HMP as warranted by changing conditions, availability of new information, and progress on the proposed mitigation actions (FEMA 2023)

- Planning process—the procedures used to develop an HMP with broad acceptance across the community
- Risk—the potential for damage or loss when natural hazards interact with people or assets (FEMA 2023)
- Risk assessment—a data-driven analysis to find where a local jurisdiction is vulnerable to hazards (FEMA 2023)
- Social vulnerability—the potential for loss within an individual or social group, as affected by traits that influence an individual's or group's resilience, which is their ability to prepare, respond, cope, or recover from an event (FEMA 2023)
- Stakeholder—individuals or groups that a mitigation action or policy affects, including businesses, private organizations, and residents (FEMA 2023)
- Vulnerability—a description of which assets within locations identified to be hazard-prone are at risk from the effects of the hazard (FEMA 2023)

1.2 HISTORY OF HAZARD MITIGATION PLANNING IN SENECA COUNTY

1.2.1 Previous HMPs

Seneca County has been included in 12 FEMA (major disaster, fire management, or emergency) declarations since 1954. The County prepared and adopted its first HMP in 2008, followed by its second edition in 2018. The 2018 HMP identified the following as the greatest hazards of concern in Seneca County:

- Earthquake
- Flood
- Ice storm
- Severe weather (thunderstorms, high wind, and hail)
- Severe winter weather
- Tornado

1.2.2 Key Changes in the Current Update

The following are the most significant changes made between the previous Seneca County HMP (2018) and the current (2025) update:

- The 2018 Seneca County HMP did not identify dam failure, drought, extreme temperatures, or landslide as hazards of concern. Members of the Steering Committee and Planning Partnership identified these as hazards of concern for the 2025 HMP update.
- The Steering Committee re-evaluated the inclusion of tornado as a stand-alone hazard, as was done in the 2018 plan. The tornado hazard aligns with the severe weather hazard and was reassigned to this hazard grouping in the 2025 HMP update.

- The Steering Committee re-evaluated the inclusion of ice storm as a stand-alone hazard, as was done in the 2018 plan. The ice storm hazard aligns with the severe winter weather hazard and was reassigned to this hazard grouping in the 2025 HMP update.

1.3 PLAN ORGANIZATION

The HMP provides a detailed review and analysis of each hazard of concern, resources, and relevant statistical information for the Planning Partners. It is organized into two volumes: Volume I includes all information that applies to the entire planning area (Seneca County); and Volume II includes specific information for each participating jurisdiction.

Volume I is a resource for ongoing mitigation analysis. It includes a description of the County and its jurisdictions as well as information on mitigation planning and how the risk assessment and capability assessment were performed. Volume I includes the following chapters:

- Part 1: The Planning Process and Planning Area
  - Chapter 1: Introduction
  - Chapter 2: 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. Information regarding the adoption of the plan by Seneca County and each participating jurisdiction.
  - Chapter 3: County Profile: An overview of Seneca 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) community lifelines.
- Part 2: Risk Assessment
  - Chapter 4: Methodology: Description of the methodology used to assess hazard risk and the status of local data.
  - Chapter 5: Hazards of Concern Identification: Documentation of the process of identifying the natural hazards of concern for further profiling and evaluation.
  - Chapter 6–13: Documentation of the hazard ranking process, hazard profiles, and findings of the risk assessment (estimates of the impact of hazard events on life, safety, and health; general building stock; critical facilities; and the economy).
  - Chapter 14: Hazards Ranking: Description and summary of the hazard ranking process.
- Part 3: Capability Assessment
  - Chapter 15: Capability Assessment: A summary and description of the existing plans, programs, and regulatory mechanisms at all levels of government (federal, state, county, local) that support hazard mitigation within the County.
- Part 4: Mitigation Strategy
  - Chapter 16: Mitigation Strategy: 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.
- Part 5: Plan Maintenance

- Chapter 17: Plan Maintenance Procedures: A system to continue to monitor, evaluate, maintain, and update the plan.

Volume II consists of annexes for each participating jurisdiction. Each annex summarizes the jurisdiction's legal, regulatory, and fiscal capabilities; evaluates vulnerabilities to hazards; describes the status of past mitigation actions and HMP integration into local planning processes; and provides a specific mitigation strategy. The annexes provide each jurisdiction with an expedient resource for implementing mitigation projects and maximizing future grant opportunities.

Appendices include the following:

- **Appendix A:** Sample Resolution of Plan Adoption: Documentation that supports the plan approval signatures included in Chapter 2 of this plan.
- **Appendix B**: Meeting Documentation: Agendas, attendance sheets, minutes, and other documentation (as available and applicable) of planning meetings convened during the development of the plan.
- **Appendix C:** 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 D:** Participation Matrix
- **Appendix E:** Action Worksheet Template and Instructions
- **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:** Risk Assessment Supplementary Data: Details regarding past hazard events since those documented in the 2018 plan.
- **Appendix I**: Mitigation Strategy Supplementary Data: Summarizes additional activities and resources provided to plan participants to support the update of the mitigation strategy.
- **Appendix J:** NYS DHSES Planning Standards: Includes planning standards and guidelines for hazard mitigation planning.
- **Appendix K:** Linkage Procedures

2. PLANNING PROCESS

This chapter describes the planning process used to update the Seneca County HMP, including how it was prepared, who was involved in the process, and how the public was involved. The planning approach aimed to achieve the following results:

- The plan will be multi-jurisdictional. Seneca County invited all jurisdictions in the County to join in the planning process. To date, 1all 14 local municipal governments in the County (the Planning Partnership) participated along with Seneca County in the 2025 HMP update process:
  - Town of Covert
  - Town of Fayette
  - Village of Interlaken
  - Town of Junius
  - Town of Lodi
  - Village of Lodi
  - Town of Ovid
  - Village of Ovid
  - Town of Romulus
  - Town of Seneca Falls
  - Town of Tyre
  - Town of Varick
  - Town of Waterloo
  - Village of Waterloo
- The format of this plan is such that other entities can readily join at a later date as part of the regulatory 5-year plan update process.
- The plan considers all natural hazards that pose a risk to the area.
- The plan was developed following the process outlined by FEMA regulations and prevailing FEMA and NYS DHSES guidance. In addition, this plan will meet criteria for the Flood Mitigation Assistance (FMA) program.

A multi-jurisdictional planning grant under the Hazard Mitigation Grant Program (HMGP) (4567-0019) supported the development of this HMP. Grant administration was the responsibility of the Seneca County Department of Public Safety Emergency Management Office.

2.1 GENERAL MITIGATION PLANNING APPROACH

The overall approach used to update Seneca County and local hazard mitigation strategies is based on FEMA and State of New York regulations and guidance regarding local mitigation plan development, including:

- Mitigation Planning How-to Series (FEMA 386-1 through 4, 2002)
- Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (FEMA January 2013)
- Integrating Hazard Mitigation into Local Planning (FEMA March 1, 2013)
- Plan Integration: Linking Local Planning Efforts (FEMA July 2015)
- Local Mitigation Planning Policy Guide (FEMA April 19, 2022)
- Local Mitigation Planning Handbook (FEMA May 2023)
- DMA 2000 (Public Law 106-390 (October 30, 2000)
- 44 CFR 201 and 206 (Feb. 26, 2002, Oct. 1, 2002, Oct. 28, 2003, and Sept. 13, 2004, Interim Final Rules)
- Hazard Mitigation Planning Standard (NYS DHSES 2022)

- Hazard Mitigation Plan (NYS DHSES 2023)

2.2 ORGANIZATION OF PLANNING PROCESS

2.2.1 Planning Process Participants

The various jurisdictions in Seneca County have differing levels of capabilities and resources available to apply to the plan update process as well as differing levels of vulnerability to and impacts from the natural hazards being considered in this plan. It was Seneca County's intent to encourage participation by all jurisdictions and to accommodate their specific needs and limitations while still meeting the intent and purpose of plan update participation. Such accommodations included establishing a Steering Committee, engaging a contract consultant to assume certain elements of the plan update process on behalf of the jurisdictions, and providing alternative mechanisms for planning participation.

Project Management and Planning Consultant

Project management was the responsibility of the Seneca County Department of Public Safety–Emergency Management Office. A contract planning consultant (Tetra Tech) was tasked with the following:

- Assisting with the organization of a Steering Committee and the 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
- Assisting with the review and update of mitigation planning goals and objectives
- Assisting with the review of past mitigation strategy progress
- Assisting with the screening of mitigation actions and the identification of appropriate actions
- Assisting with the prioritization of mitigation actions
- Authoring of the draft and final plan documents

Planning Partnership

In September 2023, Seneca County notified all municipalities in 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 and identify planning points of contact to facilitate their participation and represent the interests of their communities.

All participating jurisdictions, including the County, are recognized as planning partners and make up the Planning Partnership for this HMP. Table 2-1 shows the primary and secondary points of contact for the participating jurisdictions in the Planning Partnership as of the time of publication of this plan update.

Table 2-1. Seneca County Hazard Mitigation Planning Partnership, Primary and Secondary Points of Contact for Participating Jurisdictions

Jurisdiction[a]	Primary Point of Contact	Title	Alternate Point of Contact	Title
Seneca County	Melissa Taylor	Emergency Management Director	Toni DiGiovanni	Deputy Emergency Management Director
Covert (T)	Michael Reynolds	Town Supervisor	Jeffrey MacCheyne	Highway Superintendent
Fayette (T)	Jeffrey Trout	Town Supervisor	Jenn Salone	Councilwoman
Interlaken (V)	Richard Richardson	Mayor	Wes Ahouse	Highway Supervisor
Junius (T)	Ernie Brownwell	Town Supervisor	David Fisk	Highway Superintendent
Lodi (T)	Luke Latini	Town Supervisor	Rick Jacot	Highway Superintendent
Lodi (V)	Rose Riley	Mayor	Nancy Jones	Village Clerk
Ovid (T)	Joe Borst	Town Supervisor	Jeremy Huff	Highway Superintendent
Ovid (V)	Leon Kelly	Mayor	Michael Snyder	Public Works Superintendent
Romulus (T)	Janet Lynch	Planning Board Chairperson	David Haynes	Town Supervisor
Seneca Falls (T)	Frank Schmitter	Town Supervisor	Thomas Cleere	Sergeant, Police Department
Tyre (T)	Elizabeth Partee	Town Supervisor	Eric Bush	Highway Superintendent
Varick (T)	Robert Hayssen	Town Supervisor	Ben Freier	Highway Superintendent
Waterloo (T)	Don Trout	Town Supervisor	Joe Mull	Highway Superintendent
Waterloo (V)	Don Northrup	Administrator	Walter Bennett	Mayor

a. (T) indicates towns; (V) indicates villages

The Planning Partnership was charged with the following:

- Representing their jurisdiction throughout the planning process
- Ensuring participation of all departments and functions within their jurisdiction that have a stake in mitigation (e.g., planning, engineering, code enforcement, police and emergency services, public works)
- Assisting in gathering information for inclusion in the HMP update, including the use of previously developed reports and data
- Supporting and promoting the public involvement process
- Reporting on progress of mitigation actions identified in prior or existing HMPs, as applicable
- Identifying, developing, and prioritizing appropriate mitigation actions
- Reporting on progress of integration of prior or existing HMPs into other planning processes and municipal operations
- Supporting and developing a jurisdictional annex
- Reviewing, amending, and approving all sections of the plan update

- Adopting, implementing, and maintaining the plan update

Appendix D (Participation Matrix) identifies how each individual who represented the jurisdictions during this planning effort contributed to the planning process.

For each jurisdiction that fully participated in the HMP, a completed annex is included in Volume II. In the annexes, the jurisdictions identify their points of contact for the HMP, evaluate their risk from the hazards of concern, identify their capabilities to effect mitigation in their community, identify and prioritize a suite of actions to mitigate their hazard risk, and adopt the updated plan via resolution.

Twelve of the municipalities in the County actively participate in the National Flood Insurance Program (NFIP) and have a designated NFIP floodplain administrator. All floodplain administrators have been informed of the planning process, reviewed the plan documents, and provided direct input to the plan update. Local floodplain administrators are identified as part of each jurisdiction's hazard mitigation planning team, as presented in the jurisdictional annexes in Volume II, as well as in Appendix D (Participation Matrix).

After completion of the plan, implementation and ongoing maintenance will become a function of the Planning Partnership as described in Chapter 17 (Plan Maintenance). The Planning Partnership will be responsible for reviewing the draft plan and soliciting public comment as part of an annual review and as part of the 5-year mitigation plan updates.

Steering Committee

Seneca County developed a Steering Committee to provide guidance and direction to the HMP update effort and to ensure that the resulting document will be embraced by local government leaders as well as all who live and work within the planning area. Steering Committee members were charged with the following:

- Providing guidance and oversight of the planning process on behalf of the general planning partnership
- Attending and participating in Steering Committee meetings
- Reviewing and updating the hazards of concern
- Developing a public and stakeholder outreach program
- Ensuring that the data and information used in the plan update process is the best available
- Reviewing and updating the hazard mitigation goals
- Identifying and screening appropriate mitigation strategies and activities
- Reviewing and commenting on plan documents prior to submission to NYS DHSES and FEMA

The Steering Committee provided guidance, leadership, and oversight of the planning process and acted as the point of contact for all participating jurisdictions and various interest groups in the planning area. Table 2-2 lists the members of the Steering Committee.

Table 2-2. Seneca County Hazard Mitigation Steering Committee Members

Affiliation	Name	Title
Seneca County Emergency Management Office	Melissa Taylor	Director
Seneca County Emergency Management Office	Toni DiGiovanni	Deputy Director
Seneca County Emergency Management Office	Jeff Case	Fire Coordinator
Seneca County Emergency Management Office	Kristopher Rodger	Public Safety Systems Administrator
Seneca County Health Department	Scott King	Director
Seneca County Division of Human Services	Annie Mahoney	Deputy Commissioner
Seneca County Division of Human Services	Michael Whirtley	Deputy Commissioner
Seneca County Highway Department	Roy Gates	Superintendent of Highways
Seneca County Mental Health Services	Margaret Morse	Director
Seneca County Soil and Water District	Erin Peruzzini	District Technician
Seneca Falls Police Department	Thomas Cleere	Sergeant
Cornell Cooperative Extension of Seneca County	Ave Bauder	Executive Director
New York State Department of Homeland Security and Emergency Services	Lisa Burkovich	Regional Director
New York State Department of Homeland Security and Emergency Services	Beth O'Reilly	Planning Manager
New York State Department of Homeland Security and Emergency Services	John Wilkinson	Environmental Specialist

2.2.2 Planning Activities

Members of the Planning Partnership (individually and as a whole), as well as key stakeholders, met and communicated as needed to share information. This included workshops to identify hazards, assess risks, update inventories of critical facilities, and assist in updating mitigation goals and strategies. All members of the Planning Partnership had the opportunity to review the draft plan, supported interaction with other stakeholders, and assisted with public involvement efforts. These activities provided continuity through the process to ensure that natural hazard vulnerability information and appropriate mitigation strategies were incorporated.

Table 2-3 summarizes meetings and other planning activities conducted during the development of the plan. It also identifies which DMA 2000 requirements each activity satisfies. Documentation of meetings (agendas, sign-in sheets, minutes, etc.) may be found in Appendix C (Public and Stakeholder Outreach). Table 2-3 identifies only formal meetings and milestone events in the plan update 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.

Table 2-3. Summary of Mitigation Planning Activities/Efforts

Date	DMA 2000 Requirement	Description of Activity	Participants
September 6, 2023	2	Project Start Up Meeting: Discuss proposed planning process and scope of work including documenting participation, schedule, and public and stakeholder outreach and involvement.	Seneca County Emergency Management Office, Tetra Tech
September, 2023	2	All municipalities invited to participate in the planning process.	-
October 11, 2023	2	Core Planning Team Meeting: Discuss participation, outreach, and kickoff meeting scheduling	Seneca County Emergency Management Office, Tetra Tech
October 2023	2	Public project website developed: https://www.senecacountynyhmp.com/	Planning Team, Contract Planner
December 15, 2023	2, 3c	Geographic information system (GIS) data collection meeting	Seneca County Emergency Management Office, Seneca County GIS technician, Tetra Tech
November 2, 2023	1b, 2, 3a, 3b, 3c, 4a, 5c	Steering Committee Kickoff Meeting: 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
November 2, 2023	1b, 2, 3a, 3b, 3c, 4a	Planning Partnership Kickoff 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, discussion of public and stakeholder outreach efforts	County and municipal representatives and stakeholders. See Appendix D
December 7, 2023	1b	Meeting to identify Seneca County NFIP administration support for municipalities.	Seneca County Code Enforcement, Tetra Tech, Michael Baker Int.
December 2023	2	Online Public Hazard Preparedness and Mitigation survey developed and deployed	Planning Team, Contract Planner
December 2023	2	Online Stakeholder Hazard Mitigation surveys developed and deployed	Planning Team, Contract Planner
December 2023	2	Online Neighboring Community Mitigation survey developed and deployed	Planning Team, Contract Planner
September 12, 2024	2, 3c, 3d, 3e, 4a, 4b, 5	Steering Committee Meeting: Project report and status review, public and stakeholder outreach, risk assessment overview, plan maintenance, next steps	See Appendix D

Date	DMA 2000 Requirement	Description of Activity	Participants
September 19, 2024	2, 3c, 3d, 3e, 4a, 4b	Steering Committee and Planning Partnership Meeting: Project report and status review, public and stakeholder outreach, risk assessment overview, mitigation strategy overview; mitigation action development schedule, next steps	County and municipal representatives and stakeholders. See Appendix D
February 18, 2025	1b, 2, 3c, 3d, 3e, 4a, 4b	Steering Committee and Planning Partnership Meeting: Draft Plan Review	County and municipal representatives and stakeholders. See Appendix D
February 18, 2025	2	Draft Plan posted to public project website	Public and Stakeholders
March 19, 2025	1b, 2	Public and stakeholder comments to Draft Plan received and incorporated into Final Plan.	Public and Stakeholders
TBD	All requirements	Final plan submitted to NYS DHSES	NYS DHSES
TBD	1b, 2	NYS DHSES comments on draft plan received and incorporated into final plan.	NYS DHSES, Planning Team, Contract Planner
TBD	All requirements	Final plan submitted to FEMA Region 2	FEMA Region 2
TBD	1b, 2	FEMA Region 2 comments on draft plan received and incorporated into final plan.	FEMA Region 2
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

2.3 STAKEHOLDER OUTREACH AND INVOLVEMENT

The Seneca 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 Seneca County. A Steering Committee solicited information from local

agencies and individuals with specific knowledge of certain natural hazards and past historical events. In addition, the Steering Committee and Planning Partnership took into consideration planning and zoning codes, ordinances, and recent land use planning decisions.

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 ensure broad regional, county, and local representation in this planning process. A comprehensive list of stakeholders was developed with the support of the Steering Committee and Planning Partnership. Stakeholder outreach was performed early and throughout the planning process, including mass media notification efforts. Identified stakeholders were invited to attend the Planning Partnership risk assessment meeting, and key stakeholders were requested to participate on the Steering Committee and/or Planning Partnership. Information and input provided by these stakeholders has been included throughout this plan.

The following sections list the stakeholders who were invited to participate in the development of this plan and describe how they contributed to the plan. This summary information demonstrates the scope and breadth of the stakeholder outreach efforts during the planning process. Beyond those described here, many stakeholders were aware of and/or contributed to this plan through formal and informal outreach efforts by the planning partners involved in the plan update.

2.3.1 Federal and State Agencies

The federal and state agencies listed in Table 2-4 were contacted during the planning process. The table describes how each participated.

Table 2-4. Participation of Federal and State Agencies

Agency	Participation
FEMA Region 2	Provided planning guidance; provided summary and detailed NFIP data for planning area; presented preliminary regulatory flood products to municipalities and the public; attended meetings; participated in a Mitigation Strategy Workshop; conducted plan review.
• National Centers for Environmental Information (NCEI) • National Hurricane Center (NHC) • National Oceanic and Atmospheric Administration (NOAA) • National Weather Service (NWS) • Storm Prediction Center (SPC) • U.S. Army Corps of Engineers (USACE) • U.S. Census Bureau • U.S. Geological Survey (USGS)	Information regarding hazard identification and the risk assessment for this HMP update was requested and received or incorporated by reference

Agency	Participation
NYS DHSES: Headquarters and Region II	Administered planning grant and facilitated FEMA review; provided planning guidance; attended meetings; participated in the Mitigation Strategy Workshop, provided review of Draft and Final Plan.
New York State Department of Environmental Conservation (NYSDEC)	Provided data and information on various hazards. Provided dates of most recent Community Assistance Visits and Community Assistance Contacts for municipalities enrolled in the NFIP.

2.3.2 County and Regional Agencies

The Seneca County and regional agencies listed in Table 2-5 were invited to participate during the planning process. The table describes how each participated.

Table 2-5. County and Regional Agencies

Agency	Participation
• Seneca County Emergency Management Office • Seneca County Health Department • Seneca County Division of Human Services • Seneca County Highway Department • Seneca County Mental Health Services • Seneca County Soil and Water District • Seneca Falls Police Department • Cornell Cooperative Extension of Seneca County	Served on steering committee, attended meetings, completed hazard of concern exercise, goals and objectives exercise, and reviewed draft plan.
• Seneca County Code Enforcement • Seneca Towns Engaging People for Solutions	Provided input and reviewed draft plan.
• Seneca County Industrial Development Agency • Seneca County Chamber of Commerce • Cayuga Indian Nation	Invited to take the stakeholder survey and review the draft plan.

2.3.3 Stakeholders by Community Lifeline Category

FEMA defines community lifelines as fundamental services in a community that, when stabilized, enable all other aspects of society. Following a disaster event, intervention is required to stabilize community lifelines. All participating jurisdictions were asked to invite their internal agencies associated with community lifeline categories to complete a stakeholder survey. Many jurisdictions also directly involved representatives of these agencies in the planning process, as identified in Table 2-1. This section describes outreach to and participation by other stakeholders in the planning process associated with FEMA's eight designated community lifeline categories. More detailed information about community lifelines in the planning area is provided in Chapter 3.9.

Safety and Security

Law Enforcement

Many municipalities directly involved police and other law enforcement representatives in the planning process. The following police departments and law enforcement agencies were invited to complete a stakeholder survey and review the draft plan:

- Seneca County Sheriff's Office
- Town of Seneca Falls Police Department
- Village of Interlaken Police Department

Fire Districts and Fire Departments

Many jurisdictions directly involved fire district/department, haz-mat teams, and rescue team representatives in the planning process. The following fire districts or departments, hazardous materials response teams, and rescue teams were invited to complete a stakeholder survey and review the draft plan:

- Seneca County Fire Coordinator
- Town of Seneca Falls Volunteer Fire Department
- Town of Romulus Fire Department
- Town of Ovid Fire Department
- Town Varick Fire Department
- Village of Interlaken Volunteer Fire Department
- Town of Lodi Volunteer Fire Company
- Town of Fayette Volunteer Fire Department
- Town of Junius Volunteer Fire Department
- Town of Waterloo Volunteer Fire Department
- Galen-Clyde Fire Department

Dams

In order to address high hazard potential dams, outreach was conducted with dam owners and/or the dam safety agency. The following information was requested:

- Information, data, or resources regarding the risk to dam failure as a result of deficiencies or exposure to hazards such as flooding, landslides, and severe weather
- Concerns with dam safety due to changing climate conditions
- Concerns with emergency action plan deficiencies including warning time, evacuation needs, etc.
- Completed or in progress repairs/improvements to dams
- Potential new mitigation actions that should be considered for inclusion in the HMP mitigation strategy

No responses were received. Information related to dams was sourced from the NYS DEC database and the USACE NID. Additional information utilized was from the reviewed and approved list of critical facilities provided by the County and online mapping capabilities to determine nearby roadways and additional facilities which may be at risk to a dam failure incident.

Food, Hydration, and Shelter

Jurisdictions were asked to invite their emergency management related agencies to provide information on shelters and sheltering procedures. The following stakeholders that provide food, hydration, shelter, and agricultural activities in the County were invited to complete a stakeholder survey and review the draft plan:

- Ovid Federated Church
- Finger Lakes Fellowship Center
- Fayette Mennonite Church
- Waterloo Mennonite School
- West Brook Mennonite School
- Geneva Mennonite Church
- Cornerstone Mennonite Fellowship

Health and Medical

Hospitals and Healthcare Facilities

The following hospitals and healthcare facilities were invited to complete a stakeholder survey and review the draft plan:

- Seneca Family Health Center
- Seneca Falls Urgent Care
- Auburn Community Hospital
- Tri-State Hospital Supply Corporation
- Auburn Memorial Hospital
- Lifecare Medical Association
- Finger Lakes Health Occupational Health
- Finger Lakes Health Medical Urgent Care
- University of Rochester Medicine Finger Lakes Health
- WIC Waterloo
- Finger Lakes Community Health
- Seneca Falls Veterinary Hospital
- Ovid Primary Care Center
- Cayuga Medical Center

Ambulance/Emergency Medical Services

The following ambulance and emergency medical service providers in the County were invited to complete a stakeholder survey and review the draft plan:

- South Seneca Ambulance

Energy

In addition to municipal utilities, the following electrical, natural gas, and fuel companies were invited to complete a stakeholder survey and review the draft plan:

- NYS Electric and Gas

Communications

Each jurisdiction was asked to provide information on emergency communication and warning systems. In addition, the following communications companies were invited to complete a stakeholder survey and review the draft plan:

- Seneca County E-911 Center

Transportation

The following transportation companies and organizations were invited to complete a stakeholder survey and review the draft plan:

- RTS Seneca

2.3.4 Additional Stakeholder Groups

School Districts and Other Academic Institutions

Many jurisdictions directly involved school district representatives in the planning process, as identified in Table 2-1. Jurisdictions were asked to invite representatives of their local schools to complete a stakeholder survey. Additionally, the following school districts, colleges, and academic organizations were invited to complete a stakeholder survey and review the draft plan:

- Northeast College of Health Sciences
- Romulus CSD
- Romulus Central School
- Seneca Falls CSD
- Elizabeth Cady Stanton Elementary School
- Frank M. Knight Elementary School
- Mynderse Academy
- Seneca Falls Middle School
- South Seneca CSD
- South Seneca Elementary School
- South Seneca Middle School
- South Seneca High School
- Waterloo CSD
- Skoi-Yase Primary School
- LaFayette Intermediate School
- Waterloo Middle School
- Waterloo High School

Groups Supporting Socially Vulnerable Populations and Underserved Communities

The following groups and agencies that provide support to and work with socially vulnerable populations and underserved communities were invited to complete a stakeholder survey and review the draft plan:

- Seneca Towns Engaging People for Solutions (STEPS)
- Cayuga Indian Nation

2.3.5 Adjacent Jurisdictions

The County kept surrounding jurisdictions apprised of the project, invited them to complete a neighboring community survey, and requested their review of the draft plan. The following adjoining Seneca County

and jurisdictional representatives were contacted to inform them about the availability of the project website, draft plan documents, and surveys and to invite them to provide input to the planning process:

- Cayuga County Emergency Services
- Cayuga County Sheriff's Office
- Ontario County Emergency Management Office
- Ontario County Sheriff's Office
- Schuyler County Emergency Services
- Schuyler County Planning Department
- Tompkins County Department of Emergency Response
- Tompkins County Sheriff's Office
- Wayne County Emergency Management Office
- Wayne County Fire Coordinator
- Wayne County Sheriff's Office
- Yates County Emergency Management
- Yates County Sheriff's Office
- Village of Aurora
- Village of Dresden
- City of Geneva
- Town of Montezuma
- Village of Trumansburg
- Village of Phelps
- Town of Phelps
- Village of Burdett
- Village of Montour Falls
- Village of Watkins Glen
- City of Ithaca
- Town of Danby
- Town of Savannah
- Village of Clyde
- Town of Lyons
- Village of Cayuga Heights
- Town of Lansing
- Village of Odessa
- Town of Hector
- Town of Enfield

2.3.6 Stakeholder and Neighboring Community Survey Summaries

This section summarizes the results and feedback received by those who completed the stakeholder and neighboring community surveys. Feedback was reviewed by the Steering Committee and integrated where appropriate in the plan.

Stakeholder Survey

The stakeholder survey was designed to identify general needs for hazard mitigation and resiliency within Seneca 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 Seneca County and municipal departments and agencies.

Overview of Respondents

As of January 21, 2025, five stakeholders completed the survey, with respondents coming from the emergency services, health and human services, and non-profit sectors. The majority of respondents represented groups that serve Seneca County as a whole (60 percent).

When asked if the organization maintains or manages anything within their designated service area, 60 percent said no they do not manage any facilities. For those that did answer, they indicated the following facilities: buildings, bridges, water and sewer infrastructure, and roads.

80 percent of respondents noted that they work with socially vulnerable populations. Examples of this work included:

- Support for individuals with disabilities
- Support for refugees, the economically disadvantaged, developmentally disabled, and those diagnosed with HIV/AIDS
- Housing and services to the homeless population
- Drug and alcohol addiction services
- Services and support for individuals with autism
- Support for those with mental health challenges
- Food distribution and nutrition education

The remaining respondents noted a variety of work including fire suppression, medical assistance and responses, water rescue; delivering education programs, conducting applied research, and encouraging community collaborations; and providing public assistance in the form of food, shelter, medical care, and protective services.

Hazard and Damage Identification

100 percent of respondents indicated that buildings, facilities, or structures their organization is involved with have not been impacted by a natural hazard. 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:

- Land by streams and other waterbodies
- Farmland impacted by drought, frost, and severe rain events
- Tree damage and fall, especially impacting transportation and power supply
- Power outages causing a halt in internet services

60 percent of respondents indicated they did not know if their facilities are prepared for withstanding natural disasters and 40 percent said their facilities are not adequately prepared for withstanding natural disasters.

Community Preparedness

100 percent of respondents noted they are aware of the location and number of socially vulnerable populations in their community/operating area but need additional information on how to better serve and protect the populations. Respondents felt that education and outreach programs regarding hazards in Seneca County are effective in informing these vulnerable populations on what they should do to prepare for and reduce personal risk to natural disasters.

50 percent of total respondents being part of an Emergency Operations Plan, 25 percent being part of a Continuity of Operations/Government Plan, and 50 percent are unsure what plans their organization are involved in.

Project Identification

Respondents did not identify any projects or programs that their organization's currently have underway, or would like to complete, to reduce vulnerability to damages and losses, including loss of operation/service, to hazard events.

Neighboring Community Survey

The neighboring community survey was sent to the County and municipal governments that border Seneca County due to their proximity to the County and because the effects of hazard events that impact Seneca County would be similar to that of their neighbors. As of January 21, 2025, four counties submitted the survey (Cayuga, Schuyler, Tompkins, and Wayne Counties).

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

Emergency Operations and Continuity of Operations Planning

Wayne County indicated it shares an MOU with Seneca County for 9-1-1 dispatch back-up call answering. Regionally, Seneca County provides hazardous materials team members as part of the four-county consortium which includes Ontario, Seneca, Wayne, and Yates counties.

33 percent of respondents noted that Seneca County and/or its local jurisdictions are involved in their county's emergency operations planning and vice versa. 33 percent of respondents noted that Seneca County and/or its local jurisdictions are involved in their county's continuity of operations planning and vice versa.

Information Sharing

Respondents noted information sharing primarily occurs verbally or via email between the entities. 50 percent of respondents have access to contact information for Seneca County's emergency operations center. Wayne County indicated it has an excellent working relationship with Seneca County Emergency Manager.

Projects, Grants, Education, and Outreach

Wayne County noted that being within the ingestion pathway for the Ginna Plant is a hazard risk they share with Seneca.

Respondents did not identify any projects as requiring cross-collaboration between county boundaries, however Wayne County indicated they and Seneca County were collaborators in a regional hazardous materials grant.

None of the respondents were aware of any organizations that support socially vulnerable or underserved populations in their county and Seneca County. Similarly, no respondents were aware of any organizations that carry out education and outreach regarding hazards in their jurisdiction and Seneca County.

Evacuation and Sheltering

Participants indicated collaboration with Seneca County and/or its local jurisdictions is not taken when establishing evacuation routes or making evacuation decisions. Similarly, respondents noted collaboration with Seneca County and/or its local jurisdictions is not taken when establishing shelters or making sheltering decisions. No shared spaces for temporary housing were identified.

2.4 PUBLIC OUTREACH

2.4.1 Outreach Strategy

The Steering and Planning Partnership 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 kickoff meeting and through public service announcements released throughout the planning process.
- A public website is being maintained to facilitate communication between the Steering Committee, Planning Partnership, public, and stakeholders (www.senecacountynyhmp.com). The public website contains a project overview, Seneca County and local contact information, access to the citizens survey and stakeholder surveys, and sections of the HMP for public review and comment.
- All participating jurisdictions have been encouraged to distribute links to the project webpage and citizen and stakeholder surveys.
- In order to facilitate coordination and communication between the Planning Partnership and citizens and involve the public in the planning process, the HMP update will be available to the public through a variety of venues. A printed version of the HMP will be maintained at the Seneca County Emergency Management Office and Seneca County Department of Planning.
- An online natural hazards preparedness citizen survey was developed to gauge household preparedness that may impact Seneca 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 September 8, 2023, for public input. All participating jurisdictions have been requested to advertise the availability of the survey via local homepage links, and other available public announcement methods (e.g., Facebook, X, email blasts, etc.). 25 responses have been collected. A summary of survey results is provided later in this Section with full results provided in Appendix C of this plan.
- Directed response surveys were distributed to academia, fire departments, emergency medical services, hospitals and healthcare organizations, business and commercial interests, utilities, and law enforcement stakeholders as detailed in the Stakeholder Outreach subsection of this chapter.

A 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 February 18, 2025, for public review and comment. A physical copy of the plan was available for viewing at the Seneca County Emergency Management Office. All public comments were directed to the Seneca County Emergency Management Office for collection and review by the Steering Committee. 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 as well as in hard-copy format at the following as identified in Chapter 17, Plan Maintenance.

Examples of virtual outreach via websites and social media completed by the planning partners are provided in Figure 2-1 and Figure 2-2.

2.4.2 Public Survey Summary

The public survey was developed to assess the level of knowledge of tools and techniques to assist in reducing risk and loss associated with 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 January 21, 2025, the survey received 25 responses.

Demographically, survey respondents were from eight municipalities within Seneca County, with 57.8 percent having lived in the County for 20 years or more. The most common (36.8 percent) age of respondents was over the age of 60. The majority (72 percent) of residents receive information concerning hazards through social media. Over half (64 percent) receive information utilizing the internet and (52 percent) rely on radio news.

Survey respondents identified the following as the top 5 most frequently occurring natural hazard events within Seneca County in the past 10 years, as shown in Figure 2-3:

- Disease/Pandemic Outbreak (64 percent)
- Severe weather–wind, lightning, hail (56 percent)
- Severe winter weather–blizzard, heavy snow, ice (56 percent)
- Extreme wind (52 percent
- Flooding (street/land) (52 percent)

Respondents identified the following as priorities regarding planning for hazards:

- Protecting and reducing damages to utilities (94.7 percent)
- Protecting critical facilities and community lifelines (94.7 percent)
- Promoting cooperation among public agencies, residents, non-profit organizations, and local businesses (84.2 percent)
- Strengthening emergency services (e.g., police, fire, EMS) (78.9 percent)

- Protecting private property (73.6 percent)

Respondents were asked which activities have been performed to mitigate hazard impacts to their homes. Approximately 95 percent of respondents have installed smoke detectors; roughly 73 percent have talked with other household members about what to do in case of a natural disaster or emergency; 53 percent have become trained in first aid and/or CPR; 58 percent have attended meetings or received information on natural disasters or emergency preparedness; 42 percent have prepared a disaster supply kit; and 53 percent have developed an emergency plan for the household to decide what will be done in the event of a disaster or emergency.

Respondents were also asked about their property's location within the floodplain, and if they have flood insurance. Of the 25 respondents who answered this question, only four (16 percent) indicated that their property is located in a designated floodplain. Of those residents just two indicated their home is covered by flood insurance.

The most self-selected jurisdictions respondents indicated that they live in, include the Village of Waterloo (42.1 percent), the Town of Seneca Falls (26.3 percent), and the Town of Fayette (10.5 percent).

Jurisdiction-specific responses can be found in Volume II. Refer to Appendix C (Public and Stakeholder Outreach) for the full list of survey questions and responses.

Figure 2-1. Seneca County HMP Webpage and Local Online Outreach

Figure 2-2. Seneca County HMP Webpage and Local Online Outreach

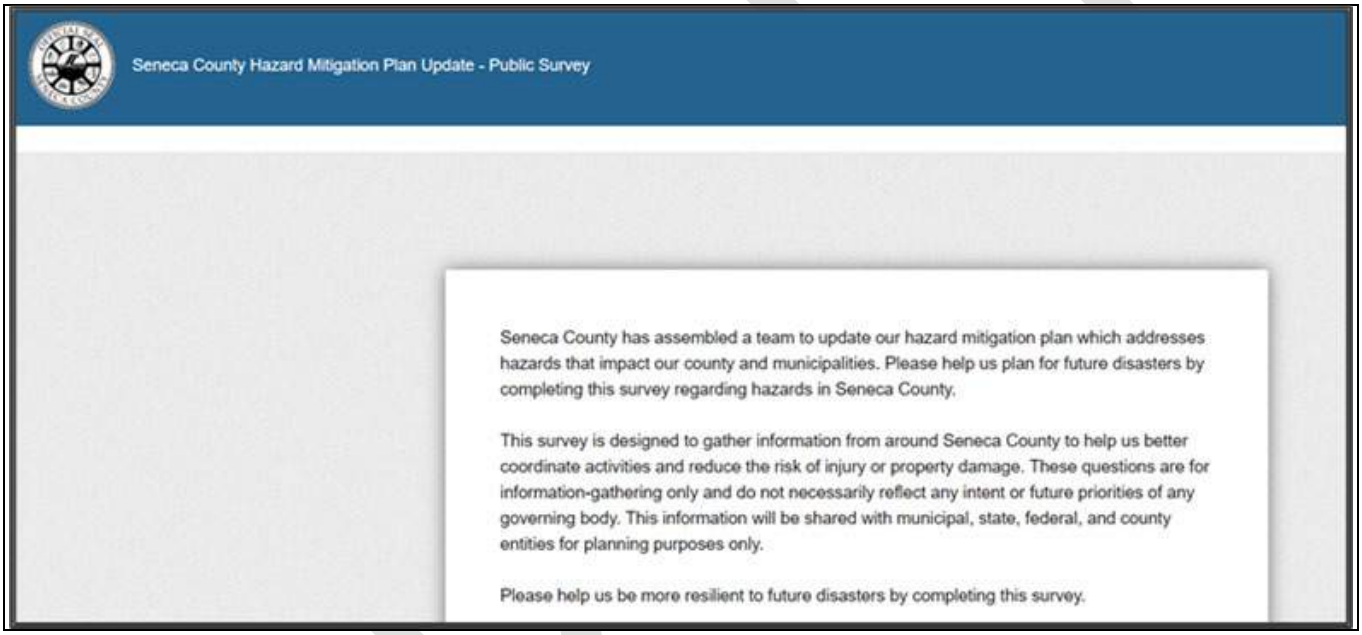
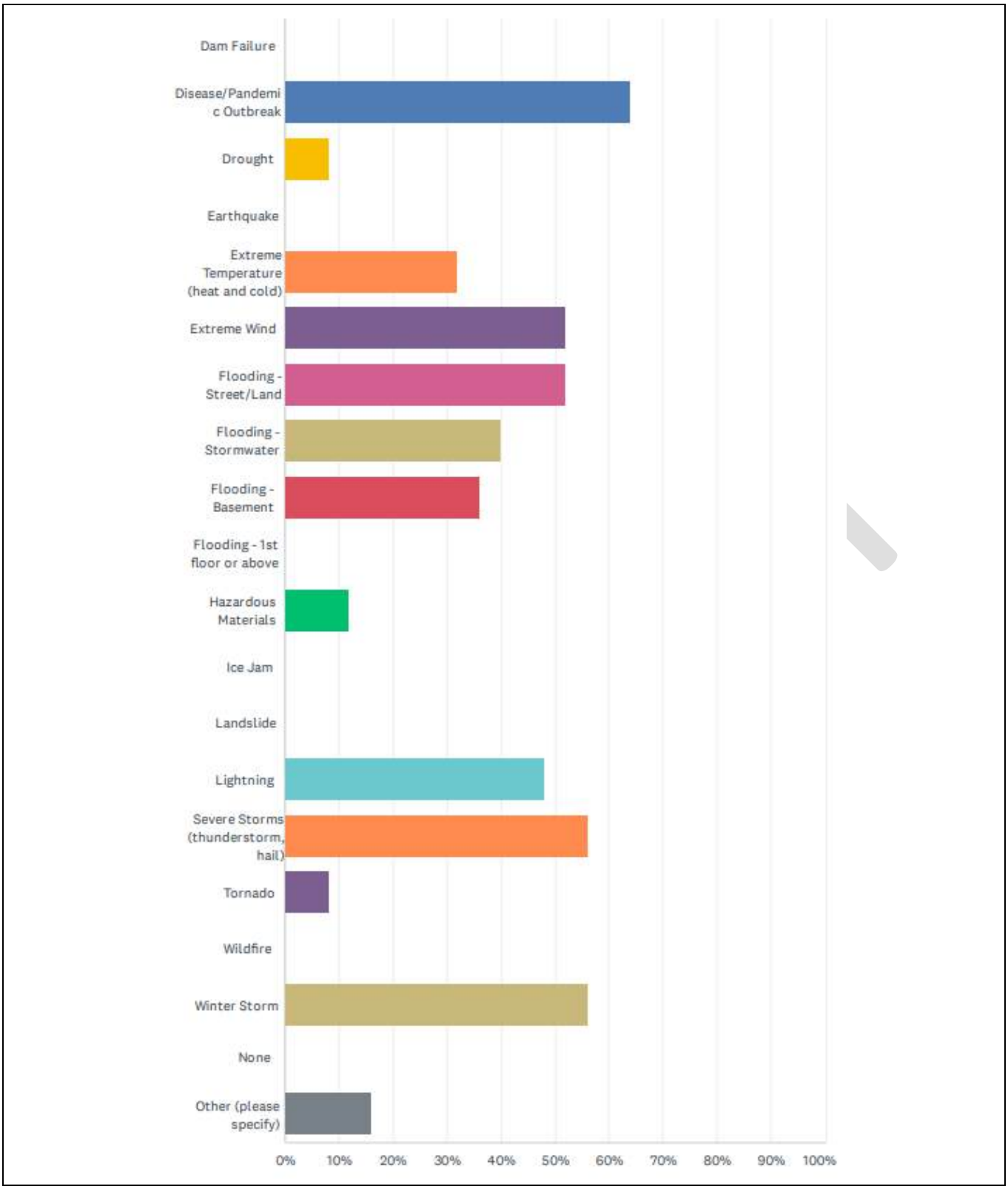


Figure 2-3. Most Frequently Experienced Natural Hazard Events in Seneca County



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

The Seneca County HMP uses the best available information to support hazard profiling, risk assessment, review and evaluation of mitigation capabilities, and development and prioritization of County and local mitigation strategies. The County and participating jurisdictions provided relevant jurisdiction-specific planning and regulatory documents, which were reviewed to identify the following:

- Existing jurisdictional capabilities
- Needs and opportunities to develop or enhance capabilities, which may be identified in the County or local mitigation strategies
- Mitigation-related goals or objectives
- Proposed, in-progress, or potential mitigation actions to be incorporated into the updated County and local mitigation strategies

The following regulations, codes, ordinances, and plans were reviewed:

- Comprehensive/master plans
- Building codes
- Zoning and subdivision ordinances
- Flood insurance studies
- Flood insurance rate maps
- 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
- 2023 New York State HMP

Plans, reports, and other technical information were identified and accessed online through independent research by the planning consultant or provided directly by Seneca County, participating jurisdictions, and stakeholders involved in the planning effort. Detailed sources of technical data and information used are listed in the references at the end of this volume. The asset inventory data used for the risk assessment is presented in the County Profile (Chapter 3). Details of the source of this data, along with technical information on how the data was used to develop the risk assessment, are presented in Chapter 4, as well as throughout the hazard profiles in this HMP.

The County and participating jurisdictions reviewed relevant plans contributing to their capabilities to integrate effective mitigation efforts into their daily activities. This review is reflected in the capability assessment table in each of the municipal annexes in Volume II. These tables list plan types, names, and dates, as well as a summary of how each plan supports mitigation and resilience.

2.6 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. Many existing plans and programs support hazard mitigation in Seneca County.

The capability assessment presented in Chapter 15 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 in Seneca County. In the jurisdictional annexes in Volume II, each participating jurisdiction identifies how it has already integrated hazard mitigation into its planning, regulatory and administrative framework ("integration capabilities") and how it intends to promote this integration ("integration actions").

2.7 PLAN ADOPTION

Adoption by the local governing bodies of each participating jurisdiction demonstrates the commitment of the planning partners to fulfill the mitigation goals and strategies outlined in this HMP. Adoption via a municipal resolution legitimizes the HMP and authorizes responsible agencies to execute their responsibilities.

Formal adoption of the HMP by the governing bodies of participating jurisdictions achieves the following:

- 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 to program and grant administrators that the plan's recommendations have been properly considered and approved by the jurisdictions' governing authority and citizens.
- 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 HMP to Life (FEMA 386-4).

Seneca County and all participating jurisdictions will proceed with formal adoption proceedings when FEMA completes review of the plan and provides conditional approval (known as Approval Pending Adoption).

Following adoption on the plan, the jurisdiction must submit a copy of the formal adoption resolution or other legal instrument to the Seneca County HMP Coordinator in the Seneca County Emergency Management Office. Seneca County will forward the executed resolutions to the New York Division of Homeland Security and Emergency Services (NYS DHSES), after which they will be forwarded to FEMA for the record. FEMA will transmit acknowledgement of verification of formal plan adoption and the official approval of the plan to the Seneca County HMP Coordinator.

The resolutions issued by each jurisdiction to support adoption of the plan are included in Appendix A.

2.8 CONTINUED PUBLIC INVOLVEMENT

The planning partners 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.senecacountynyhmp.com/), and jurisdictions will be encouraged to maintain links to the plan website. Each jurisdiction's governing body will be responsible for receiving, tracking, and filing public comments regarding this plan.

In coming years, after the Planning Partnership completes an annual evaluation of how the HMP is being implemented, a notice will be posted on the website with information on any updates and where the most current plan can be found. The public will have an opportunity to comment on the plan as a part of the annual mitigation planning evaluation process and the next 5-year mitigation plan update. Meetings may be held as deemed necessary by the Planning Partnership to provide the public an opportunity to express concerns, opinions, and ideas about the plan. A notice regarding annual updates of the plan and the location of plan copies will be publicized annually after the Planning Partnership's annual evaluation and posted on the public website (currently at https://www.senecacountynyhmp.com/).

The HMP Coordinator will be responsible for coordinating the plan evaluation, soliciting feedback, collecting and reviewing the comments, and ensuring their incorporation in the 5-year plan update as appropriate. Members of the Planning Partnership will assist the HMP Coordinator. Melissa Taylor of the Seneca County Emergency Management Office has been identified as the ongoing County HMP Coordinator (see Chapter 17), and is responsible for receiving, tracking, and filing public comments regarding this Plan Update. Contact information is:

Mailing Address:	Seneca County Public Safety Department Emergency Management Office 1 DiPronio Drive, Waterloo, NY 13165
Contact Name:	Melissa Taylor
Email Address:	mtaylor@co.seneca.ny.us
Telephone:	(315) 539-9241

Further details regarding continued public involvement are provided in Chapter 17.

3. COUNTY PROFILE

This chapter presents general information about the land, people, and assets of Seneca County. This information provides a baseline for understanding the economic, structural, and population assets at risk from the hazards addressed in this HMP.

3.1 LOCATION

The planning area for this HMP is the entirety of Seneca County. Seneca County is situated in the heart of the New York's Finger Lakes Region. The County is bordered by the Lake Ontario plain to the north and the central Southern Tier region to the south. Cayuga and Seneca Lakes form parts of its eastern and western boundaries. Neighboring counties are Wayne County to the north, Cayuga and Tompkins Counties to the east, Tompkins and Schuyler Counties to the south, and Yates and Ontario Counties to the west.

The County covers 390 square miles, extending 35 miles from north to south and about 8 to 10 miles from east to west. The NYS Thruway (I-90) crosses the north end of the county from east to west, and the Erie Canal crosses the county's northeast corner. Figure 3-1 shows Seneca County and its municipalities.

3.2 HISTORY

The area that is now Seneca County was originally the home of Native Americans who farmed, hunted, and fished in the region. Eastern pioneers began settling the area in the mid-1700s seeking opportunities offered by the fertile soil, forested and timbered land, plentiful wildlife, and abundant water resources. The expansive plains and watersheds to the north and the temperate slopes of the Finger Lakes provided agricultural and transportation opportunities to support westward expansion and would become the home of modest populations engaged in farming, service businesses, manufacturing, and tourism.

Rich, well-drained soils and a temperate climate made Seneca County ideal for growing crops. The Seneca River with its 45-foot drop, provided a site for powering mills to process lumber, produce flour, and manufacture textiles.

In 1818, New York State used the Seneca River to link the Finger Lakes to statewide development of the Erie Canal, making Seneca County an important part of the transportation corridor that would support America's expansion to the west. This early canal development also established Seneca Falls and Waterloo as the commercial and population centers of Seneca County, which was reinforced by the building of railroads in the 1840s (Seneca County 2018).

The flat terrain of northern Seneca County became host to the interstate highway system in the 1950s when the NYS Thruway was constructed through the towns of Tyre and Junius. In recent decades, this corridor has become a secondary center of commercial expansion and development.

Figure 3-1. Seneca County HMP Area

Wells for natural gas were first sunk in and around Seneca Falls in 1887 to a depth of 1,500 feet into the Medina Sandstone, a known gas reservoir rock. By 1895, 12 wells were drilled, and six of them were producers. Other well drillings elsewhere in the County—Junius, Waterloo, Seneca Falls, and Ovid—were unsuccessful, and the Geneva gas field and its step-off wells in Seneca County were abandoned as commercial producers. Drilling for natural gas in Central New York increased significantly in the 1980s and 1990s, and annual production in Seneca County has been more than 500,000 million cubic feet since the late 1980s. According to data provided by New York State, in 2004, more than 160 wells are producing at least some natural gas in the County (Seneca County 2019).

The natural resources of Seneca County and the Finger Lakes region have supported outdoor recreation, vacationing, and tourism. Traditional activities related to hunting, fishing, camping and a summer cottage industry have existed for generations. Today, the geography also supports wineries, conservation, charter fishing, boating services, public access to waterways and the development of high profile second homes.

3.3 JURISDICTIONS WITHIN THE COUNTY

Today, Seneca County comprises 14 municipalities—10 towns and 4 villages—as follows:

- Towns
  - Town of Covert
  - Town of Fayette
  - Town of Junius
  - Town of Lodi
  - Town of Ovid
  - Town of Romulus
  - Town of Seneca Falls
  - Town of Tyre
  - Town of Varick
  - Town of Waterloo
- Villages
  - Village of Interlaken
  - Village of Lodi
  - Village of Ovid
  - Village of Waterloo

3.4 MAJOR PAST HAZARD EVENTS

Federal disaster declarations are issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government. A federal 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 federal disaster declarations helps establish the probability of occurrence for each hazard, which helps to identify targets for risk reduction. Table 3-1 shows federal disaster declarations that included Seneca County through January 2025 (records date back to 1954). Federal disaster declaration numbers are designated with DR for major disasters and EM for emergency declarations.

Table 3-1. History of Federal Disaster Declarations in Seneca County

Declaration Number	Declaration Date	Incident Date	Incident Type	Declaration Title	Designated Area
DR-26	1954-10-07	1954-10-07	Hurricane	Hurricanes	Statewide
DR-45	1955-08-22	1955-08-22	Hurricane	Hurricane & floods	Statewide
DR-52	1956-03-29	1956-03-29	Flood	Flood	Statewide
DR-129	1962-03-16	1962-03-16	Flood	Severe storm, high tides & flooding	Statewide
DR-158	1963-08-23	1963-08-23	Flood	Heavy rains & flooding	Statewide
DR-338	1972-06-23	1972-06-23	Flood	Tropical Storm Agnes	Seneca County
EM-3107	1993-03-17	1993-03-13 – 1993-03-17	Snowstorm	Severe blizzard	Seneca County
FM-2115	1995-08-25	1995-08-21	Fire	Rocky Point/Cranberry Bog fire	Statewide
EM-3155	2000-10-11	2000-05-22 – 2000-11-01	Other	West Nile virus	Seneca County
DR-1391	2001-09-11	2001-09-11	Fire	Fires and explosions	Seneca County
DR-1467	2003-05-12	2003-04-03 – 2003-04-05	Severe Ice Storm	Ice storm	Seneca County
EM-3186	2003-08-23	2003-08-14 – 2003-08-16	Other	Power outage	Statewide
EM-3186	2003-08-23	2003-08-14 – 2003-08-16	Other	Power outage	Seneca County
DR-1534	2004-08-03	2004-05-13 – 2004-06-17	Severe Storm	Severe storms and flooding	Seneca County
EM-3262	2005-09-30	2005-08-29 – 2005-10-01	Hurricane	Hurricane Katrina evacuation	Seneca County
EM-3351	2012-10-28	2012-10-27 – 2012-11-08	Hurricane	Hurricane Sandy	Seneca County
DR-4397	2018-10-01	2018-08-13 – 2018-08-15	Flood	Severe storms and flooding	Seneca County
EM-3434	2020-03-13	2020-01-20 – 2023-05-11	Biological	COVID-19	Seneca County
DR-4480	2020-03-20	2020-01-20 – 2023-05-11	Biological	COVID-19 pandemic	Seneca County

Source: FEMA 2025

The Secretary of 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 contiguous counties. The process includes fast track disaster designations for severe drought when, during the growing season, any portion of a county meets the severe drought intensity value for eight consecutive weeks or a higher drought intensity value for any length of time as reported in the U.S. Drought Monitor. For all other natural disaster occurrences, the county must have a 30 percent production loss of at least one crop or a determination must be made by surveying producers that other lending institutions will not be able to provide emergency financing (USDA n.d.). USDA disaster declarations in Seneca County are described in each of the hazard profile chapters in this HMP.

3.5 ECONOMY

3.5.1 Primary Industries

Seneca County's leading business sectors are agriculture and food processing (agribusiness), advanced manufacturing and technology, higher education, and arts, culture, and tourism (Seneca County Chamber of Commerce 2023). The retail trade industry has the greatest number of establishments in the County, with 149. This is followed by the "other services (except public administration)" industry with 81 establishments, and construction with 74 establishments (2020 Census CBPS 2020).

Seneca County's 422 farms identified in the U.S. Department of Agriculture (USDA) 2022 Census of Agriculture generate $110.3 million per year in sales, an increase of 22 percent from 2017 and 2022. These revenues support an extensive array of local suppliers and service providers, including machinery dealers, crop and nutrient management specialists, meat processors, veterinarians, and animal feed distributors. About a third of the farms in Seneca County have on-farm hired workers, including paid family members, who contribute to farm operations (USDA 2024, USDA 2019).

Since 2002, Seneca County has experienced an increase in the number of farms raising beef cattle, growing fruit (primarily grapes), and cultivating vegetables. In addition, more farms are selling directly to consumers. The value of agricultural products sold at such venues as farm stands and farmers' markets increased from $1.2 million in 2012 to $14.2 million 5 years later. Overall, 8 percent of all farms in the County produce and sell value-added products, with average earnings well above statewide figures, while 5 percent earn income through agritourism (Seneca County 2022).

As of August 2021, there were 52 licensed wineries, breweries, cideries, and distilleries in Seneca County, 43 of them farm based. These businesses generate revenues through value-added production and tourism. A 2019 study conducted for the New York Wine and Grape Foundation estimated that the wine and grape industries in Seneca County (including wineries and vineyards, wholesalers, and retail stores that sell wine and grape juice to consumers) directly employ nearly 3,000 people and generate more than $271.4 million economic activity in Seneca County (Seneca County 2022).

3.5.2 Major Institutions

As a travel destination, Seneca County contains major resorts such as the del Lago Resort & Casino and Seneca Lake Resorts. Seneca County is also home to one higher education institution, the Northeast College of Health Sciences.

3.5.3 Employment

The U.S. Census 2020 County Business Patterns Survey data identified 697 business establishments in Seneca County employing 8,460 people (2020 Census CBPS 2020). The labor force participation rate in Seneca County is 57 percent. Top employers in the County are shown in Table 3-2.

Table 3-2. Seneca County Top Employers

Employer	Industry	Total Employees
Finger Lakes Health	Health Care	1,845
del Lago Resort & Casino	Entertainment	1,200
Wegmans Food Markets	Grocery	1,194
Waterloo Premium Outlets	Retail Shopping	1,100
ITT Gould Pumps	Manufacturing	1,000
Wadhams Enterprises	Transportation	700
Hobart and William Smith Colleges	Education	695
Mozaic	Service for Disabled	335
New York Chiropractic College	Education	275
New York State Electric and Gas	Utilities	175

Source: Seneca County Chamber of Commerce 2023

3.5.4 Income

Median household income in Seneca County, according to the U.S. Census Bureau's 2023 American Community Survey (ACS) 5-year estimates, was $65,354, which is below the state ($79,463) and national ($74,755) averages. Table 3-3 shows median household income in the County from 2018 to 2022.

Table 3-3. Seneca County Median Household Income, 2018–2022

Year	Seneca County Median Household Income	New York Median Household Income	National Median Household Income
2018	$54,184	$67,648	$61,937
2019	$51,064	$72,038	$65,712
2020	$56,929	$73,354	$67,340
2021	$60,985	$74,230	$69,717
2022	$65,354	$79,463	$74,755

Source: U.S. Census 2023

3.6 PHYSICAL SETTING

3.6.1 Water Resources

Surface Water Bodies

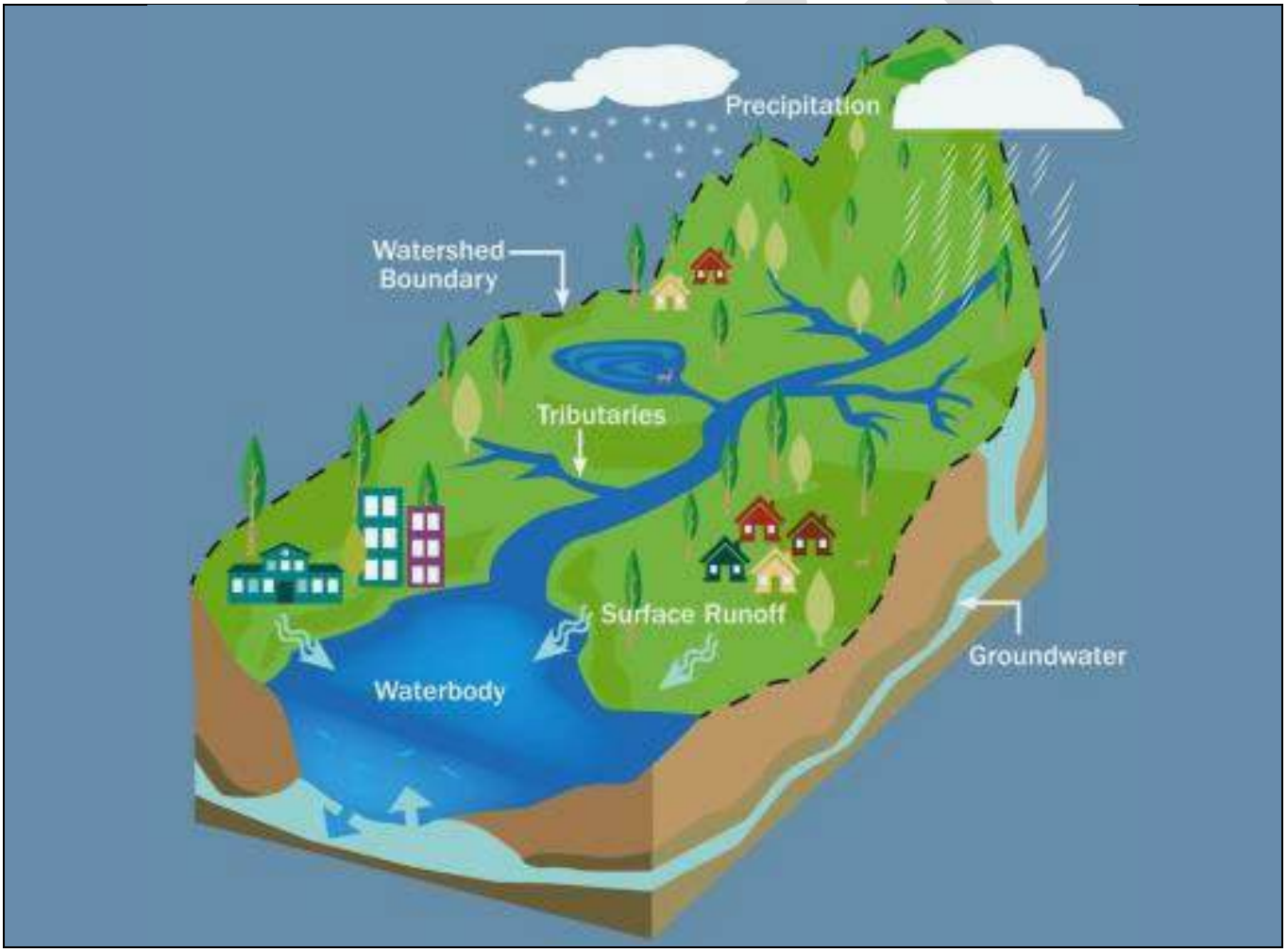
Major surface water bodies in Seneca County include 2 of the 11 Finger Lakes: Cayuga Lake to the east and Seneca Lake to the west. Both lakes have inlets on their south ends and outlets to the north. The Seneca River, the Clyde River, and several creeks and brooks flow through the County. The portion of the Seneca River within Seneca County extends 20 miles from Seneca Lake east through the Villages of Waterloo and Seneca Falls, then meets the outlet of Cayuga Lake and turns north to the Clyde River and

Erie Canal. Over its course in Seneca County, it also forms the Cayuga-Seneca Canal, which connects the Finger Lakes to the Erie Canal to the north. From its connection with the Erie Canal, the river continues outside Seneca County to where it joins the Oneida River to form the Oswego River, which flows to Lake Ontario.

Watersheds and Drainage Basins

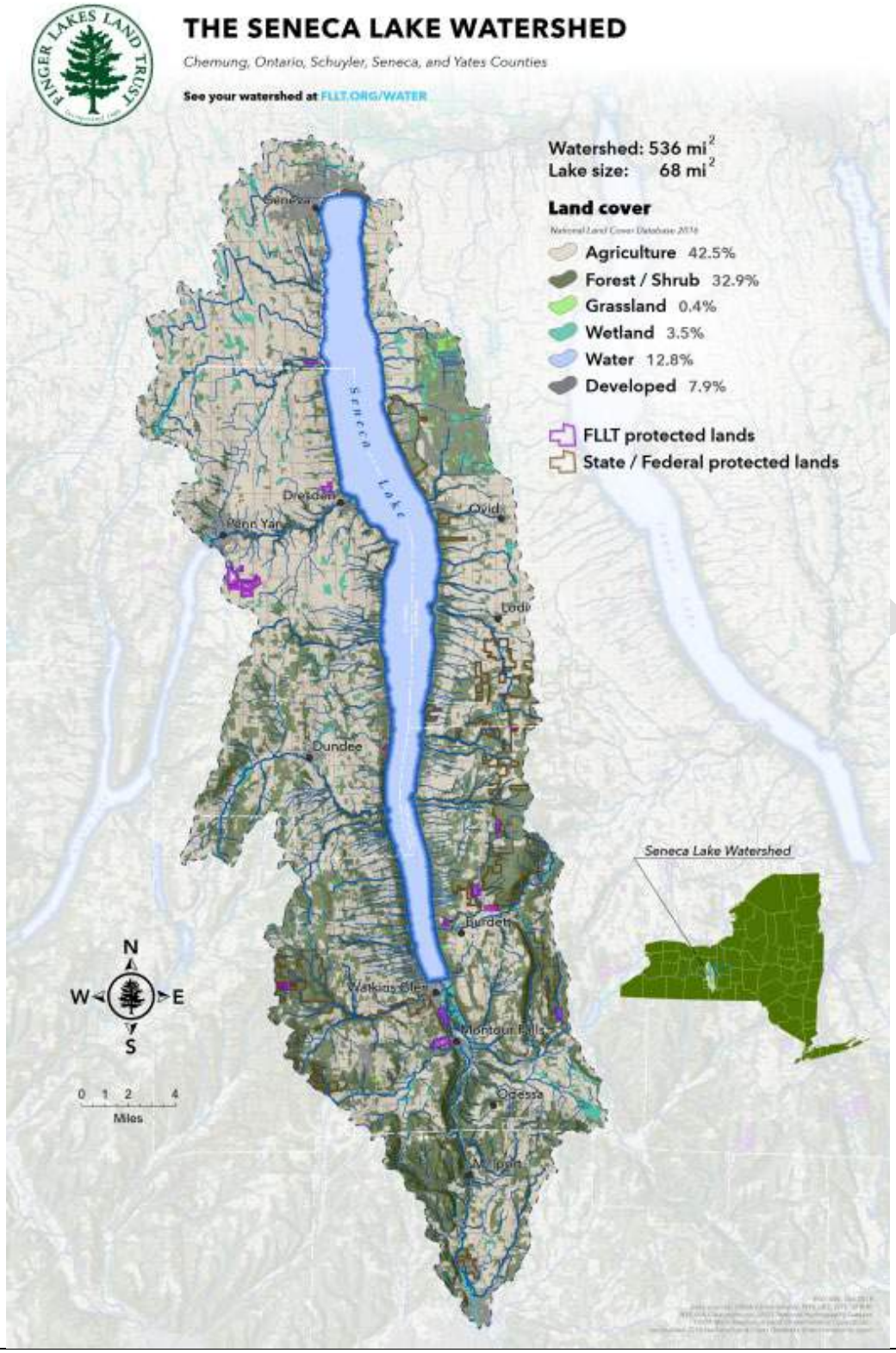
A watershed is the area of land that drains into a body of water such as a river, lake, stream, or bay. It is separated from other systems by high points in the area such as hills or slopes. It includes not only the waterway itself but also the entire land area that drains to it. For example, the watershed of a lake would include not only the streams entering the lake but also the land area that drains into those streams and eventually the lake. Drainage basins generally refer to large watersheds that encompass the watersheds of many smaller rivers and streams (USGS 2019). Figure 3-2 depicts the hydrologic system of a typical watershed. Figure 3-3 shows the Seneca Lake Watershed, and Figure 3-4 shows the Cayuga Lakes watershed.

Figure 3-2. Watershed



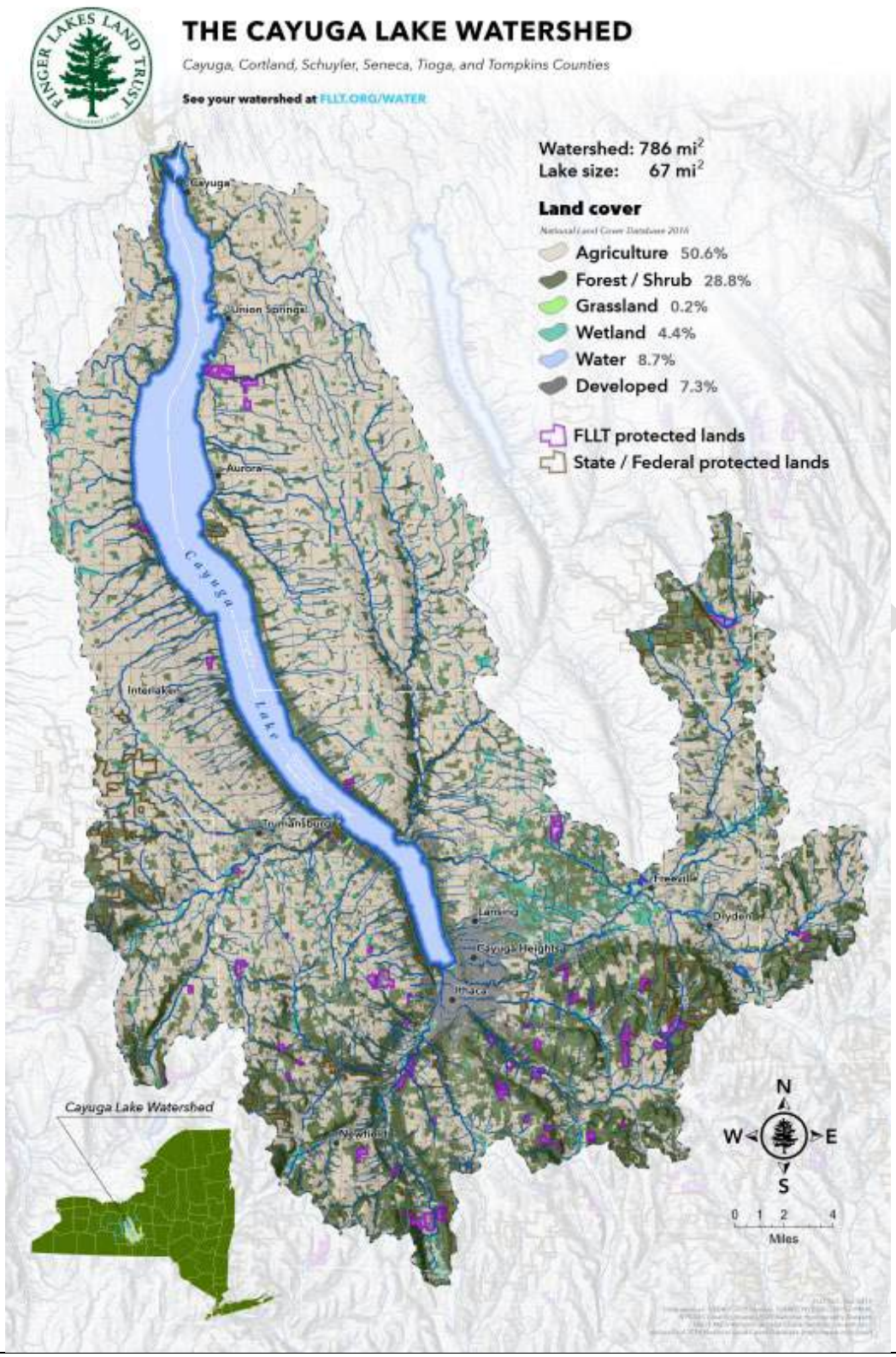
Source: (NOAA 2022)

Figure 3-3. Seneca Lake Watershed



Source: Finger Lakes Trust Fund 2019

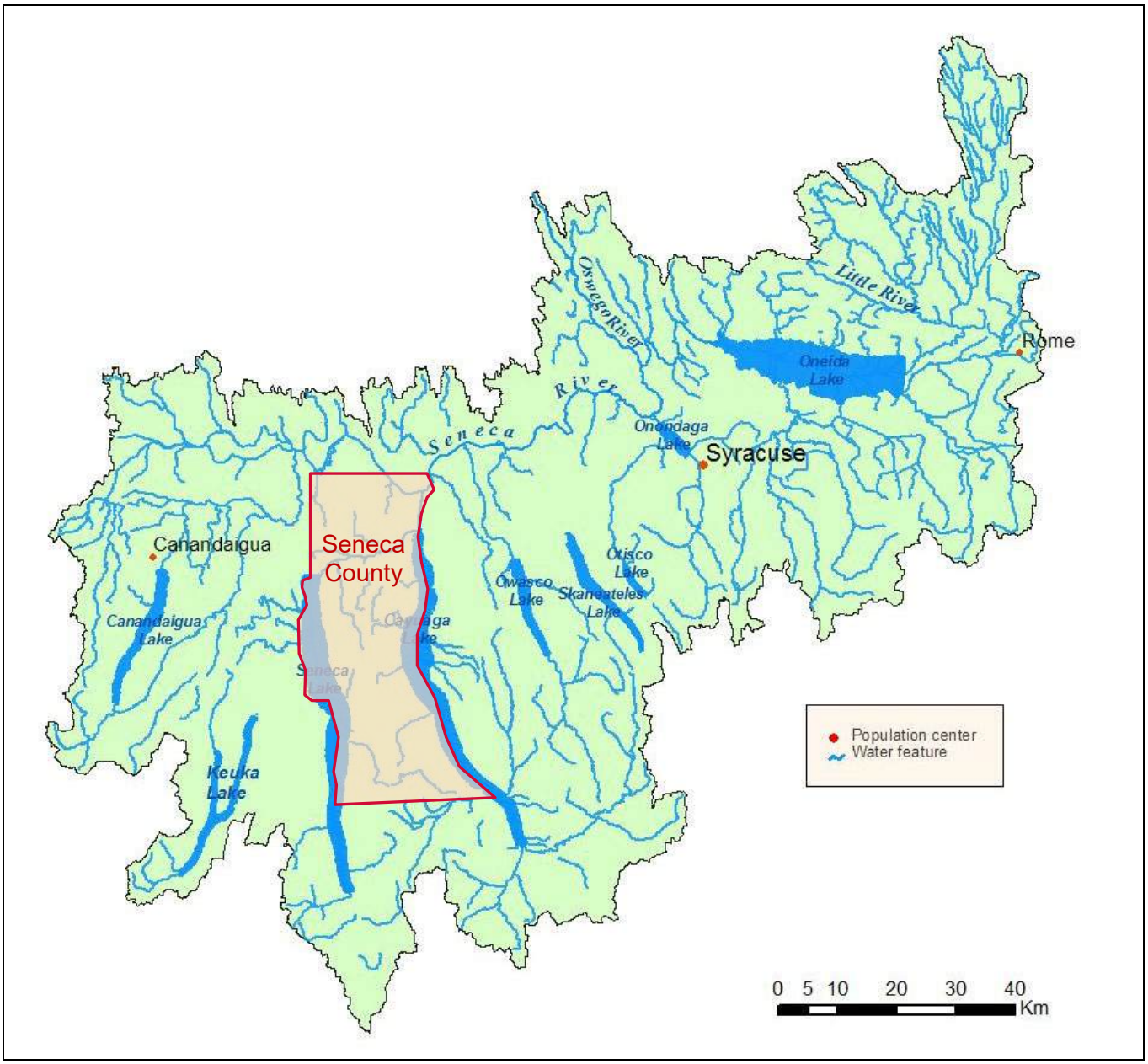
Figure 3-4. Cayuga Lake Watershed



Source: Finger Lakes Trust Fund 2019

New York State's lakes, rivers, and streams fall within one of 17 major drainage basins. All of Seneca County is within the Oswego River/Finger Lakes drainage basin, one of the largest in New York State (see Figure 3-5). This basin includes the drainages of the Oswego, Oneida, Seneca, and Clyde Rivers. Within this drainage basin, surface waters generally flow from headwaters in the southwestern Adirondack Mountains and the northern edge of the Appalachian Plateau across the central lowlands before emptying into Lake Ontario. Lakes make up about 6 percent of the total surface area of the drainage basin (NYSDEC n.d.).

Figure 3-5. Oswego River/Finger Lakes Drainage Basin



Source: NYSDEC n.d.

3.6.2 Topography

Seneca County straddles two major physiographic provinces: the Ontario Lowland in the north and the Allegheny Plateau in the south. The boundary between the two lies roughly along the line of the Seneca River (Seneca County 2018).

North of the Cayuga-Seneca Canal and State Routes 5 and 20, the geography of Seneca County is dominated by rolling hills and low-lying swamps. Land elevations are between 390 feet above sea level in the Montezuma marshlands to 560 feet among the hills in the Junius Ponds area.

The area south of the canal and Routes 5 and 20 is referred to as the Finger Lakes hills. Shoreline elevations along Cayuga and Seneca Lake range from 381 feet and slope upward to hilltops in the center of the County at 720 feet in the Town of Fayette, 940 feet in Romulus, 1,140 feet in Ovid, and 1,630 feet in Lodi.

3.6.3 Geology

The bedrocks of Seneca County, underlying glacial superficial deposits, are sedimentary rocks nearly 8,000 feet thick, resting on a basement of ancient igneous and metamorphic rocks. The younger strata, belonging to the Paleozoic Era of earth history, are inclined gently to the south at about 40 feet per mile so that the older sedimentary stones appear in the north of the County and successively younger formations appear to the south. This means that the limestone seen along the Seneca River at an elevation of about 450 feet would be found in a well drilled at Ovid at a depth of 150 feet below sea level (Seneca County 2018).

A wide variety of ancient igneous rocks—granite, syenite, gabbro, anorthosite, etc.—occur as erratic boulders and cobbles in the glacial deposits in Seneca County, far from their homes to the north in Ontario, Canada. There is evidence in the south wall of the Seneca Stone quarry west of Canoga of volcanic ash. Natural gas (methane) springs have been known in Seneca County for over 150 years. The gas is under pressure in the dark and black shales of the Hamilton and Genesee Groups and slowly issues from joints in the bedrock (Seneca County 2018).

3.6.4 Climate

Historical Conditions

The New York State Energy Research and Development Authority (NYSERDA) has established climate regions for New York State. Seneca County is part of Region 1. A baseline of 1971-2000 has been established for the region using weather stations at the Buffalo/Niagara International Airport, Rochester International Airport, Geneva Research Farm, and Fredonia. The average yearly temperature is 48 °F. The region has roughly 8 days a year with temperatures exceeding 90 °F and 133 days with temperatures below 32 °F. The region averages roughly 37 inches of precipitation per year, with 5 days per year with rainfall exceeding 1 inch (NYSERDA 2014).

Projections for Climate Change

According to the New York State Climate Impacts Assessment, annual average temperatures are projected to increase across New York State by 2.5 °F to 4.4 °F by the 2030s, 3.8 °F to 6.7 °F by the 2050s, 5.1 °F to 10.9°F by the 2080s, and 5.6 °F to 15.3°F by 2100, relative to the 1981–2010 base period. The ranges represent climate change for varying levels of potential future emissions of greenhouse gases (low through high). The warming is projected to be the greatest in the northern regions of the state and projections suggest that each season will experience a comparable amount of warming in the future relative to the baseline period (Stevens & Lamie 2024).

Annual average precipitation is projected to decrease in the low-emissions estimate but increase in the middle- and high-emissions estimates across all regions of New York. Precipitation is projected to decrease by 2 percent or increase by up to 11 percent by the 2030s, decrease by 2 percent or increase by up to 14 percent by the 2050s, increase by 1 to 22 percent by the 2080s, and decrease by 4 percent or increase by 30 percent by 2100 (Stevens & Lamie 2024).

In the Central/Finger Lakes region that includes Seneca County, temperatures are estimated to increase by 3.5 ºF to 7.4 ºF by the 2050s, 5 ºF to 12.3 ºF by the 2080s, and 5.6 ºF to 14.3 ºF by 2100, relative to the 1981-2010 base period. Precipitation totals are estimated to increase by 0 to 11 percent by the 2050s, increase by 2 to 17 percent by the 2080s, and decrease by 3 percent or increase by up to 22 percent by 2100, relative to the 1981-2010 base period (Stevens & Lamie 2024).

3.6.5 Land Cover

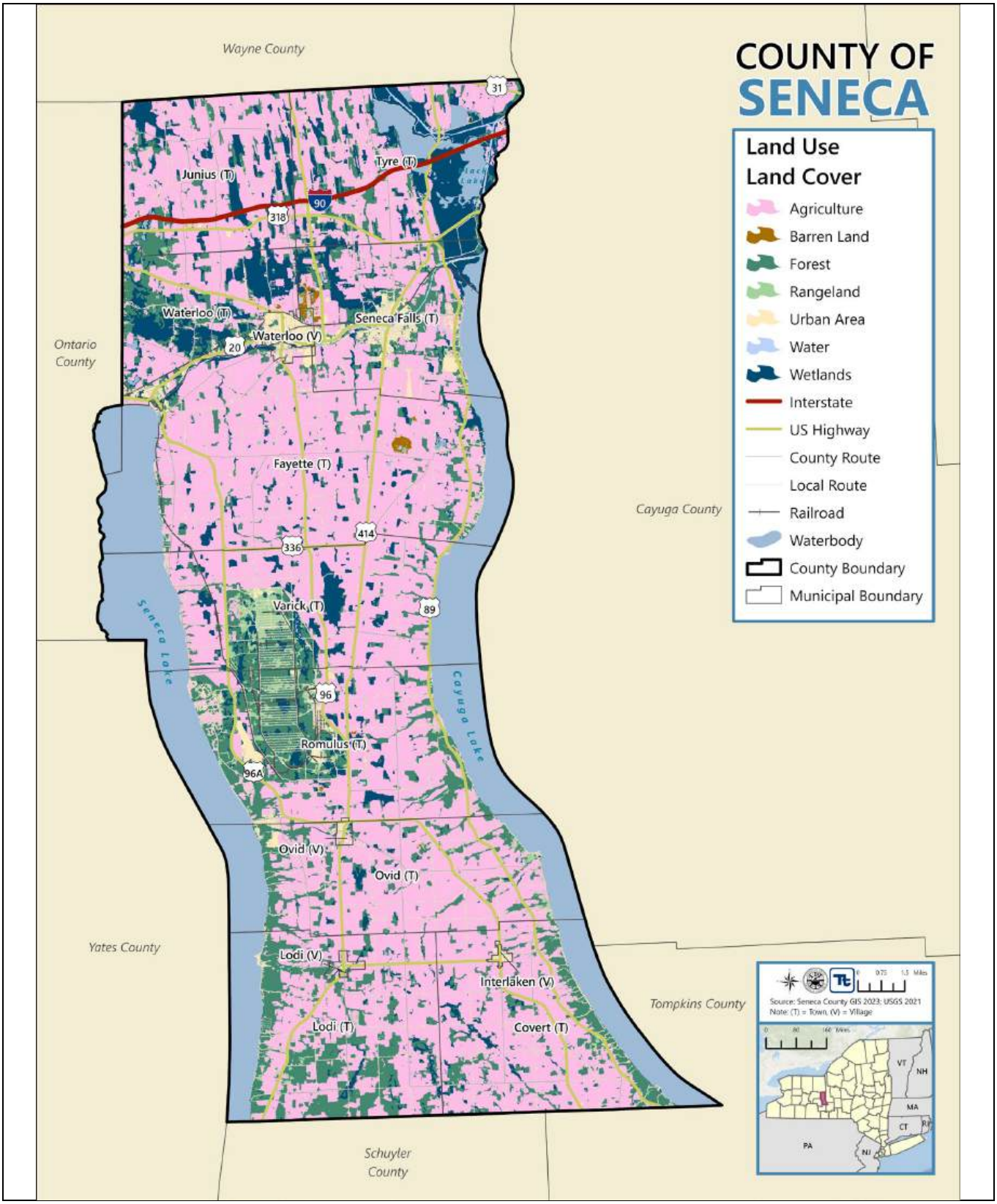
As shown in Table 3-4 and Figure 3-6, the most common land cover in Seneca County is agricultural, with 49.8 percent of all land cover (124,539 acres), followed by water (41,441 acres or 16.6 percent of all land cover) and forest (36,254 acres or 14.5 percent of all land cover).

Table 3-4. Seneca County Land Use

Land Use Category	Area in Category (as of 2021)	
	Acreage	% of County Total Area
Agriculture	124,539	49.8%
Barren Land	534	0.2%
Forest	36,254	14.5%
Rangeland	3,449	1.4%
Urban Area	21,169	8.5%
Water	41,441	16.6%
Wetland	22,476	9.0%
Seneca County Total	249,862	100.0%

Source: USGS 2021

Figure 3-6. Seneca County Land Cover



3.6.6 Land Uses

Federal regulations for hazard mitigation planning require communities to consider land use trends, which can impact the need for, and priority of, mitigation options over time. Land use trends can also significantly affect vulnerability to various hazards and the potential impacts from hazard events. In New York State, land use regulatory authority is vested in towns, villages, and cities, although many development issues transcend local political boundaries. The dominant land uses in Seneca County are rural and small-town settings, farmlands, and open space.

Residential and Commercial Uses

The population and commercial center of the County is the area around the Towns of Seneca Falls and Waterloo, an area that contains about two-thirds of Seneca County's population and provides over half the jobs within the County. To the north, the Towns of Junius and Tyre along Route 318/41, adjacent to the NYS Thruway, are experiencing emerging retail and casino development. The former Seneca Army Depot, which now belongs to Seneca County and covers 10,587 acres in the Towns of Romulus and Varick, has been targeted as a future business expansion and development area. The Seneca Meadows Landfill operates the 600-acre Seneca Meadows Landfill on Route 414 in Seneca Falls. (Seneca County 2018)

There are 72 miles of lakeshore in Seneca County on Cayuga and Seneca Lakes, predominantly occupied by permanent, single-family homes and seasonal cottages. The trend is to replace seasonal cottages with larger permanent residences.

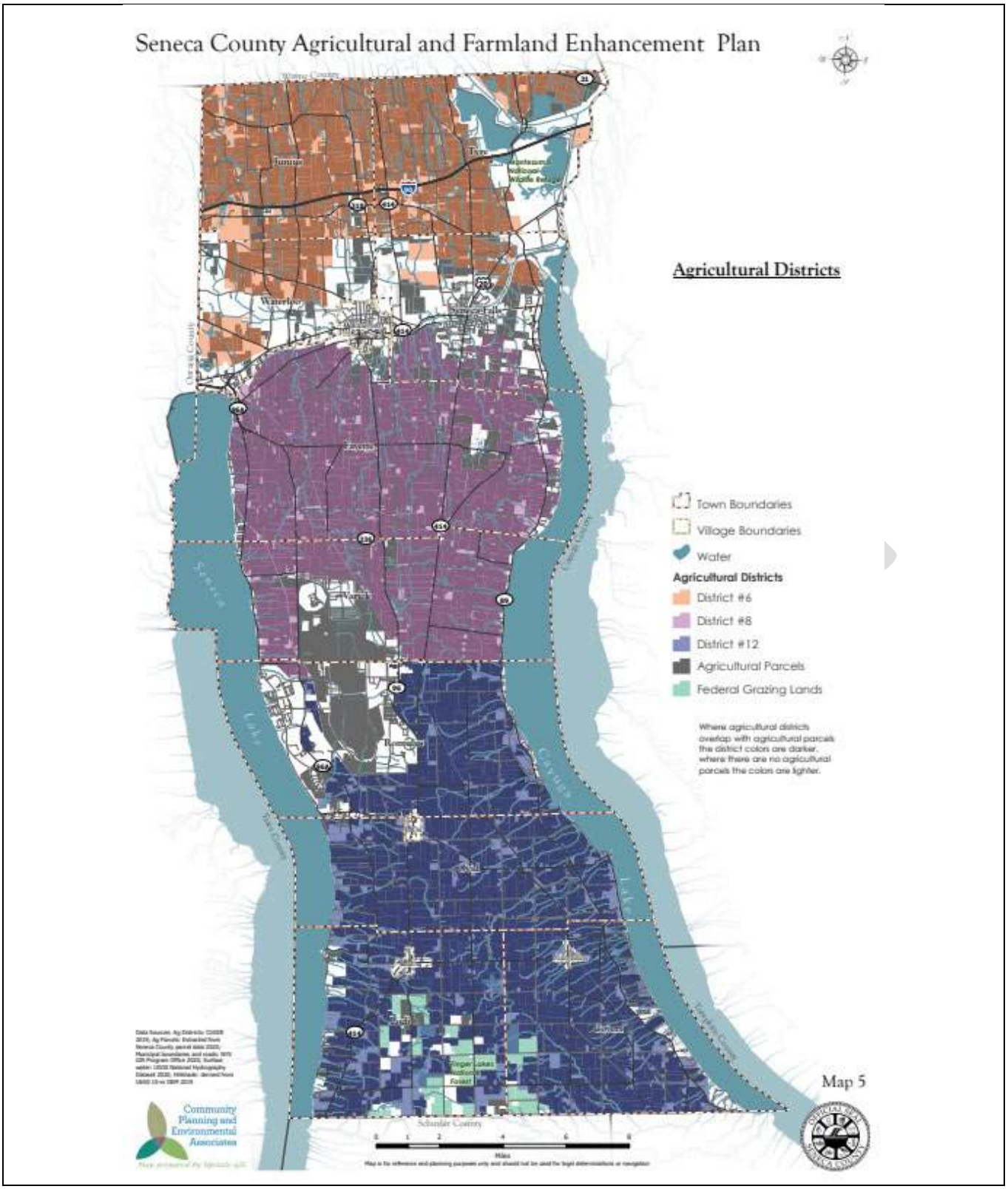
Agriculture

In the USDA 2022 Census of Agriculture, farmland and agriculture covered 103,156 acres in Seneca County, a 13 percent decrease from the 2017 USDA Census. Two-thirds of agricultural operations and activities in Seneca County are classified as grain and soybean producers, beef cattle farms, fruit (grapes) growers, and dairy operations. In 2022, Seneca County ranked first out of all counties in New York State in the value of hogs and pigs sold; sixth in the sales of grains, oilseeds, and dry beans; and tenth in the sales of poultry and eggs. It also ranked third in the state, after Chautauqua and Yates Counties, in grape production (USDA 2024).

The New York State Agriculture and Markets Law allows counties to create agricultural districts to protect and promote the agriculture industry (Article 25AA, Agricultural Districts). Each district must be reviewed on an 8-, 10-, or 12-year basis to see if it is still achieving its intended purpose (NYS Agriculture and Markets 2020). Seneca County has three agricultural districts, as shown in Figure 3-7 (NYS Data 2024):

- District #6 consists of Junius, Seneca Falls, Tyre, and Waterloo and has a total acreage of 36,722 acres.
- District #8 consists of Fayette, Romulus, Seneca Falls, and Varick and has a total acreage of 48,579 acres.
- District #12 consists of Covert, Lodi, Ovid, and Romulus and has a total acreage of 66,532 acres.

Figure 3-7. Seneca County Agricultural Districts



Source: Seneca County 2022

Parks and Open Space

Other than residences, the dominant lakeshore uses are state parks and waterfront recreation. New York State operates six parks in Seneca County, covering more than 2,000 acres (NYS Parks, Recreation, and Historic Preservation 2024).

- Bonavista State Park Golf Course
- Cayuga Lake State Park
- Dean's Cove State Boat Launch
- Lodi Point State Park
- Sampson State Park
- Seneca Lake State Park

New York State operates seven parks and recreational facilities in Seneca County covering more than 2,000 acres.

The Montezuma National Wildlife Refuge is managed by the federal government, and New York State owns and operates several wildlife management areas in Seneca County at Cayuga Lake/Canoga Marsh, Willard, and Montezuma.

3.7 POPULATION AND DEMOGRAPHICS

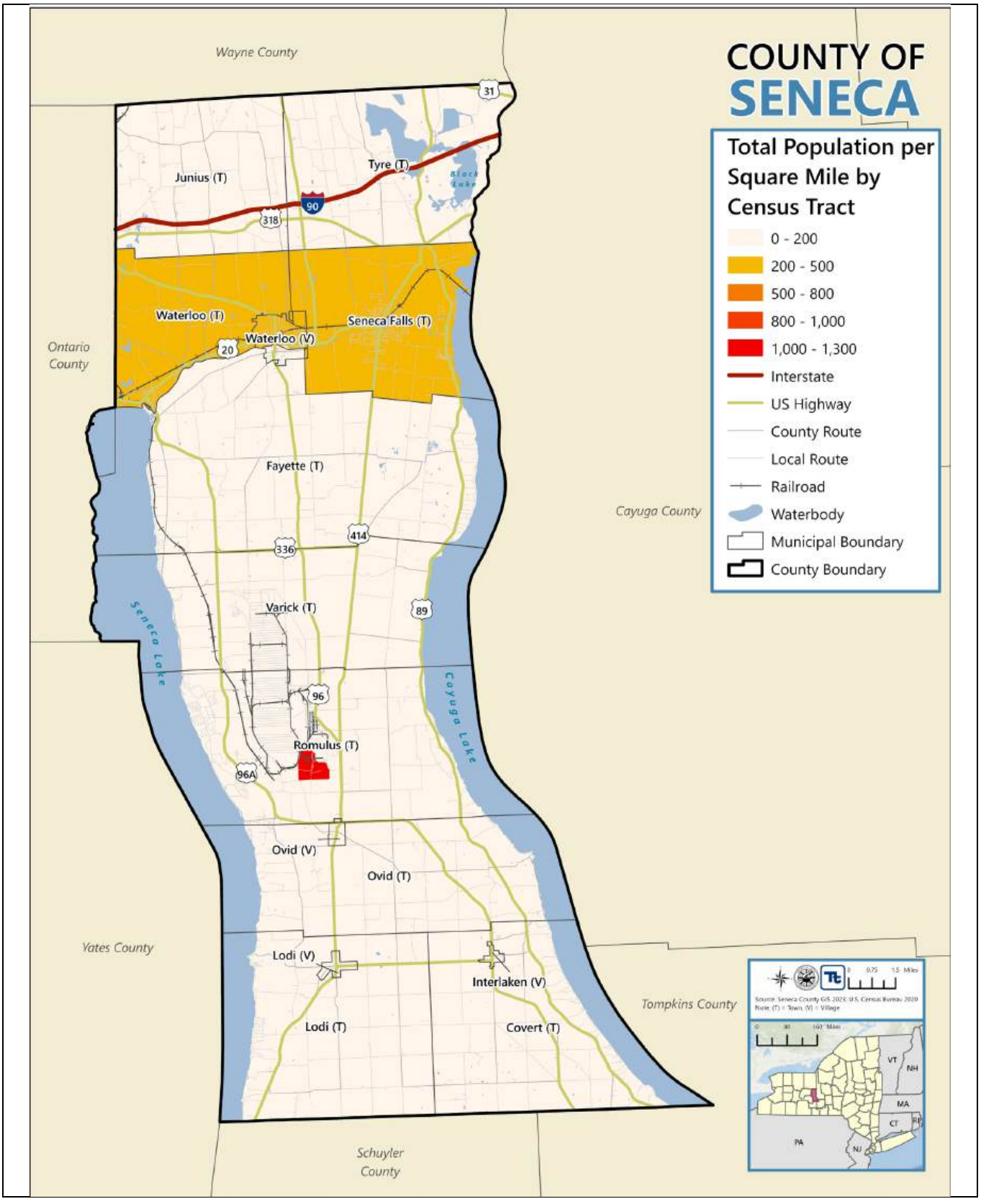
3.7.1 Population

According to the 2020 U.S. Census, Seneca County has a population of 33,814, with a distribution among municipalities as shown in Table 3-5. Figure 3-8 shows the total population of Seneca County per square mile by census tract.

Table 3-5. 2020 Population for Seneca County and Municipalities

Jurisdiction	Total Population (2020 Decennial Census)
Covert (T)	1,568
Fayette (T)	2,659
Interlaken (V)	595
Junius (T)	1,388
Lodi (T)	1,228
Lodi (V)	254
Ovid (T)	2,342
Ovid (V)	534
Romulus (T)	3,174
Seneca Falls (T)	9,027
Tyre (T)	1,013
Varick (T)	1,656
Waterloo (T)	3,566
Waterloo (V)	4,810
Seneca County	**33,814**

Figure 3-8. Seneca County Total Population per Square Mile by Census Tract



3.7.2 Population Trends

Population trend information was evaluated 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 consider 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.

As seen in Table 3-6, Seneca County's population has fluctuated since 2000. While the overall population of Seneca County has decreased by approximately 3 percent since 2010, this decline is not geographically uniform throughout the County, with some areas having experienced an increase in population. Population projections for Seneca County from Cornell University for the next two decades anticipate a continuing decrease in population (Cornell University 2018).

Table 3-6. Historical and Projected Population Change in Seneca County

Historical Seneca County Population			Projected Seneca County Population Change	
2000	2010	2020	2020 – 2030	2020 – 2040
33,342	35,251	33,814	-237 (-0.7%)	-874 (-2.5%)

Source: Cornell University 2018; Seneca County 2018; U.S. Census n.d.; NYS Office of the State Comptroller 2021
Note: Projected future changes are the difference between the 2020 and future populations as projected in Cornell's 2018 estimates. The 2020 population estimated in that study was 34,724, which is 910 more than the population determined in the 2020 Census.

3.7.3 Socially Vulnerable Populations

Federal guidance 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 during a hazard and the location and construction quality of their housing. Populations with a higher level of vulnerability can be more seriously affected during an emergency or disaster. They have unique needs that need to be considered by public officials to help ensure the safety of demographics with a higher level of risk. Identifying concentrations of vulnerable populations can assist communities in targeting preparedness, response, and mitigation actions. The vulnerable populations for this HMP include the following:

- Persons 65 years of age or older
- Persons 5 years of age or younger
- Non-English speakers.
- Persons with physical or mental disability
- Persons living below the poverty threshold (as defined by the U.S. Census Bureau)

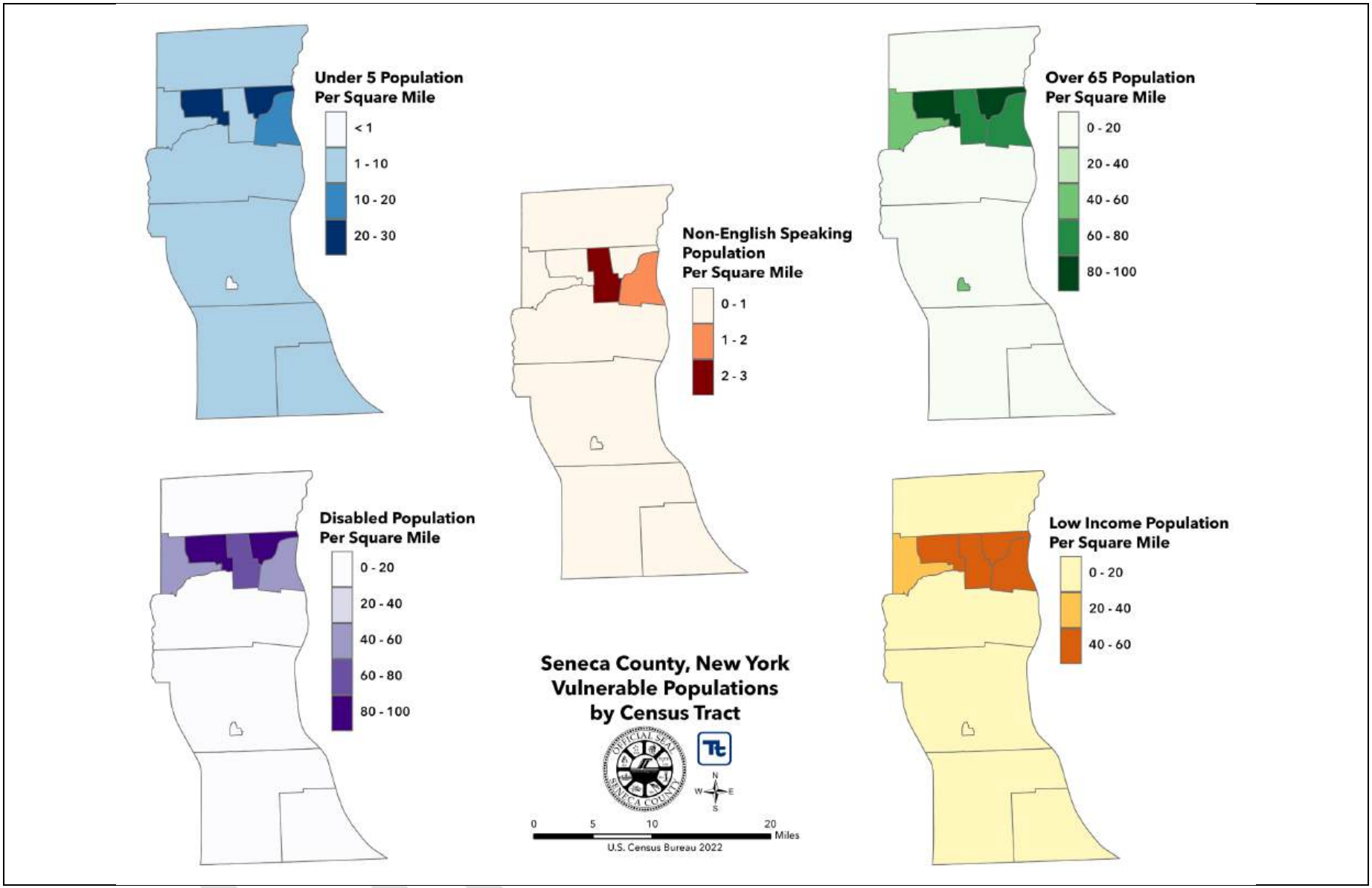
Table 3-7 presents the population statistics for each municipality in the County based on the 2020 Census data; vulnerable population data is based off the 2022 ACS. Figure 3-9 shows the distribution of socially vulnerable populations in Seneca County.

Table 3-7. Seneca County Population and Demographic Statistics 2020 Census, 2022 ACS Estimates

Jurisdiction	Total Population	65 and Older		5 and Younger		Non-English-Speaking		Disability		Below Poverty Level	
		Population	% of Total	Population	% of Total	Households	% of Total	Population	% of Total	Population	% of Total
Covert (T)	1,568	378	24.1%	117	7.5%	0	0.0%	218	13.9%	108	6.9%
Fayette (T)	2,659	530	19.9%	220	8.3%	15	0.6%	244	9.2%	262	9.9%
Interlaken (V)	595	148	24.9%	26	4.4%	0	0.0%	108	18.2%	50	8.4%
Junius (T)	1,388	158	11.4%	68	4.9%	2	0.1%	161	11.6%	154	11.1%
Lodi (T)	1,228	257	20.9%	82	6.7%	0	0.0%	128	10.4%	137	11.2%
Lodi (V)	254	56	22.0%	27	10.6%	0	0.0%	49	19.3%	28	11.0%
Ovid (T)	2,342	459	19.6%	148	6.3%	26	1.1%	339	14.5%	407	17.4%
Ovid (V)	534	112	21.0%	11	2.1%	18	3.4%	74	13.9%	75	14.0%
Romulus (T)	3,174	410	12.9%	134	4.2%	8	0.3%	292	9.2%	217	6.8%
Seneca Falls (T)	9,027	1,873	20.7%	435	4.8%	115	1.3%	1,792	19.9%	1,399	15.5%
Tyre (T)	1,013	240	23.7%	39	3.8%	0	0.0%	175	17.3%	104	10.3%
Varick (T)	1,656	342	20.7%	147	8.9%	7	0.4%	182	11.0%	305	18.4%
Waterloo (T)	3,566	738	20.7%	129	3.6%	4	0.1%	688	19.3%	400	11.2%
Waterloo (V)	4,810	1,087	22.6%	236	4.9%	18	0.4%	975	20.3%	498	10.4%
Seneca County	33,814	6,788	20.1%	1,819	5.4%	213	0.6%	5,425	16.0%	4,144	12.3%

Source: U.S. Census Bureau 2020; U.S. Census Bureau ACS 2022

Figure 3-9. Distribution of Socially Vulnerable Population by Census Block for Seneca County



Age

Older adults are more vulnerable than other age groups before and after disasters. Factors include a greater prevalence of chronic conditions, multi-morbidity, cognitive impairment, medication concerns, greater dependence on assistive devices (i.e., walkers, glasses), support requirements from caregivers and others, and likelihood of social isolation. Children are vulnerable to hazard events because they are dependent on others to access resources during emergencies and may experience increased health risks (American Red Cross 2020). The 2022 ACS reports 5.4 percent of the population of Seneca County is under the age 5, and 20.1 percent of the population is age 65 and older.

Language

Individuals who are not fluent or do not have a working proficiency in English are vulnerable because they can have difficulty 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 2022 ACS Estimates, less than 1 percent of Seneca County's population speaks a language other than English.

Physical or Mental Disability

A disability is a condition of the body or mind that makes it more difficult to do certain activities and interact with the world (CDC 2020). Cognitive impairments can increase the level of difficulty that individuals 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 2022 ACS, 16 percent of Seneca County's population lives with a disability.

Income

Of the total population, economically disadvantaged populations are more 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 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 (Census 2021). The 2022 ACS indicates that 12.3 percent of persons in Seneca County live below the poverty level (compared to the state average of 14 percent).

While the poverty threshold is typically used as a standard for identifying low-income populations, the Steering Committee noted that households may be above the poverty threshold but still struggle financially, making them socially vulnerable to hazard events. The County also used data available from United for ALICE. ALICE stands for Asset Limited, Income Constrained, Employed. This dataset is meant to identify households with income above the federal poverty threshold but below the basic cost of living. This represents the growing number of families who are unable to afford the basics of housing, childcare, food, transportation, health care, and technology (United For ALICE 2024). Costs associated with hazard events could exceed the financial capacity of these households, making them highly vulnerable to hazard events. In 2022 42 percent of the 13,622 households in Seneca County had incomes below the ALICE thresholds (less than the statewide average of 46 percent). See Table 3-8 for ALICE data by jurisdiction.

Table 3-8. Seneca County ALICE Data for 2022

Jurisdiction	Total Households	Households Below FPL[a]		ALICE Households[b]		Households Below Alice Threshold[c]	
		Number	% of Jurisdiction Total	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total
Covert (T)	849	70	8.2%	272	32.0%	342	40.3%
Fayette (T)	1,458	176	12.1%	320	21.9%	496	34.0%
Junius (T)	417	80	19.2%	64	15.3%	144	34.5%
Lodi (T)	708	51	7.2%	197	27.8%	248	35.0%
Ovid (T)	1,029	136	13.2%	363	35.3%	499	48.5%
Romulus (T)	710	58	8.2%	181	25.5%	239	33.7%
Seneca Falls (T)	4,211	670	15.9%	1,421	33.7%	2,091	49.7%
Tyre (T)	439	39	8.9%	132	30.1%	171	39.0%
Varick (T)	598	80	13.4%	122	20.4%	202	33.8%
Waterloo (T)	3,203	400	12.5%	902	28.2%	1,302	40.6%
Interlaken (V)	256	23	9.0%	95	37.1%	118	46.1%
Lodi (V)	131	7	5.3%	78	59.5%	85	64.9%
Ovid (V)	216	38	17.6%	49	22.7%	87	40.3%
Waterloo (V)	1,943	179	9.2%	651	33.5%	830	42.7%
Seneca County	13,622	1,760	12.9%	3,969	29.1%	5,729	42.1%

Source: United For ALICE 2024

Note: Village household statistics are included in those for associated towns. Therefore, County totals are the sum of town values only.

a. FPL = federal poverty level. Values taken from 5-year ACS data for 2022. These values for 2022 households below FPL differ from the 2023 population below FPL shown in Table 3-7.

b. ALICE households are those above the FPL but below the 2022 ALICE threshold ($54,113 for households under age 65; $49,524 for households 65 and over)

c. Households below ALICE threshold calculated as the sum of ALICE households and households below the FPL.

Low Internet Access

Throughout the State of New York, in particular the more rural counties, including portions of Seneca County, there is low access to internet. This lack of access can cause detriment to informing the public about hazard risks and ways to mitigate the identified risks. According to the 2023 ACS 5-Year estimates, the Town of Seneca Falls has the greatest number of households that lack internet access, as displayed in Table 3-9.

Table 3-9. Seneca County Internet Access by Jurisdiction

Jurisdiction	Total Households	Households with an Internet Subscription	Households without an Internet Subscription
Covert (T)	874	741	133
Fayette (T)	1468	1243	225
Junius (T)	439	373	66
Lodi (T)	668	562	106
Ovid (T)	1044	805	239

Jurisdiction	Total Households	Households with an Internet Subscription	Households without an Internet Subscription
Romulus (T)	641	581	60
Seneca Falls (T)	4276	3683	593
Tyre (T)	417	321	96
Varick (T)	588	509	79
Waterloo (T)	3264	2786	478
Interlaken (V)	271	218	53
Lodi (V)	124	99	25
Ovid (V)	217	154	63
Waterloo (V)	2,012	1,792	220
Seneca County	**13,679**	**11,604**	**2,075**

Source: American Community Survey 2023

3.8 GENERAL BUILDING STOCK

For this HMP update, a customized general building stock inventory was created using building footprint and parcel data from tax records and spatial data. Contents are valued at 50 percent of the structure value for residential structures and 100 percent of the structure value for non-residential facilities. Table 3-10 presents building stock statistics by occupancy class. Replacement cost value density for residential, commercial, and industrial properties are shown in Figure 3-10 through Figure 3-12. Key numbers from the inventory include the following:

- The inventory contains 23,460 structures with a replacement cost value of $14.8 billion.
- The value of contents in the inventoried structures is $6.5 billion.
- Residential housing accounts for 75.5 percent of the total number of buildings in the County and 44.2 percent of the total building stock value.

The ACS data identified 16,240 housing units in the County. A housing unit is a house, apartment, mobile home or trailer, a group of rooms, or a single room intended for occupancy as separate living quarters.

Table 3-10. Building Stock Count and Replacement Cost Value (RCV) by Occupancy Class

	Residential		Commercial		Industrial		Other	
	Count	Total RCV (Structure + Contents)	Count	Total RCV (Structure + Contents)	Count	Total RCV (Structure + Contents)	Count	Total RCV (Structure + Contents)
Covert (T)	1,325	$397,411,948	64	$67,115,966	3	$5,908,775	244	$308,787,987
Fayette (T)	1,996	$734,081,372	143	$170,075,307	24	$49,492,843	575	$770,743,329
Interlaken (V)	298	$92,352,427	31	$33,312,286	8	$27,989,896	6	$12,322,979
Junius (T)	974	$272,801,574	65	$231,914,745	9	$9,402,826	232	$245,261,391
Lodi (T)	1,190	$313,801,293	30	$19,925,241	0	$0	252	$225,324,577
Lodi (V)	189	$50,681,249	15	$10,227,169	0	$0	10	$21,710,520

	Residential		Commercial		Industrial		Other	
	Count	Total RCV (Structure + Contents)	Count	Total RCV (Structure + Contents)	Count	Total RCV (Structure + Contents)	Count	Total RCV (Structure + Contents)
Ovid (T)	1,330	$460,955,506	43	$48,086,845	0	$0	409	$475,099,643
Ovid (V)	257	$83,189,645	49	$59,580,075	0	$0	19	$93,426,074
Romulus (T)	1,360	$477,384,574	190	$967,371,452	15	$15,711,157	369	$738,663,984
Seneca Falls (T)	3,837	$1,339,101,312	463	$789,625,664	70	$728,539,610	142	$428,279,492
Tyre (T)	597	$182,569,297	73	$254,319,318	2	$754,884	250	$236,073,829
Varick (T)	1,243	$401,417,130	20	$28,193,099	1	$560,353	364	$478,566,623
Waterloo (T)	2,035	$581,135,369	210	$324,973,201	21	$76,425,010	119	$122,229,281
Waterloo (V)	2,087	$644,562,201	150	$349,374,357	18	$80,074,025	34	$249,964,124
Seneca County (Total)	18,718	$6,031,444,898	1,546	$3,354,094,726	171	$994,859,380	3,025	$4,406,453,834

Source: Seneca County GIS 2023; USACE, NSI 2022; RS Means 2022
Note: T = Town; V = Village; RCV = replacement cost value; Other = government, religion, agricultural, and education

Figure 3-10. Residential Building Value Density in Seneca County

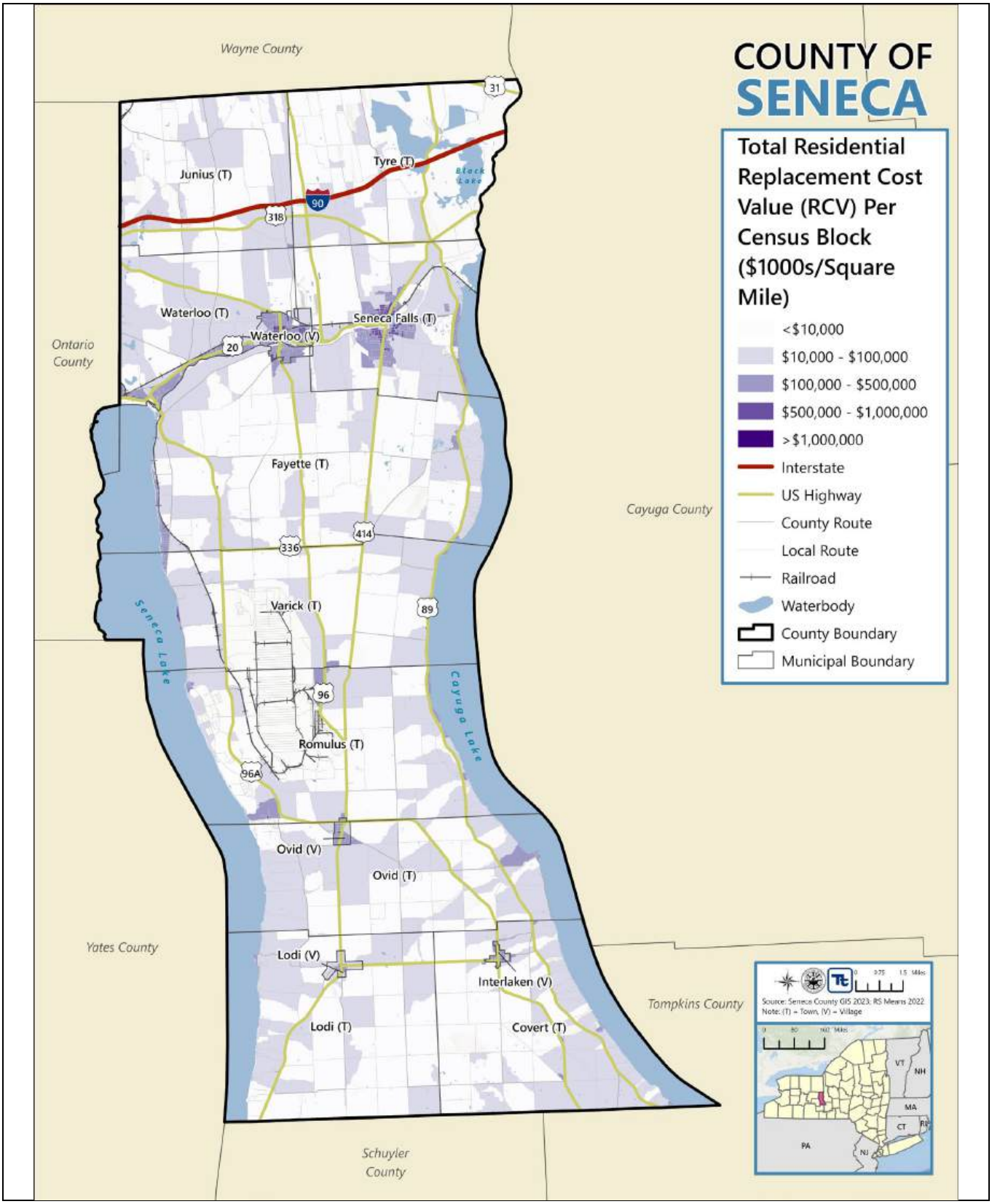


Figure 3-11. Commercial Building Value Density in Seneca County

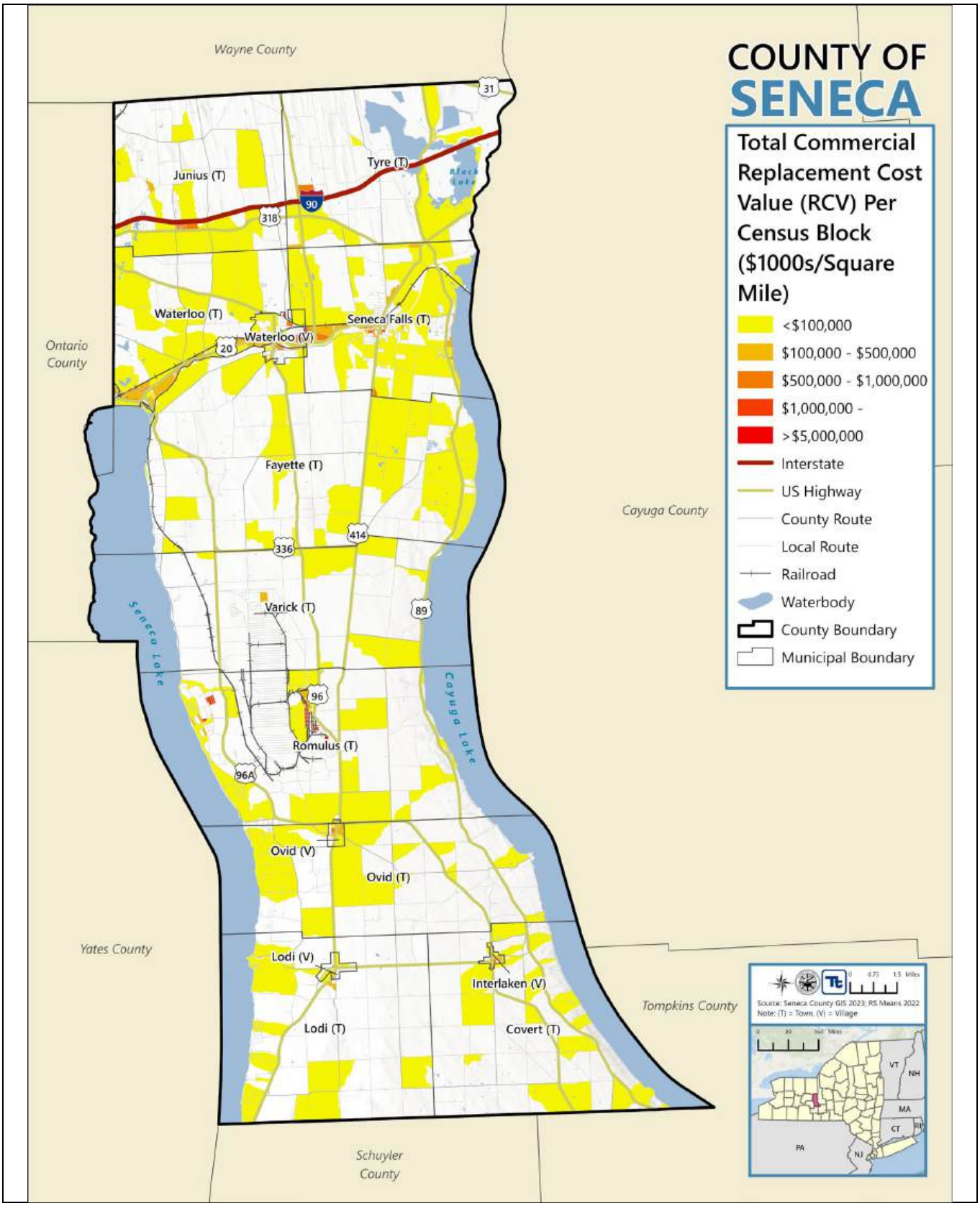
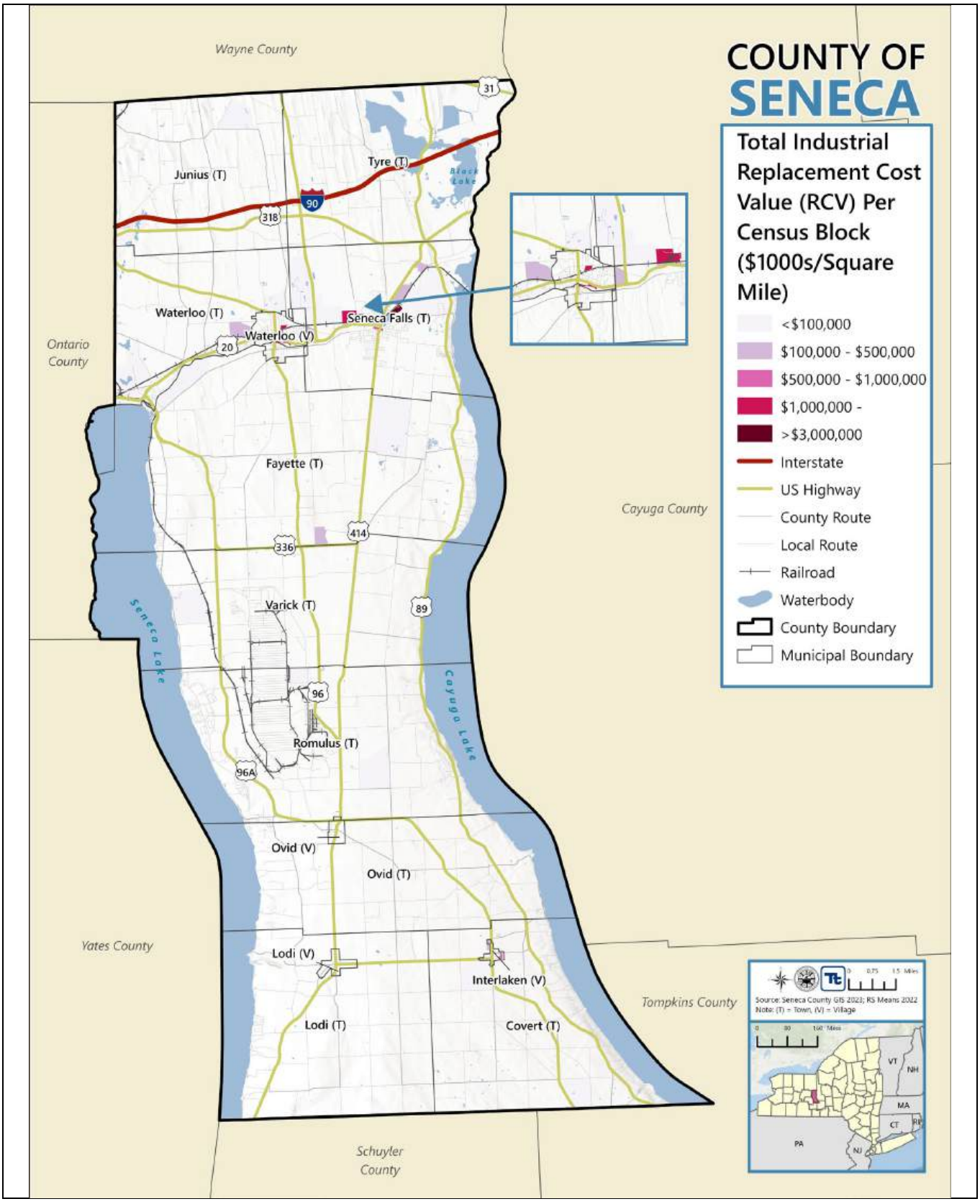


Figure 3-12. Industrial Building Value Density in Seneca County



3.9 CRITICAL FACILITIES AND COMMUNITY LIFELINES

Critical facilities are those that are essential to the health and welfare of the population. These facilities are especially important after any hazard event. Critical facilities are those that maintain essential and emergency functions and are typically defined to include police and fire stations, schools, and emergency operations centers.

Critical facilities include infrastructure such as roads and bridges that provide access to those in need and utilities that provide water, electricity, and communication services. Also included are facilities that use or store hazardous materials (FEMA 1997).

FEMA defines some types of critical facilities, as well as public services or activities, as "community lifelines." Community lifelines provide the fundamental services in a community that, when stabilized, enable all other aspects of society. Following a disaster event, intervention is required to stabilize lifelines. FEMA defines eight categories of community lifelines as summarized in Table 3-11.

Table 3-11. FEMA-Defined Categories of Community Lifelines

Community Lifeline Category	Types of Facilities and Services Included
Safety and security	Law enforcement/security, fire service, search and rescue, government service, community safety
Food, hydration, shelter	Food, hydration, shelter, agriculture
Health and medical	Medical care, public health, patient movement, medical supply chain, fatality management
Energy	Power grid, fuel
Communications	Infrastructure, responder communications, alerts warnings and messages, finance, 911 and dispatch
Transportation	Highway/roadway/motor vehicle, mass transit, railway, aviation, maritime
Hazardous materials	Facilities, hazmat, pollutants, contaminants
Water systems	Potable water infrastructure, wastewater management

Source: (FEMA 2024b)

A comprehensive inventory of community lifelines in Seneca County was developed from various sources, including input from the Steering Committee and Planning Partnership. The following sections describe the inventory of community lifelines that was used for the risk assessment in this HMP. Although many lifeline facilities could fall within numerous categories, the lifeline facilities identified for this planning effort have been categorized according to their primary function.

3.9.1 Safety and Security

The safety and security community lifeline category includes law enforcement, security, fire services, search and rescue services, government services, and community safety (e.g., dams). Figure 3-13 shows the location of safety and security facilities and Table 3-12 lists the number of each facility type.

Table 3-12. Seneca County Safety and Security Lifeline Facilities

Facility Type	Number of Facilities
Correctional Institution	2
County Building	24
County Health Department	1
Dam	11
Emergency Operations Center	1
Fire Station	17
Police Station	6
Post-Secondary Education Facility	1
Primary Education Facility	5
Private Education Facility	1
Secondary Education Facility	3
Total	71

Note: The identified lifeline facilities may not include all facilities within the County. It is recognized that facilities may have been missed in the information-gathering process.

Emergency Facilities

The Seneca County Emergency Management Office (EMO) operates an emergency operations center in the City of Waterloo where public organizations and private-sector agencies meet to decide and coordinate emergency response to community-wide disasters.

There are 12 fire department facilities and two emergency medical services providers in Seneca County serving the municipalities. Police enforcement and public safety are maintained by the New York State Police Department, Seneca County Police, and local departments. The Seneca County Sheriff's Office operates one jail and one station. The Sheriff's Office patrols towns in Seneca County that do not have their own police patrols.

Figure 3-13. Safety and Security Facilities in Seneca County

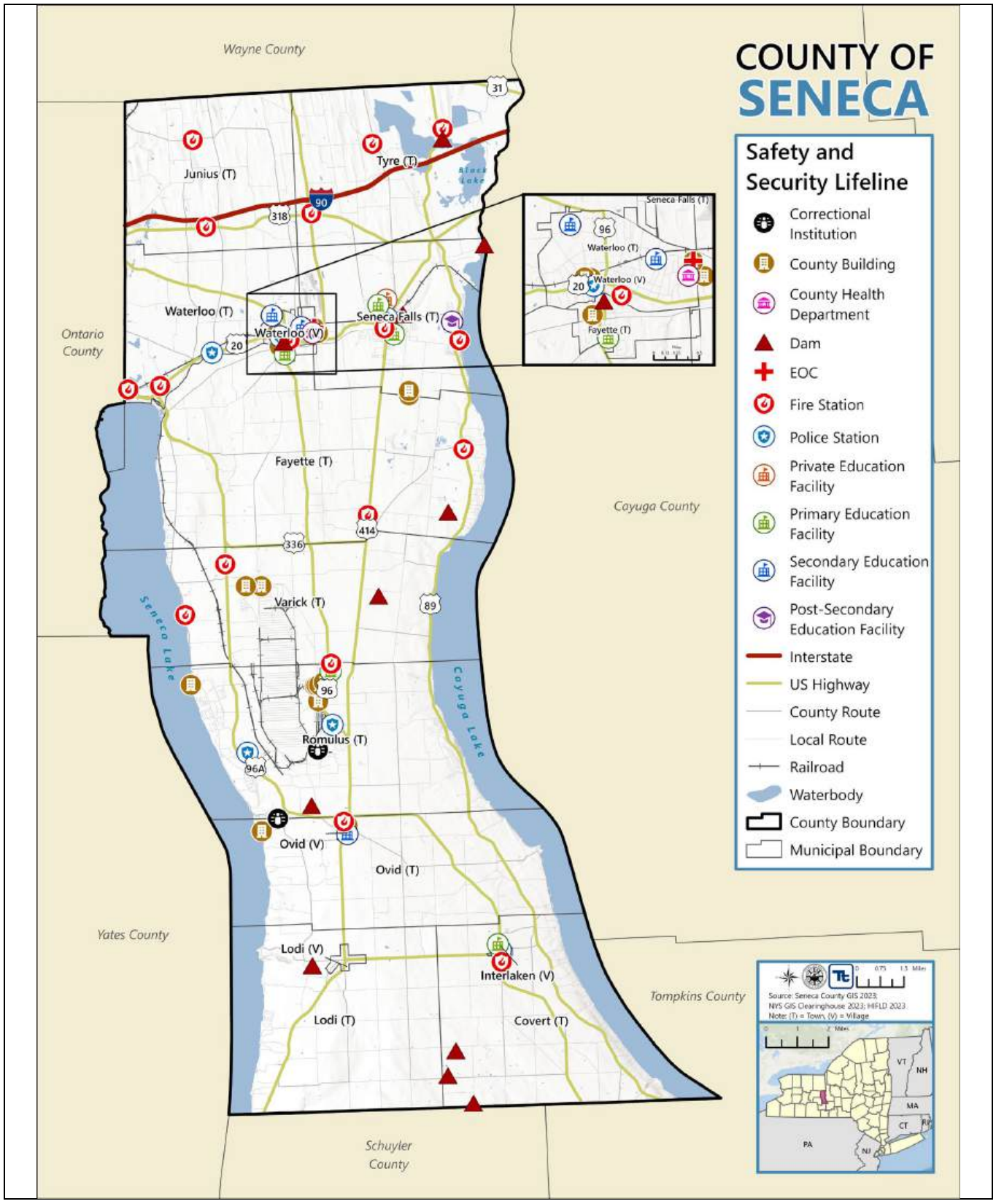
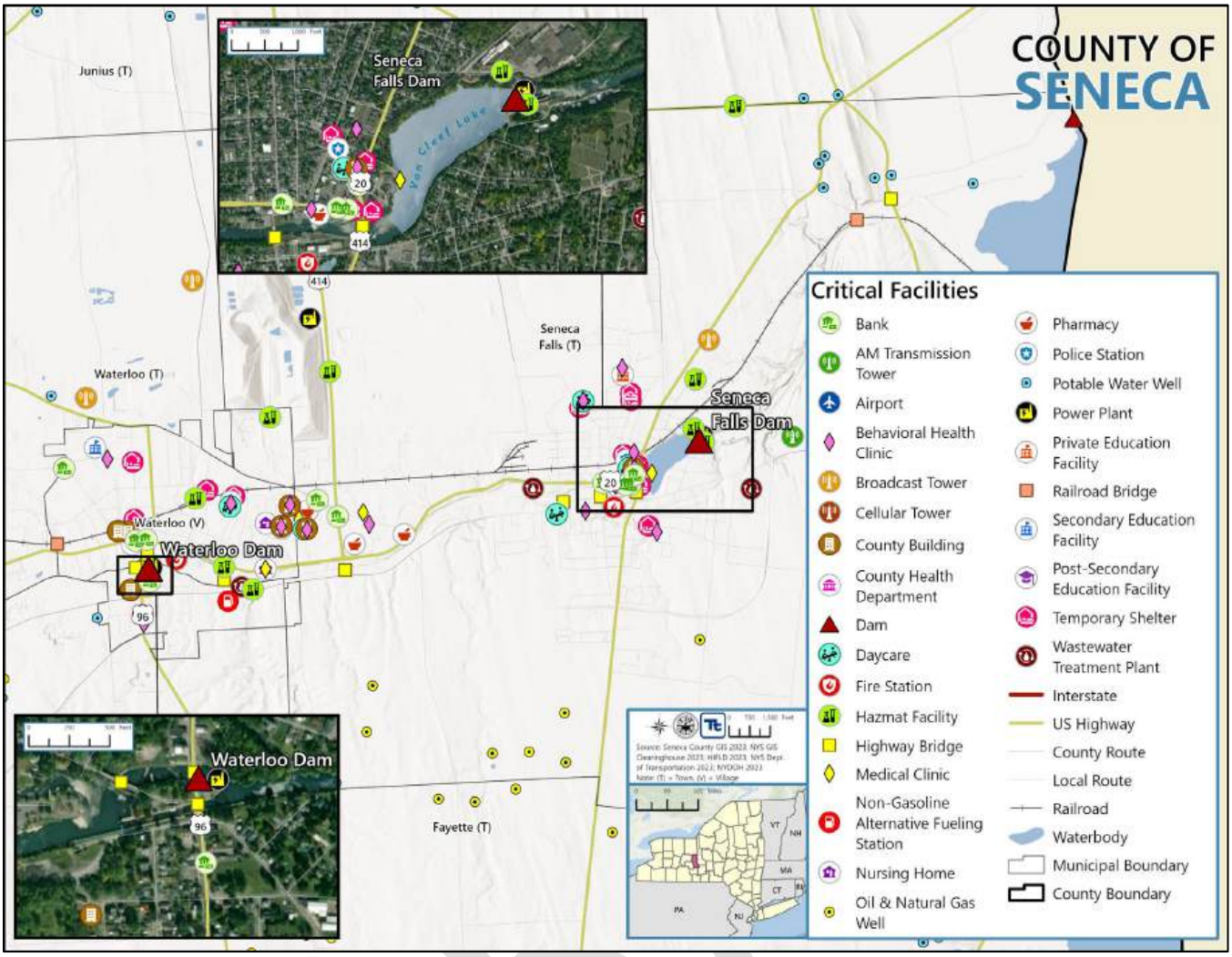


Figure 3-14. High Hazard Potential Dams and Nearby Critical Facilities



Dams and Levees

The U.S. Army Corps of Engineers (USACE) National Inventory of Dams (NID) lists four dams located within Seneca County, with two listed as high hazard and two listed as low hazard (USACE 2024). Geographic information system (GIS) data from the New York State Department of Environmental Conservation (NYSDEC) lists 10 dams in Seneca County (2 high hazard, 6 low hazard, and 2 undetermined) (NYSDEC 2024). Figure 3-14 and Figure 3-15 display critical facilities near the high hazard dams. The USACE National Levee Database lists no levees in Seneca County (USACE 2024). Refer to Appendix G for the names and locations of the dams found in the County.

Military Installations

There are no active military installations in Seneca County. The former Seneca Army Depot now belongs to Seneca County and has been targeted as a future business expansion and development area.

3.9.2 Food, Hydration, and Shelter

The food, hydration, and shelter community lifeline category includes agricultural lifelines. Figure 3-15 shows the location of food, hydration, and shelter facilities and Table 3-13 lists the number of each facility type.

Table 3-13. Seneca County Food, Hydration, Shelter Lifeline Facilities

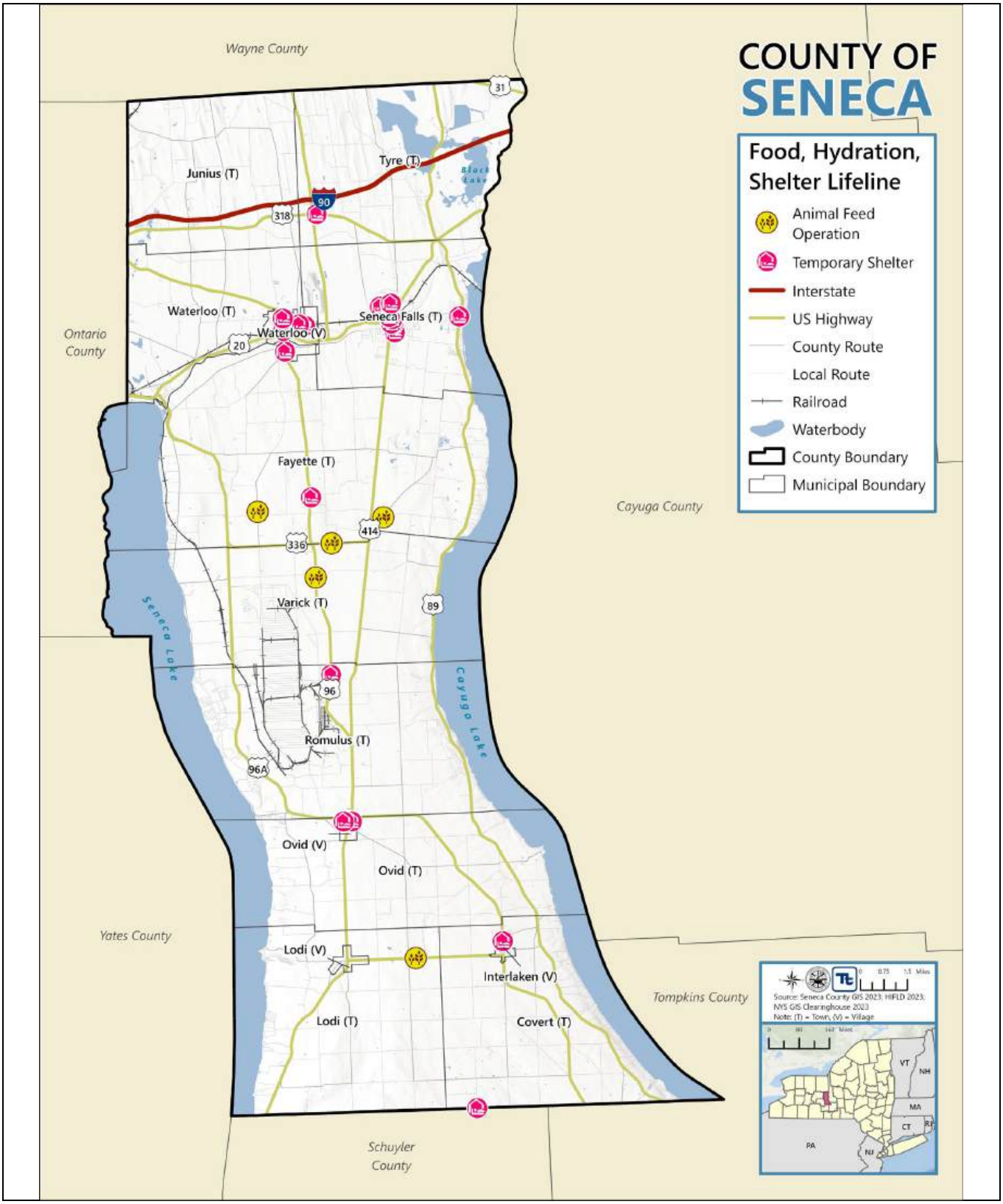
Facility Type	Number of Facilities
Animal Feed Operation	5
Temporary Shelter	23
Total	28

Note: The identified lifeline facilities may not include all facilities within the County. It is recognized that facilities may have been missed in the information-gathering process.

Shelters

With support and cooperation of the American Red Cross and local jurisdictions, Seneca County references an inventory of suitable shelter locations and can assist with the coordination and communication of shelter availability as necessitated by the execution of local municipal emergency operation plans. Countywide sheltering policies and procedures are documented in the Seneca County Comprehensive Emergency Management Plan and the Seneca County Pandemic Plan.

Figure 3-15. Food, Hydration, and Shelter Facilities in Seneca County



Schools

School buildings may be able to serve as shelters in emergency situations. There are 14 public educational facilities and nine private educational facilities (pre-k, elementary, middle, and high schools) in Seneca County (New York Schools n.d., New York Schools n.d.). The 14 public educational facilities are split between four school districts:

- Romulus School District
  - Romulus Elementary School–Pre-K to 6th grade
  - Romulus Junior-Senior High School–7th to 12th grade
- Seneca Falls School District
  - Elizabeth Cady Stanton Elementary School–3rd to 5th grade
  - Frank M. Knight Elementary School–Kindergarten to 2nd grade
  - Mynderse Academy–9th to 12th grade
  - Seneca Falls Middle School–6th to 8th grade
- South Seneca School District
  - South Seneca Elementary School–Pre-K to 5th grade
  - South Seneca High School–9th to 12th grade
  - South Seneca Middle School–6th to 8th grade
- Waterloo School District
  - Border City Elementary School–Kindergarten to 5th grade
  - La Fayette School–3rd to 5th grade
  - Skoi-Yase School–Kindergarten to 2nd grade
  - Waterloo High School–9th to 12th grade
  - Waterloo Middle School–6th to 8th grade

The only higher education location in Seneca County is the Northeast College of Health Sciences, located in Seneca Falls (Northeast College of Human Services n.d.).

Support Facilities for Socially Vulnerable Populations and Undeserved Communities

Seneca County and partnering agencies offer assistance to socially vulnerable populations and underserved communities. The list below identifies these agencies:

- Private Agencies
  - Glove House, Inc
- County Agencies
  - Seneca County Community Counseling Center
  - Seneca County Community Service Board

- Seneca County Crisis Response Team
- Seneca County Health Department
- Seneca County Human Services
- Seneca County Office for the Aging
- Seneca County Veterans Service Agency
- Seneca County Workforce Development and Youth Bureau
- Seneca County Youth Counseling Services

- State Agencies
  - New York State Central Register of Child Abuse and Maltreatment
  - New York State Office for the Aging
  - New York State Office of Children and Family Services
  - New York State Office of Temporary and Disability Assistance

3.9.3 Health and Medical

The health and medical community lifeline category includes medical care, public health, patient movement, medical supply chain, and fatality management. Figure 3-16 shows the location of health and medical facilities, and Table 3-14 lists the number of each facility type.

Table 3-14. Seneca County Health and Medical Lifeline Facilities

Facility Type	Number of Facilities
Behavioral Health Clinic	34
Medical Clinic	7
Nursing Home	4
Pharmacy	6
Total	51

Note: The identified lifeline facilities may not include all facilities within the County. It is recognized that facilities may have been missed in the information-gathering process.

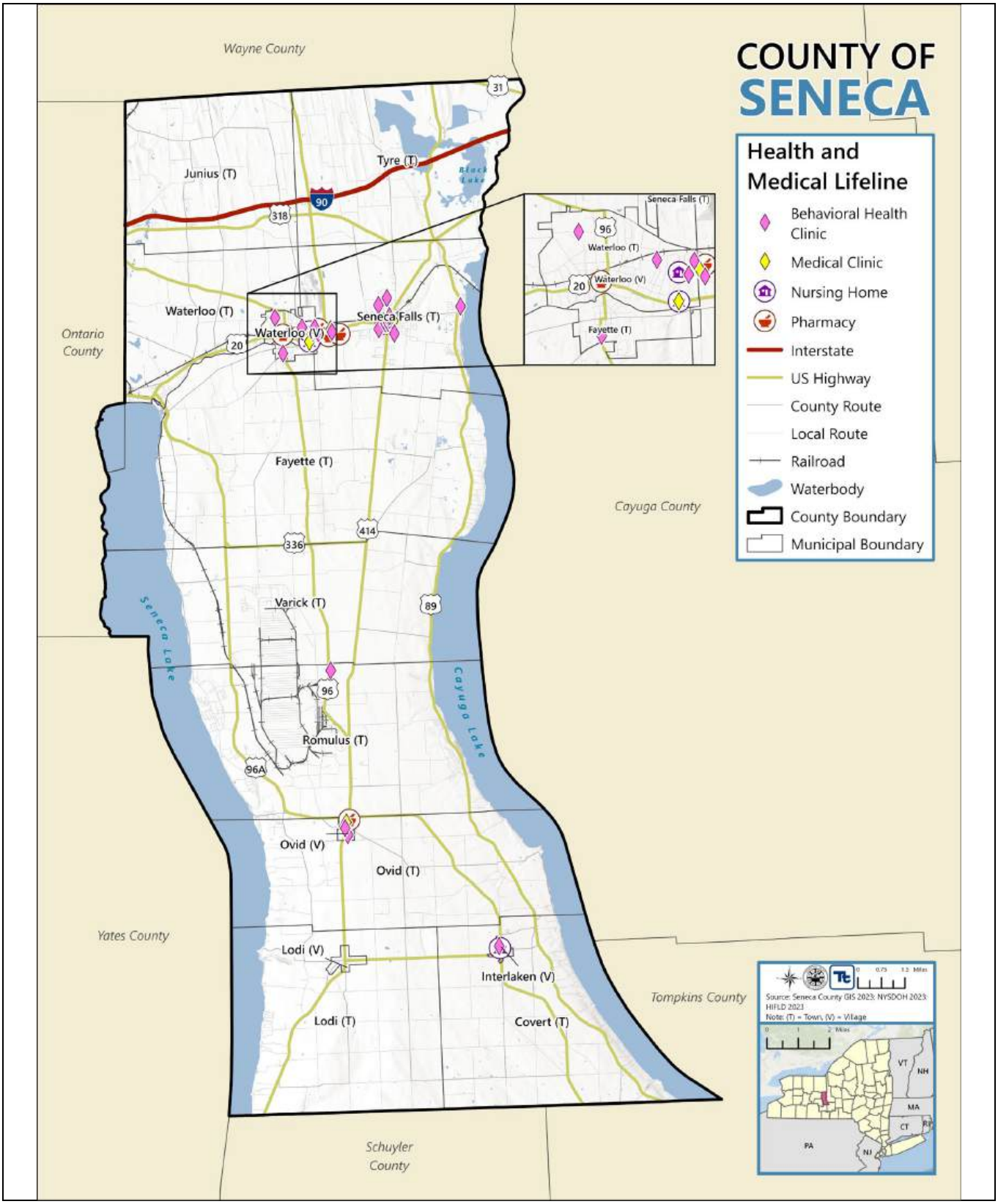
Hospitals and Medical Facilities

There are no acute care medical facilities in the County, and some residents are a 40-minute drive from the nearest hospital (Seneca County 2018). However, there are several clinics located within the County, including medical and behavioral health clinics.

Senior Care and Living Facilities

The County has four nursing home facilities. These facilities are highly vulnerable to potential impacts from disasters, and knowing the location and numbers of these types of facilities will be effective in managing a response plan pre- and post-disaster.

Figure 3-16. Health and Medical Facilities in Seneca County



3.9.4 Energy

The energy community lifeline category includes power grids and fuel supplies. Figure 3-17 shows the location of energy facilities and Table 3-15 lists the number of each facility type.

Table 3-15. Seneca County Energy Lifeline Facilities

Facility Type	Number of Facilities
Non-Gasoline Alternative Fueling Station	2
Oil & Natural Gas Well	215
Oil Storage Facility	1
Power Plant	3
Total	221

Note: The identified lifeline facilities may not include all facilities within the County. It is recognized that facilities may have been missed in the information-gathering process.

Gas and electric power in Seneca County are transmitted and distributed by New York State Gas and Electric Corporation. While all users in Seneca County remain dependent on the utility grid for overall energy needs, several major energy consumers are supplementing energy use with alternate or renewable sources. Homes in the County are also heated by different sources, with a majority using utility gas or fuel oil. Some areas are dependent on residential propane tanks for gas service. The County Law Enforcement Center, schools, and other commercial users have installed solar energy projects, and geothermal heating and cooling are becoming more common (Seneca County 2018).

3.9.5 Communications

The communications community lifeline category includes communications infrastructure; responder communications; alerts, warnings, and messages; finance; 911; and dispatch. Figure 3-18 shows the location of communications facilities and Table 3-16 lists the number of each facility type.

Table 3-16. Seneca County Communication Lifeline Facilities

Facility Type	Number of Facilities
AM Transmission Tower	1
Bank	13
Broadcast Tower	44
Cellular Tower	4
FM Transmission Tower	4
Land Mobile Tower	2
Total	68

Note: The identified lifeline facilities may not include all facilities within the County. It is recognized that facilities may have been missed in the information-gathering process.

Figure 3-17. Energy Facilities in Seneca County

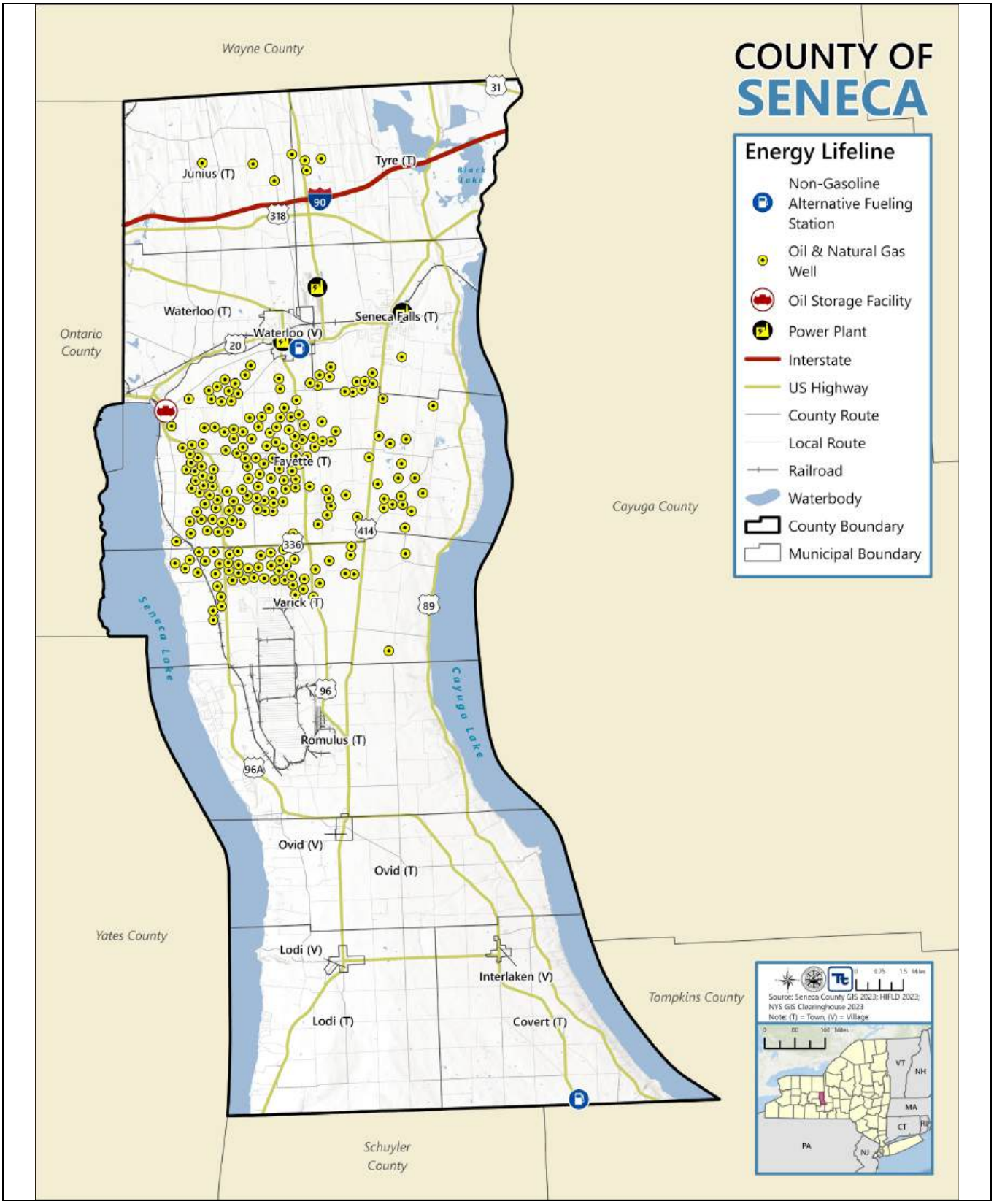
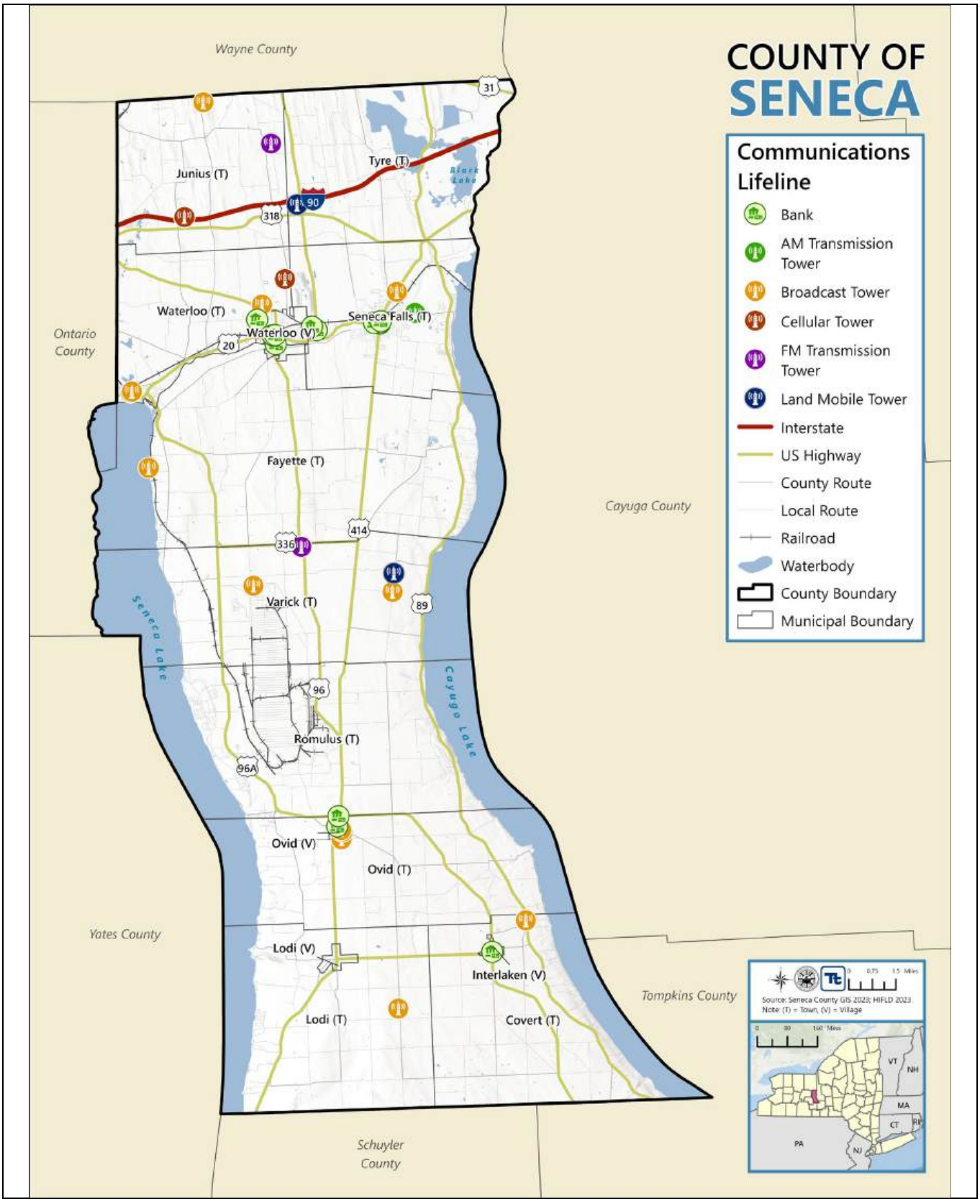


Figure 3-18. Communications Facilities in Seneca County



Emergency Warnings and Responder Communications

Seneca County EMO operates its E-911 Center in the Town of Waterloo. The E-911 Center answers 18 administrative phone lines, 1 TDD line, 3 alarm lines, and 14 911 lines. The center handles dispatches for 7 law enforcement agencies in addition to 12 fire departments and 2 ambulance companies.

Seneca County E-911 utilizes the Hyper-Reach System to send a recorded message to telephones in specific areas and alert residents to any emergency situations that may require immediate action. The system is designed to deliver more than 5,000 calls per hour. The Hyper-Reach message delivers critical information to residents and provides guidance on what precautions need to be taken by residents during and after an incident, including situations such as:

- Shelter in place
- Missing persons
- Any other situation occurring that would require a mass notification in a short period of time

All hard-wired (landline) telephones in Seneca County are automatically listed to receive these alerts. The database of landline telephone numbers comes directly from Verizon. Cell phones can be entered into the system for people who do not have landline service. These users must register to be added to the system.

Internet and Wireless Communications

Fiber optics, broadband, and high-speed internet access are available from commercial providers for residences and businesses throughout the County. Wireless service is widely available in populated areas and along major transportation routes, but there are areas that do not have wireless capability. Seneca County is continuing to work with New York State and neighboring jurisdictions to fully implement digital services (Seneca County 2018).

3.9.6 Transportation

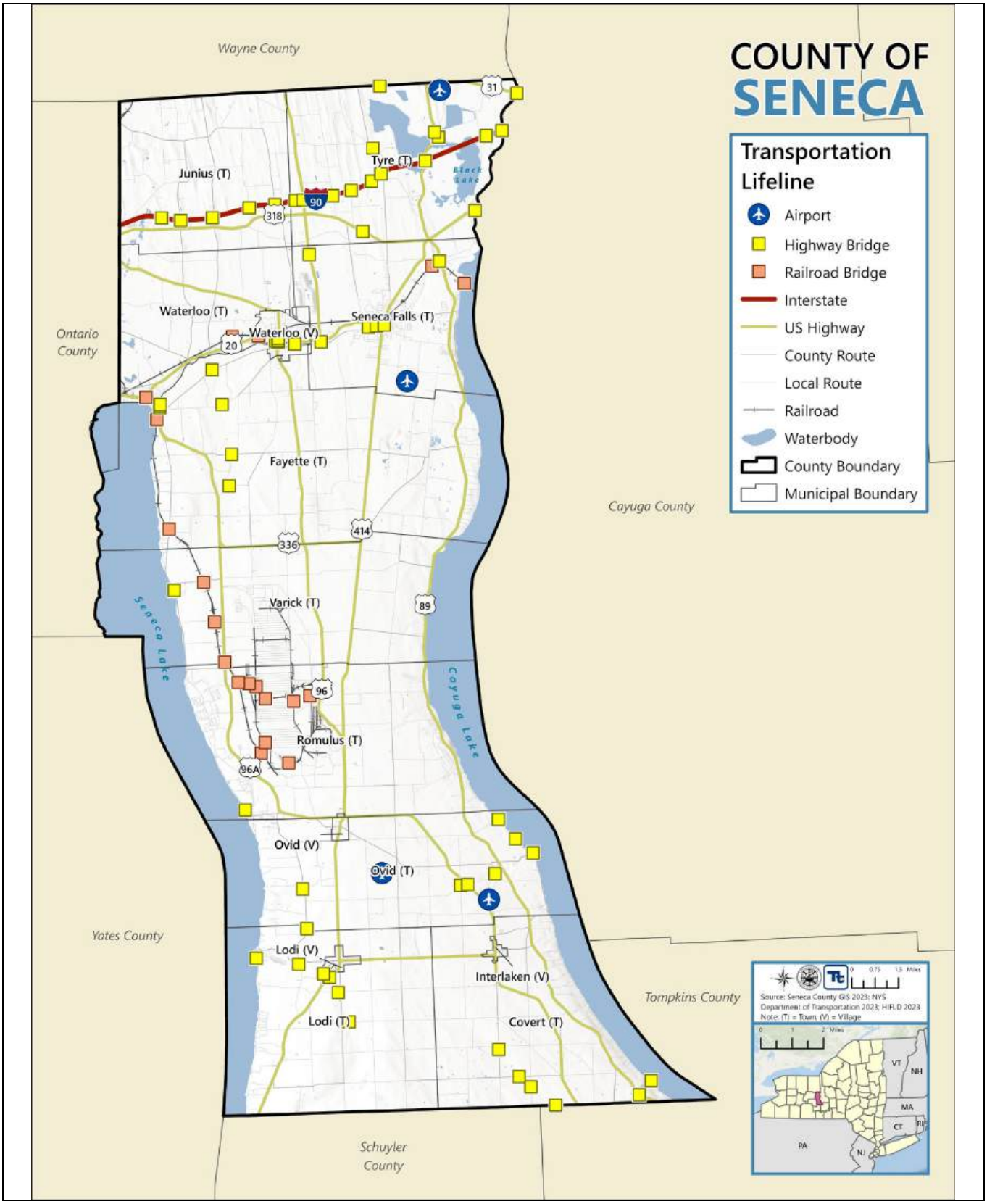
The transportation community lifeline category includes motor vehicle networks; mass transit; railways; aviation; and maritime facilities. Figure 3-19 shows the location of transportation facilities in Seneca County and Table 3-17 lists the number of each facility type.

Table 3-17. Seneca County Transportation Lifeline Facilities

Facility Type	Number of Facilities
Airport	4
Highway Bridge	65
Railroad Bridge	20
Total	89

Note: The identified lifeline facilities may not include all facilities within the County. It is recognized that facilities may have been missed in the information-gathering process.

Figure 3-19. Transportation Facilities in Seneca County



Major Roadways

Seneca County has approximately 525 miles of local roads that are maintained by the County, towns, and villages. New York State maintains about 160 miles of highways in Seneca County, including the main north-south Routes 96, 96A, 414, and 89; east-west routes 5, 20, and 318; and the NYS Thruway (Interstate 90). Management of truck traffic associated with the Seneca Meadows Landfill remains a high-profile transportation issue for the State and County (Seneca County 2018).

Evacuation Routes

The County maintains specific evacuation plans and can assist with the coordination and communication of evacuation routing as necessitated by the execution of local municipal emergency operation plans.

Bus and Other Transit Facilities

The Seneca Transit System provides limited fixed-route, dial-a-ride, and para-transit services in the County. Seneca County and nonprofit organizations also provide transport assistance for the elderly, disabled, and low-income residents for employment, medical, and essential personal needs (Seneca County 2018).

Railroad Facilities

The Finger Lakes Railway parallels Routes 5 and 20 from Geneva to Syracuse and is connected to the Norfolk Southern and Canadian Pacific Railways. Finger Lakes Railway hauls commodities such as steel, scrap metals, pulpboard, scrap paper, canned goods, sand, chemicals, salt, aggregates, grain, fertilizers, plastic, corn syrup, clay, soda ash, lumber, and building materials. The railway was recently improved to provide service to the Seneca Army Depot to facilitate a potential intermodal transportation hub at the Depot. Construction of a rail spur to the Seneca Meadows Landfill has also been proposed to reduce truck traffic (Seneca County 2018).

Airports

The Finger Lakes Regional Airport, just south of the Town of Seneca Falls, is a general aviation facility that serves as a base for business travel, tourism, and agricultural services. The County-owned airport is considered a key asset to maintain and promote economic growth in the region (Seneca County 2018).

Ferry Service and Ports

There are no ports located in Seneca County; however, there are recreational ferry and boating services available on Seneca and Cayuga Lakes.

New York State Canal System

The New York State Canal System that includes the Cayuga-Seneca Canal in Seneca County continues to be a commercial transportation alternative supporting the economic profile of Seneca County. It is still used to produce power, but the canal is predominantly a recreation, tourism, cultural, and historic resource for Seneca County (Seneca County 2018).

3.9.7 Hazardous Materials

The hazardous materials community lifeline category includes hazardous materials and the facilities where they are kept. Due to security concerns, only partial lifeline data has been obtained on local hazardous materials. Figure 3-20 shows the location of hazardous material facilities in Seneca County and Table 3-18 lists the number of each facility type.

Table 3-18. Seneca County Hazardous Materials Lifeline Facilities

Facility Type	Number of Facilities
Hazardous Material Facility	17
Solid Waste Landfill	3
Total	20

Note: The identified lifeline facilities may not include all facilities within the County. It is recognized that facilities may have been missed in the information-gathering process.

Hazardous Materials Facilities

Superfund sites are federally designated polluted locations requiring a long-term response to clean up hazardous material contaminations. The U.S. Environmental Protection Agency (EPA) reports no currently active Superfund sites in Seneca County. Abandoned hazardous waste sites placed on the federal National Priorities List (NPL) are those that are eligible for remediation under the Superfund Trust Fund Program and that the EPA has determined present "a significant risk to human health or the environment". As of 2024, Seneca County has one inactive hazardous site listed on the NPL: the Seneca Army Depot in the Town of Romulus (EPA 2024).

As of March 2024, there are 218 sites in Seneca County listed in the NYSDEC's Bulk Storage Program Database (NYSDEC 2024). The Bulk Storage Program Database catalogs three types of facilities:

- Petroleum bulk storage facilities with a total storage capacity of 1,100 gallons or more
- Major oil storage facilities sites storing more than 400,000 gallons of petroleum products
- Chemical bulk storage underground tanks and all stationary aboveground tanks with a capacity of 185 gallons or more.

Although there are no nuclear plants in Seneca County, portions of the County are within 50 miles of the Robert Emmett Ginna Nuclear Power Plant, James A. FitzPatrick Nuclear Power Plant, and Reactors 1 and 2 at the Nine Mile Point Nuclear Station.

3.9.8 Water Systems

The water system community lifeline category includes potable water and wastewater infrastructure. Due to security concerns, only partial lifeline data has been obtained on local water utility systems. Figure 3-21 shows the location of water system facilities in Seneca County and Table 3-19 lists the number of each facility type.

Table 3-19. Seneca County Water System Lifeline Facilities

Facility Type	Number of Facilities
Wastewater Treatment Plant	12
Potable Water Well	766
Total	778

Note: The identified lifeline facilities may not include all facilities within the County. It is recognized that facilities may have been missed in the information-gathering process.

Potable Water

In Seneca County, drinking water, including tap water and bottled water, comes from rivers, lakes, streams, ponds, reservoirs, springs, and wells. There are 13 municipal water supply systems in Seneca County, and all draw water supplies from Seneca and Cayuga Lakes. Seneca County Water District purchases water from the Village of Waterloo. Areas within and immediately surrounding the villages and Seneca Army Depot generally have sufficient potable water service (Seneca County 2018). Water from Seneca Lake is treated using state-of-the-art disinfection and filtration to remove or reduce harmful contaminants that may come from the source water (Seneca County Water and Sewer 2023). Water treatment facilities and distribution systems are not identified for security purposes.

Improvements and upgrades to aging water supply and wastewater systems in Seneca County are a high priority for local leaders. Meeting service demand, avoiding infrastructure breakdowns and disruptions, and assuring adequate water supply and pressure for firefighting require continuous modernization. The County also maintains programs to monitor and assist residents using private wells and septic systems. The use of “gray” water for agricultural irrigation is emphasized to manage runoff and contamination (Seneca County 2018).

The Seneca County Department of Health issues inspection reports for sources of public water supply. Between February 2017 and January 2023, the Seneca County Health Department issued 188 inspection reports for over 84 entities across the County, including at locations such as wineries, breweries, water districts, campgrounds, diners and cafes, grocery stores, and schools (Seneca County DOH 2023).

Many of the rural areas are dependent on private wells. Several large industries have their own supply source and treatment facilities. Many fire departments have an alternate water source for firefighting, including standpipes on natural waterways.

Wastewater Facilities

Villages and higher-density rural areas are served by public sanitary sewer systems. Existing wastewater treatment plants generally have excess capacity that can handle modest growth, but new economic development in the Route 318/414 corridor will require municipal sewer expansion, pump stations, and treatment plant upgrades. The County is seeking to improve infrastructure services, including electric and sanitation, at the Seneca Army Depot to meet goals for expanding economic opportunities at the site (Seneca County 2018).

3.10 OTHER CRITICAL FACILITIES

Some facilities that are identified as critical for hazard mitigation in Seneca County do not fit in any of FEMA's community lifeline categories. Figure 3-22 shows the location in Seneca County of these other critical facilities and Table 3-20 lists the number of each facility type.

Table 3-20. Seneca County Other Critical Facilities

Facility Type	Number of Facilities
Daycare	5
Resort	1
Total	6

Note: The identified lifeline facilities may not include all facilities within the County. It is recognized that facilities may have been missed in the information-gathering process.

Figure 3-20. Hazardous Material Facilities in Seneca County

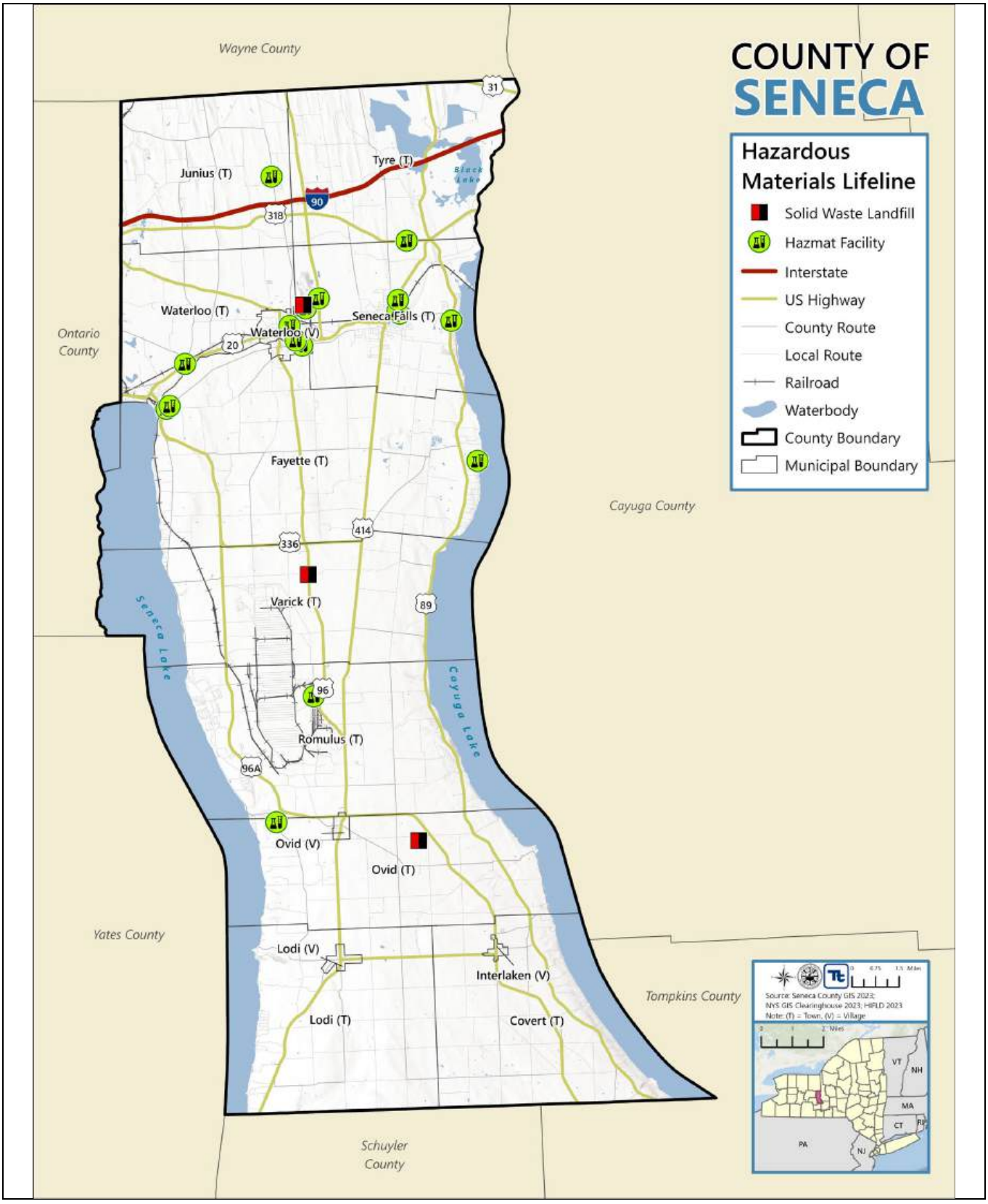


Figure 3-21. Water Systems Facilities in Seneca County

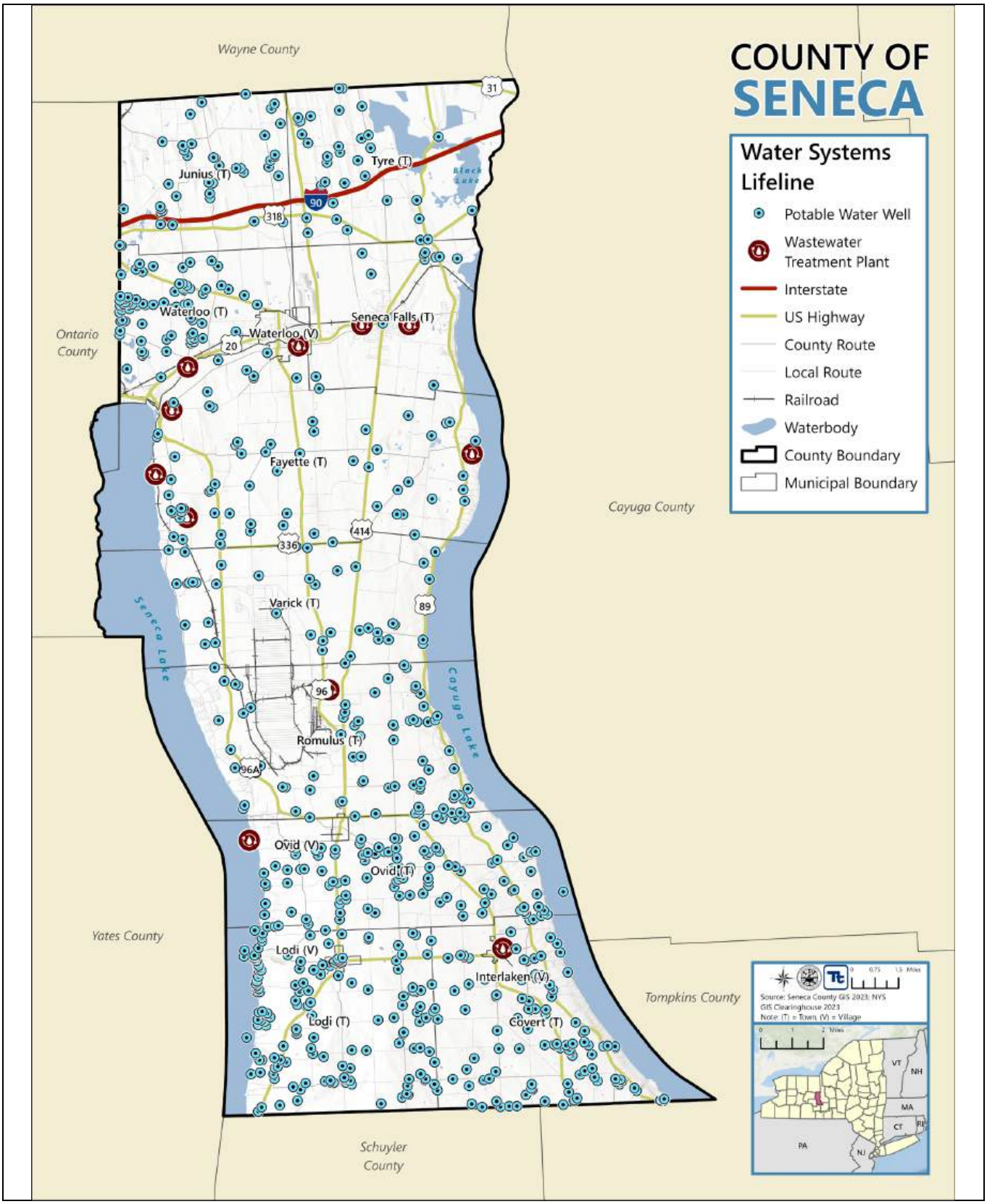


Figure 3-22. Other Critical Facilities in Seneca County

PART 2: RISK ASSESSMENT

4. RISK ASSESSMENT METHODOLOGY AND TOOLS

A risk assessment is the process of evaluating the potential loss of life, personal injury, and economic and property damage that could result from identified hazards. Identifying potential hazards and vulnerable assets allows planning personnel to address and reduce hazard impacts and allows 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 from each hazard. Past, present, and future conditions must be evaluated to assess risk most accurately for the County and participating jurisdictions. The process focuses on the following elements:

- **Identify Hazards of Concern**—Use all available information to determine what types of hazards may affect a jurisdiction.
- **Profile Each Hazard**—Understand each hazard in terms of:
  - Description—Overview of general the hazard's general principles, causes, and behaviors
  - Location—Geographic area most likely to be affected by the hazard
  - Extent—The potential severity of each hazard
  - Previous occurrences and losses
  - Probability of future hazard events (including changes in probability due to climate change)
- **Assess Risk**—Use all available information to estimate to what extent populations and assets may be adversely affected by a hazard.
  - Determine vulnerability—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.
  - Estimate potential impacts—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.
  - Evaluate future changes that may affect vulnerability and impacts—Analyze how demographic changes, projected development, and climate change impacts can alter current vulnerability and potential impacts.

4.1 ASSET INVENTORIES

This HMP update assesses vulnerability and potential hazard impacts for the following types of assets: population, buildings, critical facilities/community lifelines, the environment, and new development. Each asset type is described below.

4.1.1 Population

General Population Estimates for Vulnerability Analysis

Statistics from the 2020 Decennial Census and 2018–2022 5-year ACS were used to estimate Seneca County's population for vulnerability analyses. Population counts at the jurisdictional level were averaged

over the number of residential structures in the jurisdiction to estimate population at each structure. This estimate provides a more precise distribution of population across the County than estimates using census block or census tract boundaries. Limitations of these analyses are recognized, and thus the results are used only to provide a general estimate for planning purposes.

To determine population statistics for villages and towns, village populations were subtracted from the town population. Where villages were split between towns (the Village of Ovid is in two towns and the Village of Waterloo is in three towns), a portion of the village population was subtracted from each town based on the percentage of the geographic area of the village within each town. Residential structures were used as a resource to identify the percentage of population that was applied across the multiple jurisdictions.

General Population Estimates for Impact Analysis

FEMA's Hazus program was used to estimate potential casualties and persons requiring shelter due to seismic and wind hazards. Hazus contains 2020 U.S. Census data. The 2020 U.S. Census data in Hazus is believed to be appropriate to support the risk assessment and mitigation planning efforts of this project.

Socially Vulnerable Population Estimates

Vulnerable populations in Seneca County included in the risk assessment are children, the elderly, populations below the poverty level, non-English speaking individuals, and persons with a disability. These populations can be more susceptible to hazard events based on a number of factors, including their physical and financial ability to respond during a hazard and the location and construction quality of their housing. Population estimates for these socially vulnerable populations for each municipality in the County were based on the 2022 5-year ACS data. The estimates are shown in Table 3-7.

4.1.2 Buildings

Building Inventory for Vulnerability Analysis

The analysis of building vulnerability to each hazard used a custom-building inventory for Seneca County at the structure level. This inventory was based on the most current parcels, building footprints, and address points, provided by Seneca County's GIS group. To fill in any data gaps, National Structure Inventory (NSI) building points were sourced from USACE. Building attributes incorporated into the inventory included year built, number of stories, basement type, occupancy class, and square footage. The centroid of each building footprint was used to represent the building location as a single point for GIS analysis.

Building replacement cost value (RCV) was calculated using assessor data, the square footage of each building, and RSMeans 2022 data. RCV is the cost of returning a destroyed asset to its pre-damaged condition assuming present-day costs for labor and materials. Total RCV consists of both the structural cost to replace a building and the estimated value of the contents of a building. Costs from RSMeans were adjusted using a location factor associated with zip codes, as follows:

- 130xx, 131xx—Factor of 0.99 for both residential and non-residential
- Zip codes 144xx, 145xx—Factor of 1.00 for both residential and non-residential

- Zip codes 148xx—Factor of 0.92 for residential; 0.97 for non-residential

The occupancy classes available in Hazus were condensed into the categories of residential (multi-family and single-family), commercial, industrial, and other (agricultural, religious, governmental, and educational) to facilitate analysis and presentation of results.

Building Inventory for Analysis of Impacts

For the analysis of impacts from the seismic and wind hazards, Seneca County used the default general building stock from FEMA's Hazus model (v6.1). The default general building stock is analyzed at the aggregate census block and census tract levels and incorporates 2022 RSMeans replacement cost values.

4.1.3 Critical Facilities and Community Lifelines

A critical facility inventory was created with assistance from the Planning Partnership and Seneca County. The development involved a review for accuracy, additions, or deletions of new or 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 G, Critical Facilities). To protect individual privacy and the security of assets, information is presented in aggregate, without details about specific individual properties or facilities.

4.1.4 Land Cover

National land cover data created by the U.S. Geological Survey (USGS) in 2021 was used to assess land use characteristics of Seneca County. This dataset was converted from a raster to a vector polygon, which informed spatial areas of built and natural land use areas. The built land use areas were defined as urban areas and included developed open space and low, medium, and high-intensity locations. Non-urban areas were extracted into agricultural, barren land, forest, rangeland, water, and wetlands land use categories.

4.1.5 New Development

Each jurisdiction was asked to provide a list by address of recent development over the last 5 years and anticipated new development in the next 5 years. The location of new development projects was submitted via ArcGIS Survey123. An analysis was conducted in GIS to determine hazard exposure of 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. Results are found in the jurisdictional annexes in Volume II.

4.2 METHODOLOGY

Seneca County used standardized tools combined with local, state, and federal data and expertise to assess potential vulnerability and losses associated with hazards of concern. Three levels of analysis were used, depending on the data available for each hazard:

- **Historical Occurrences and Qualitative Analysis–**This analysis includes an examination of historical impacts to understand potential impacts of future events of similar size. Potential impacts and losses are discussed qualitatively using best-available data and professional judgment.
- **Vulnerability Analysis–**This analysis involves overlaying available spatial hazard layers, for hazards with defined extent and locations, on asset mapping in GIS to determine which assets are located in the impact area of the hazard.
- **Loss Estimation**–The FEMA Hazus modeling software was used to estimate potential losses for the following hazards: flood, earthquake, and hurricane.

Table 4-1 summarizes the type of analysis conducted by hazard of concern.

Table 4-1. Summary of Risk Assessment Analyses

Hazard	Population	General Building Stock	Critical Facilities	New Development
Dam Failure	Q	Q	Q	Q
Drought	Q	Q	Q	Q
Earthquake	V, H	V, H	V, H	Q
Extreme Temperature	Q	Q	Q	Q
Flood	V	V	V	Q
Landslide	V	V	V	Q
Severe Weather	H	H	H	Q
Severe Winter Weather	Q	Q	Q	Q

Note: V = Vulnerability analysis; H = Hazus analysis; Q = Qualitative analysis

4.2.1 Hazus

Hazus is a GIS-based software tool developed by FEMA that applies engineering and scientific risk calculations developed by hazard and information technology experts to estimate damage and loss. 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. The Hazus methodologies are accepted by FEMA and provide a consistent framework for assessing risk across multiple hazards. The use of this software promotes consistency of data output now and in the future and standardization of data collection and storage.

Hazus uses GIS technology to estimate a hazard's direct physical damage to building stock and critical facilities. The Hazus software incorporates default data for asset inventories, vulnerability, and hazards; this default data can be supplemented with local data to provide a more refined analysis. Table 4-2 lists the levels of analysis that can be conducted using the Hazus software.

Table 4-2. Summary of 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.

4.2.2 Hazard-Specific Methodologies

Dam Failure

To assess the vulnerability of Seneca County to dam failure and its associated impacts, a qualitative assessment was conducted.

Drought

All of Seneca County is at risk from the impacts of drought events. A qualitative analysis was conducted to assess the County’s vulnerability to this hazard of concern.

Earthquake

A vulnerability analysis was conducted for the County’s assets (population, building stock, and critical facilities) using National Earthquake Hazard Reductions Program (NEHRP) soil data provided by New York State. The vulnerability analysis focused on hazard areas defined as areas with NEHRP soil types that would experience amplified ground motion during an earthquake (i.e., Class D and E). Assets with their centroid in the hazard areas were totaled to estimate the numbers and values vulnerable to the seismic hazard.

A Hazus Level 2 loss estimation was conducted for the 500-year mean return period (MRP) earthquake event estimate potential impacts on the County’s assets. Hazus’ potential loss estimates are acceptable for the purposes of this HMP. The 500-year MRP earthquake event is based on information from historical earthquakes and inferred faults, locations, and magnitudes. Hazus computes probable ground shaking by census tract for earthquakes of varying return periods. The default assumption is a magnitude 7.0 earthquake for all return periods. Default NEHRP soils data was used in Hazus. Groundwater was set at a depth of 5 feet (default setting).

Damage estimates are calculated for losses to buildings (structural and non-structural) and contents; structural building losses include load-carrying components of the structure, and non-structural building losses include those to non-support components of the structure, such as nonbearing walls, veneer, and finishes, HVAC systems, and boilers. Although damage is estimated at the census tract level, results were presented at the municipal level. For census tracts that lie within more than one jurisdiction, an area analysis was used to extract the percentage of each tract that falls within individual jurisdictions. The percentage was multiplied against the results calculated for each tract and summed for each jurisdiction.

Extreme Temperature

All of Seneca County is at risk from the impacts of extreme temperature events. A qualitative analysis was conducted to assess Seneca County’s vulnerability to this hazard of concern.

Flood

The 1 percent and 0.2 percent annual chance flood events were examined to evaluate Seneca 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 CoreLogic digital effective FIRM flood hazard data was provided by Michael Baker and was utilized to estimate vulnerability to the 1 percent and 0.2 percent annual chance flood events. The flood boundaries were overlaid on the centroids of updated assets (population, building stock, and critical facilities). Centroids that intersected the flood boundaries were totaled to estimate the assets vulnerable to the flood hazard.

Landslide

High (>20 percent grade) and moderate (15–20 percent grade) landslide hazard areas were mapped using a digital elevation model from the New York State Clearinghouse (NYS 2012). A vulnerability analysis was conducted by overlaying the landslide hazard areas on the centroids of updated assets (population, building stock, and critical facilities). Centroids that intersected the landslide boundaries were totaled to estimate the assets vulnerable to the high and moderate landslide hazards.

Severe Weather

A Hazus analysis was performed to estimate potential losses in Seneca County for the 500-year MRP wind event. The Hazus hurricane model draws upon a database of thousands of potential storms reflecting the full spectrum of Atlantic hurricanes observed since 1886. The model identifies those with tracks through or near Seneca County. Hazus also includes surface roughness and vegetation (tree coverage) maps for the area to support the modeling of wind force across various types of land surfaces.

Default demographic and updated building and critical facility inventories in Hazus were used for the analysis. Although damage is estimated at the census tract level, results were presented at the municipal level. Where census tracts lie within more than one jurisdiction, a density analysis was used to extract the percentage of building structures in each census tract and jurisdiction. The percentage was multiplied against the results calculated for each tract and summed for each jurisdiction.

Severe Winter Weather

All of Seneca County is vulnerable to the winter storm hazard. Current modeling tools are not available to estimate specific losses for this hazard. A qualitative analysis was conducted to assess Seneca County's vulnerability to this hazard of concern.

4.3 DATA SOURCE SUMMARY

Table 4-3 summarizes the data sources used for the risk assessment for this plan.

Table 4-3. Risk Assessment Data Documentation

Data	Source	Date	Format
Population data	U.S. Census Bureau; ACS 5-Year Estimates	2020; 2023	Excel (.csv) format
Building Inventory	Seneca County GIS; USACE/NSI; RSMeans	2023; 2022; 2022	Digital (GIS) format
Critical Facilities and Lifelines	Seneca County GIS; NYSGIS Clearinghouse; NYSDOH; NYSDOT 2023; HIFLD; Seneca County Planning Partnership Jurisdictions	2023	Digital (GIS) format; Excel (.csv) format
Digitized Effective FIRM maps	CoreLogic	2024	Digital (GIS) format
2-Meter Digital Elevation Model	Northrop Grumman, Advanced Geospatial Intelligence Solutions Operating Unit	2014	.img
Landslide Hazard Data	NYSGIS Clearinghouse; Northrop Grumman Advanced Geospatial Intelligence Solutions Operating Unit	2012; 2014	.img
NEHRP Soil	New York State	n.d.	Digital (GIS) format

Note: HIFLD = Homeland Infrastructure Foundation-Level Data; NYSGIS = New York State GIS Clearinghouse; NYSDOH = New York State Department of Health; NYSDOT = New York State Department of Transportation

4.4 LIMITATIONS

Loss estimates, vulnerability analyses, and hazard-specific impact 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:

- Approximations and simplifications necessary to conduct such a study
- Incomplete or dated inventory, demographic, or economic parameter data
- The unique nature, geographic extent, and severity of each hazard
- Mitigation measures already employed by the participating jurisdictions
- The amount of advance notice residents have to prepare for a specific hazard event
- 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 vulnerability and loss estimates are approximate. These results do not predict precise results and should be used to understand relative risk. Over the long term, Seneca County will collect additional data and 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 using best-available data. Seneca 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.

4.5 CONSIDERATIONS FOR MITIGATION AND NEXT STEPS

The following items are to be discussed for consideration for the next plan update to enhance the risk assessment:

- All Hazards
  - Create an updated user-defined general building stock dataset using up-to-date parcels, footprints, and RSMeans values.
  - Utilize updated and current demographic data.
- Dam Failure
  - Provide a vulnerability assessment with available dam inundation hazard spatial data.
- Earthquake
  - Identify unreinforced masonry in critical facilities and privately owned buildings (i.e., residences) by accessing local knowledge, tax assessor information, and/or pictometry/orthophotos. These buildings may not withstand earthquakes of certain magnitudes and plans to provide emergency response or recovery efforts at these properties can be developed.
- 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.
- Flood
  - Update the general building stock inventory 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 a 100-year flood event.
  - As more current FEMA floodplain data become available (i.e., DFIRMs), update the vulnerability analysis and generate a flood depth grid that can be integrated into the current Hazus version.
  - Conduct a repetitive loss area analysis.
- Landslide
  - Utilize the best available digital elevation model data.
- Severe Weather
  - Update the general building stock inventory to include attributes regarding protection against strong winds, such as hurricane straps, to enhance loss estimates.
  - Integrate evacuation route data that is currently being developed.

5. IDENTIFICATION OF HAZARDS OF CONCERN

To provide a strong foundation for mitigation actions in this plan, Seneca County considered a full range of hazards that could impact the area and then identified and ranked those that present the greatest concern. These hazards of concern were identified based on the following:

- Input from all planning partners
- Review of the New York State HMP
- Review of the 2018 Seneca County HMP
- Research on the frequency, magnitude, and costs associated with hazards that have previously or could feasibly impact the region
- Qualitative information regarding natural (not human-caused) hazards and the perceived vulnerability of the study area's assets to them

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.

5.1 REVIEW OF NEW YORK STATE HAZARDS

Table 5-1 documents the process of identifying the hazards of concern for further profiling and evaluation through review of the hazards of concern included in the New York State HMP.

Table 5-1. Identification of Hazards of Concern for Seneca County

Hazard	In Seneca County		Why was this determination made?	Sources
	May Occur	Poses Significant Threat		
Avalanche	No	No	• Avalanche was identified as a hazard in the 2023 New York State HMP, and there have been occurrences in the state; however, there were no occurrences in Seneca County. • The topography and climate of Seneca County does not support the occurrence of an avalanche. The Steering Committee and Planning Partnership do not consider the hazard to be a significant concern.	NYS DHSES Input from Steering Committee and Planning Partnership
Coastal Hazards	Yes	No	• The 2023 New York State HMP identifies coastal hazards as a hazard of concern for New York State. Coastal hazards may impact inland counties and communities. • Seneca County does not have coastline. The Steering Committee and Planning Partnership do not consider the hazard to be a significant concern.	NYS DHSES Input from Steering Committee and Planning Partnership
Dam Failure	Yes	Yes	• The 2023 New York State HMP does not identify dam failure as a hazard of concern for New York State, though it is included in the flood hazard profile.	NYS DHSES NYSDEC NYS GIS Input from Steering

Hazard	In Seneca County: May Occur	In Seneca County: Poses Significant Threat	Why was this determination made?	Sources
			• According to the NYSDEC, there are 10 dams in Seneca County—6 are low hazard, 0 are intermediate hazard, 2 are high hazard, and 2 are negligible or no hazard classification code (NYSDEC 2022). • Dam failure was given its own individual hazard profile.	Committee and Planning Partnership

Drought	Yes	Yes	• The 2023 New York State HMP identifies drought as a hazard of concern for the state.
			• Seneca County was included in 2 recent drought-related U.S. Department of Agriculture (USDA) disaster declarations:
			  • S4023—2016 Drought
			  • S4037—2016 Drought
			• Agriculture is a substantial industry in Seneca County. Drought conditions would severely impact the County's economy.
			• The Steering Committee and Planning Partnership identified drought as a hazard of concern for Seneca County.
				NYS DHSES
				FEMA
				USDA
				NOAA-NCEI
				NRCC
				Input from Steering Committee and Planning Partnership

Earthquake	Yes	Yes	• The 2023 New York State HMP identified earthquake as a hazard of concern for New York State. New York State was included in one FEMA earthquake-related disaster declaration (DR-1415); Seneca County was not included in this declaration. From 2015 to 2024, there have been no significant earthquakes with epicenters in Seneca County. • Based on input from the Steering Committee and Planning Partnership, earthquake has been identified as a hazard of concern for Seneca County.	NYS DHSES U.S. Geological Survey (USGS)–Earthquake Hazards Program, Review of USGS Seismic Maps Input from Steering Committee and Planning Partnership

Extreme Temperature	Yes	Yes	• The 2023 New York State HMP identifies extreme cold and extreme heat as hazards of concern for New York State.
			• Seneca County was included in six recent USDA disaster declarations related to extreme temperature events:
			  • S3666—2014 Freeze
			  • S3672—2014 Freeze
			  • S3886—2015 Frost, Freeze, and Excessive Snow
			  • S4052—2016 Unseasonably warm followed by Freeze
			  • S4903—2020 Frost, Freeze
			  • S4904—2020 Freeze
			  • S5485—2020 Frost, Freeze
				NYS DHSES
				NOAA-NCEI
				USDA
				Input from Steering Committee and Planning Partnership

Hazard	In Seneca County: May Occur	In Seneca County: Poses Significant Threat	Why was this determination made?	Sources
			• The Steering Committee and Planning Partnership identified extreme temperature as a hazard of concern for Seneca County.	

Flood (riverine, lakeshore, ice jam, urban flooding, and flash flooding)	Yes	Yes	• The 2023 New York State HMP identifies flooding as a hazard of concern for New York State.
			• Between 1956 and 2024, Seneca County was included in 4 FEMA flood-related declarations.
			  • FEMA DR-338; June 23, 1972; New York Tropical Storm Agnes
			  • FEMA DR-1534; May 13–June 17, 2004; New York Severe Storms and Flooding
			  • FEMA EM-3351; October 27–November 8, 2012; Hurricane Sandy in New York
			  • FEMA DR-4397; August 13–15, 2018; New York Severe Storms and Flooding
			• Based on the history of flooding and its impacts on Seneca County and input from the Steering Committee and Planning Partnership, flooding has been identified as a hazard of concern for Seneca County.
				NYS DHSES
				NOAA-NCEI USACE CRREL Ice Jam Database
				FEMA
				Input from Steering Committee and Planning Partnership

Hail	Yes	Yes	See severe weather profile	
Hurricane (tropical cyclones, including tropical storms and tropical depressions)	Yes	Yes	See severe weather profile	
Ice Jams	Yes	Yes	See flood profile	
Ice Storm	Yes	Yes	See severe winter weather profile	
Land Subsidence	Yes	No	See coastal hazards	
Landslide	Yes	Yes	• The 2023 New York State HMP includes landslide as a hazard of concern for New York State. • Between 1954 and 2024, New York State was not included in any landslide-related disaster declarations; however, there were six occurrences according to NOAA's NCEI Storm Events Database. None of these events occurred in Seneca County. • USGS National Atlas Map Maker program indicates that Seneca County has low landslide incidence, with pockets of moderate incidence.	NYS DHSES NOAA NCEI FEMA Input from Steering Committee and Planning Partnership

Hazard	In Seneca County		Why was this determination made?	Sources
	May Occur	Poses Significant Threat		
			• Based on previous occurrences and input from the Steering Committee and Planning Partnership, the landslide hazard was identified as a hazard of concern for Seneca County.	
Lightning	Yes	Yes	See severe weather profile	

Severe Weather (windstorms, thunderstorms, hail, lightning, and tornadoes, hurricanes)	Yes	Yes	• The 2023 New York State HMP identifies severe weather as a hazard of concern for New York State; however, the hazards were profiled in individual sections: coastal hazards, hail, hurricane, lightning, tornado, and high winds.
			• For the Seneca County HMP, the hazards were combined into one profile.
			• Between 1954 and 2024, Seneca County was included in three FEMA severe weather-related declarations:
			  • FEMA DR-1534; May 13–June 17, 2004; New York Severe Storms and Flooding
			  • FEMA DR-3262; August 29–October 1, 2005; New York Hurricane Katrina Evacuation
			  • FEMA EM-3351; October 27–November 8, 2012; Hurricane Sandy in New York
			• Based on previous occurrences and input from the Steering Committee and Planning Partnership, severe weather is identified as a hazard of concern for Seneca County.
				NYS DHSES
				FEMA
				NOAA-NCEI
				SPC
				Input from Steering Committee and Planning Partnership

Severe Winter Weather (heavy snow, blizzards, ice storms)	Yes	Yes	• The 2023 New York State HMP identifies ice storms and snowstorms as hazards of concern for New York State. According to the 2023 New York State HMP, Seneca County experienced seven ice storm events with losses of $2,005,000 and 1 snowstorm event with losses of $300,000. • FEMA included Seneca County in one ice storm-related disaster declaration: • FEMA DR-1467; April 3-5, 2003; New York Ice Storm • Based on previous occurrences and input from the Steering Committee and Planning Partnership, severe winter weather was identified as a hazard of concern for Seneca County.	NYS DHSES FEMA NOAA-NCEI Input from Steering Committee and Planning Partnership
Snowstorm	Yes	Yes	See severe winter weather	
Tornado	Yes	Yes	See severe weather	
Wildfire	Yes	Yes	• The 2023 New York State HMP identifies wildfire as a hazard of concern for New York State. • Seneca County was not included in any FEMA wildfire-related disaster declarations. • Wildfires have occurred within Seneca County. The county's agriculture industry could be severely impacted by a large wildfire.	NYS DHSES FEMA Input from Steering Committee and Planning Partnership

Hazard	In Seneca County: May Occur	In Seneca County: Poses Significant Threat	Why was this determination made?	Sources
			• Despite available data and the nature of the County, the Steering committee and Planning Partnership elected to not choose Wildfire as a hazard of concern.	
Wind	Yes	Yes	See severe weather	

Note: 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 Administration; NRCC = Northeast Regional Climate Center; NYSDEC = New York State Department of Environmental Conservation; NYS DHSES = New York State Division of Homeland Security and Emergency Services; SPC = Storm Prediction Center; USDA = U.S. Department of Agriculture; USGS = United States Geologic Survey

Based on the review of potential hazards of concern, eight hazards of concern were identified as significant hazards affecting the entire county, to be addressed at the County level in this plan (shown here in alphabetical order):

- Dam failure
- Drought
- Earthquake
- Extreme temperature
- Flood
- Landslide
- Severe weather
- Severe winter weather

Other natural and human-caused hazards of concern have occurred within Seneca County but have a low potential to occur, are addressed by other planning mechanisms, or do not result in significant impacts within the County. Therefore, these hazards are not addressed in this update. If deemed necessary by Seneca County, these hazards may be considered in future plan updates.

5.2 HAZARD SUMMARIES

As evaluated in this HMP, the selected hazards of concern may be described as follows:

- A dam is a structure built across a river or stream to hold back water. Dam failures occur when the dam is damaged, destroyed, or otherwise overtopped, releasing water or other liquid stored behind the dam.
- A drought is a period characterized by long durations of below-normal precipitation. Drought is a temporary irregularity that can affect agriculture, water supply, aquatic ecology, wildlife, and plant life.

- An earthquake is the sudden movement of the earth's surface caused by the release of stress accumulated within or along the edge of the earth's tectonic plates, a volcanic eruption, or human activities that cause geologic stresses.
- The extreme temperature hazard includes both heat and cold events, which can have a significant impact on human health, commercial/agricultural businesses, and primary and secondary effects on infrastructure (e.g., burst pipes and power failure). What constitutes "extreme cold" or "extreme heat" can vary across the country based on what the population is accustomed to. The 2025 HMP considers the heat island effect that occurs within developed areas.
- The flood hazard includes riverine flooding, lakeshore flooding, flash flooding, shallow flooding, ice jam flooding, urban drainage flooding, and dam failure flooding. Inclusion of the various forms of flooding under a general flood hazard is consistent with FEMA's multi-hazard identification and risk assessment guidance and the 2023 New York State HMP.
- The landslide hazard includes rock falls, rock topples, rotational slump, transitional slide, earth flows, creep, block slides, debris avalanche, and debris flows.
- The severe weather hazard includes windstorms that often entail 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 weather. For this HMP update, severe weather includes thunderstorms, hail, lightning, tornadoes, hurricanes, and tropical storms.
- The severe winter weather hazard includes blizzards, ice storms, snowstorms, sleet, and freezing rain.

These summaries are the same as those provided by FEMA (FEMA 2001, FEMA 2023d) and take into consideration the hazard grouping in the NYS HMP.

6. DAM FAILURE

6.1 HAZARD PROFILE

6.1.1 Hazard Description

A dam is an artificial barrier allowing storage of water, wastewater, or liquid-borne materials for many reasons (flood control, human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, recreation, or pollution control). Many dams fulfill a combination of functions (ASDSO 2022).

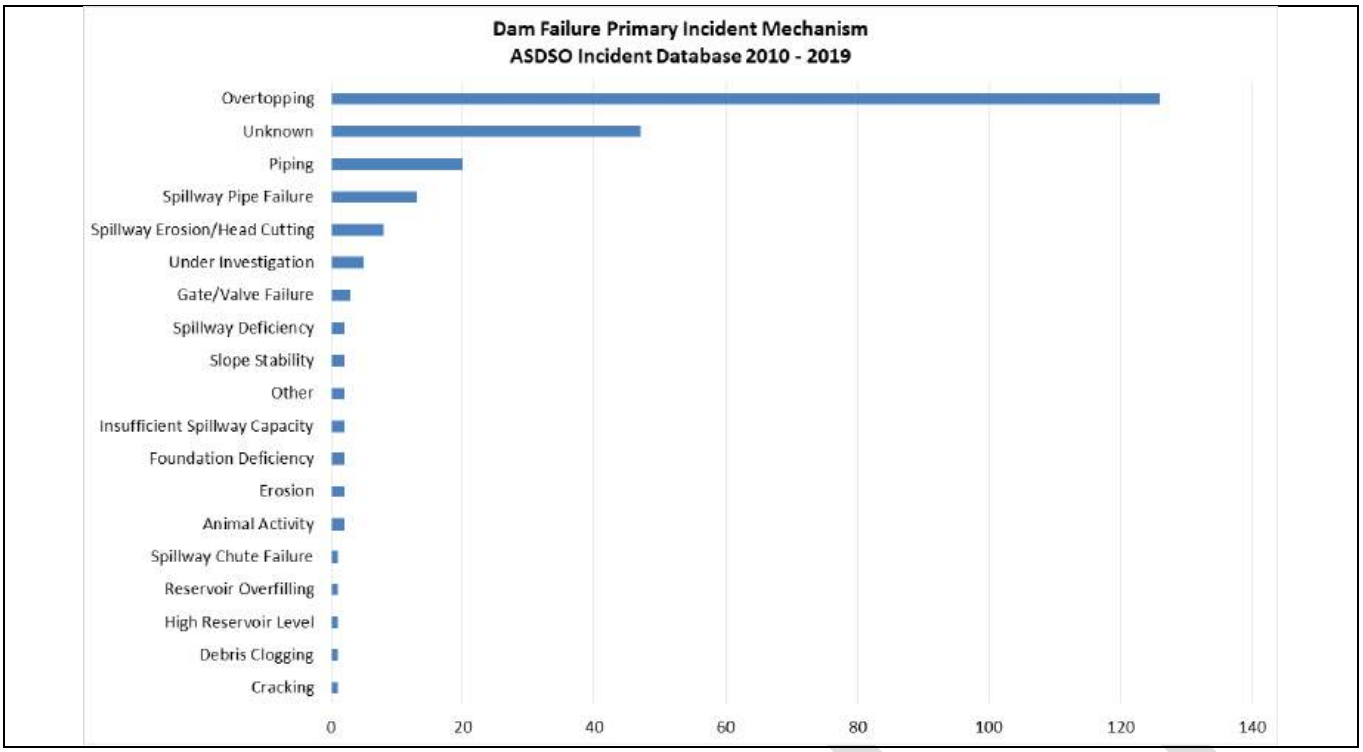
Human-built dams can be classified according to type of construction material used, methods applied in construction, slope, or cross-section of the dam, how a dam resists forces of water pressure behind it, means used to control seepage, and occasionally, purpose of the dam. Materials used for construction of dams include earth, rock, tailings from mining or milling, concrete, masonry, steel, and timber (ASDSO 2022).

Dams typically fail when spillway capacity is inadequate, and excess flow overtops the dam or when internal erosion occurs through the dam or its foundation. Complete failure occurs if internal erosion or overtopping results in a complete structural breach, releasing a high-velocity wall of debris-filled water that rushes downstream, damaging anything in its path. Dam failures can result from the following scenarios (FEMA 2018a):

- Overtopping caused by floods that exceed capacity of the dam
- Deliberate acts of sabotage
- Structural failure of materials used in dam construction
- Movement or failure of the foundation supporting the dam
- Settling and cracking of concrete or embankment dams
- Internal erosion of soil in embankment dams
- Inadequate maintenance and upkeep

Dam failures can occur suddenly and without warning during normal operating conditions or during a large storm or seismic event. Significant rainfall can quickly inundate an area and cause floodwaters to overwhelm a reservoir. If the spillway of the dam cannot safely pass the resulting flows, water will begin flowing in areas not designed for such flows, and a failure may occur. Figure 6-1 visualizes the primary causes of dam failures, nationally.

Figure 6-1. Dam Failure Causes



Source: ASDSO n.d.

Regulatory Oversight of Dams

New York State Department of Environmental Conservation

New York State dam safety regulations are established under the state codes, rules, and regulations for the New York State Department of Environmental Conservation's (NYSDEC) Division of Water Resources (N.Y. Comp. Codes R. & Regs. Tit. 6 Part 673).

The NYSDEC Dam Safety Section is responsible for safety inspection of dams, technical review of proposed dam construction or modification, monitoring of remedial work for compliance with dam safety criteria, and emergency preparedness for all dams in the state. NYSDEC is responsible for more than 100 flood control projects throughout the state, most of which were constructed by the U.S. Army Corps of Engineers (USACE) and are operated and maintained by NYSDEC (in some cases with local municipal partners) (NYSDEC 2014).

The state inspects high hazard dams every two years and moderate hazard dams every four years. To support emergency planning efforts and raise awareness among local officials and emergency managers, a copy of each inspection report is sent to the chief executive of the community in which the dam is located. Municipal officials or emergency managers from any municipality in the dam's inundation area may receive a copy of the inspection report upon request (NYSDEC 2023).

NYSDEC regulates dam safety and emergency action plans (EAPs) for all dams in New York. EAPs are formal dam failure procedures written by the dam owner/operator. They are site-specific plans that outline the facility's procedures to prevent/mitigate occurrence of a catastrophic dam failure. USACE is

responsible for submitting an EAP for each dam it owns, operates, and maintains. EAPs for hydroelectric dams fall under the purview of the Federal Energy Regulatory Commission (FERC).

U.S. Army Corps of Engineers Dam Safety Program

USACE is responsible for safety inspections of some federal and non-federal dams that meet the size and storage limitations specified in the National Dam Safety Act (Public Law 92-367). USACE has inventoried dams and has surveyed each state's and federal agency's capabilities, practices, and regulations regarding design, construction, operation, and maintenance of the dams. USACE has also developed guidelines for inspection and evaluation of dam safety (USACE 2014).

Federal Energy Regulatory Commission Dam Safety Program

FERC has the largest dam safety program in the United States (18 CFR Part 12). FERC cooperates with federal and state agencies to ensure and promote dam safety and homeland security. FERC staff inspect hydroelectric projects on an unscheduled basis to investigate the following (FERC 2022):

- Potential dam safety problems
- Complaints about constructing and operating a project
- Safety concerns related to natural disasters
- Issues concerning compliance with terms and conditions of a license

Every five years, an independent FERC-approved consulting engineer must inspect and evaluate projects with dams higher than 32.8 feet (10 meters) or with total storage capacity of more than 2,000 acre-feet (FERC 2022).

FERC monitors seismic research in areas where seismic activity is a concern. This information is applied to analyze structures of hydroelectric projects within these areas. FERC staff also evaluates effects of potential and actual large floods on safety of dams. FERC staff visit dams and licensed projects during and after floods, assess extents of damage, and direct any studies or remedial measures the licensee must undertake. FERC's *Engineering Guidelines for the Evaluation of Hydropower Projects* guides FERC engineering staff and licensees in evaluations of dam safety. The publication is frequently revised to reflect current information and methodologies (FERC 2017).

FERC requires licensees to prepare EAPs and conducts training sessions on developing and testing these plans. The plans outline an early warning system in the event of an actual or potential sudden release of water from a dam failure. The plans include operational procedures that may be implemented during regulatory measures, such as reducing reservoir levels and downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that all applicable parties are informed of the proper procedures in emergencies (FERC 2017).

FEMA Dam Safety Program

FEMA's National Dam Safety Program is a partnership among states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under this

program, states are responsible for regulating non-federal dams. The guidelines provide information for federal and state agencies, local governments, dam owners, and emergency management officials to use for reducing flood hazards and the resulting potential for economic damage and loss of life. It is a resource for developing state-specific guidelines for dam safety and as a reference manual for mapping dam breach inundation zones (FEMA 2013a).

Funding through this program allows all participating states to improve their programs through increased inspections, emergency action planning, and purchase of needed equipment. FEMA has expanded existing training programs and initiated new training programs (FEMA 2022a). Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most dams in the United States (FEMA 2023c).

6.1.2 Location

The USACE National Inventory of Dams lists four dams in Seneca County–two low hazard dams and two high hazard dams. The NYSDEC identifies 10 dams in Seneca County—two undesignated dams, six low hazard dams, and two high hazard dams (NYSDEC 2024). High hazard dams are required to develop EAPs. For the purpose of this plan, the NYSDEC dam inventory totals are utilized. These dams are listed in Table 6-1 by classification and municipality. Figure 6-2 shows dam locations and hazard classifications.

Table 6-1. Dams by Hazard Classification per Jurisdiction in Seneca County

Jurisdiction	Dam Name	Dam Owner	Waterbody	Hazard Potential Classification
Town of Seneca Falls	Seneca Falls Dam	New York State Canal Corporation	Seneca River	High
Village of Waterloo	Waterloo Dam	New York State Canal Corporation	Seneca Canal	High
Town of Tyre	Movable Dam at Mays Point	New York State Canal Corporation	Clyde River	Low
Town of Fayette	Henry W Hanley Dam	Hobart and William Smith Colleges	Cayuga Lake Tributary	Low
Town of Varick	Boyle Marsh Dam	Richard W. Boyle	Cayuga Lake Tributary	Low
Town of Ovid	State Ice Pond Dam	New York State	Simpson Creek	Low
Town of Lodi	Lehigh Valley Dam	Richard McCheyne	Mill Creek	Low
Town of Covert	Parlich Pond Dam	Parlich-Markovich	Cayuga Lake Tributary	Low
Town of Covert	Hector #4 Marsh Dam	U.S. Forest Service	Trumansburg Creek Tributary	Undetermined
Town of Covert	Hector #3 Marsh Dam	U.S. Forest Service	Bolter Creek Tributary	Undetermined

Source: NYSDEC 2024

Seneca Falls Dam

Seneca Falls Dam is a Class I High Hazard Dam that is located on the eastern end of where Van Cleef Lake meets the Seneca River. The dam is owned by the New York State Canal Corporation. Failure of the dam could result in inundation of densely populated areas, critical facilities and community lifelines, State Route 20, and local roadways including Johnston Street, Seneca Street, and Washington Street. Although the dam was last inspected in 2011, the risk of dam failure warrants an engineering evaluation to determine if retrofits of the dam would result in safer conditions. Several critical facilities may also be impacted from a dam failure including the Wastewater Treatment Plant, Scepter New York, Inc., Seneca Falls Hydroelectric Project, and an AM Transmission Tower. Critical facilities upriver from the Seneca Falls may also be at risk should the release of a dam failure cause a back flow of water. These facilities include several bridges, banks, temporary shelters, behavioral clinics, and daycare facilities; the Seneca Falls Police Station, Seneca Falls Volunteer Fire Department - West Station, and ITT Goulds Pumps. Figure 6-3 displays the high hazard potential dams in Seneca County and any nearby critical facilities.

Waterloo Dam

Waterloo Dam is a Class I High Hazard Dam that is located on the Seneca River where it meets the Seneca Canal. The dam is owned by the New York State Canal Corporation. Failure of the dam could result in inundation of densely populated areas, critical facilities and community lifelines, State Route 96, and local roadways including Locust Street, Huff Street, and Fayette Street. Although the dam was last inspected in 2011, the risk of dam failure warrants an engineering evaluation to determine if retrofits of the dam would result in safer conditions. Several critical facilities may also be impacted from a dam failure including Generations Bank, Waterloo Hydroelectric Project, the County Highway Garage, Waterloo Volunteer Fire Department, and several bridges. Critical facilities downriver from the Waterloo may also be at risk due to the increased rate of water flow. These facilities include the Wastewater Treatment Plant, Bruno Bock Thiochemicals, Huntington Living Center, and Geneva Adult Day Care at Waterloo. Figure 6-3 displays the high hazard potential dams in Seneca County and any nearby critical facilities.

Figure 6-2. Dam Locations in Seneca County

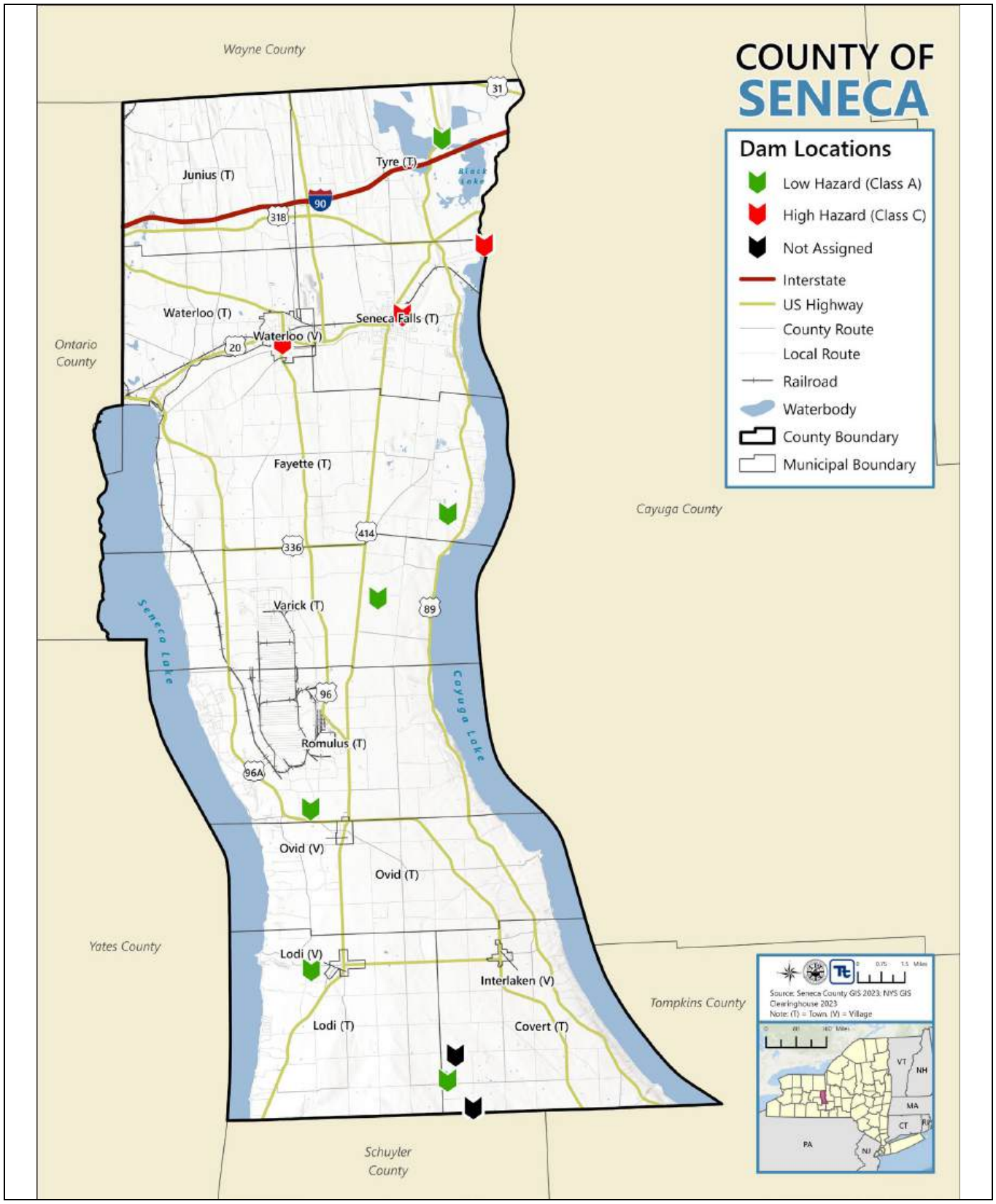
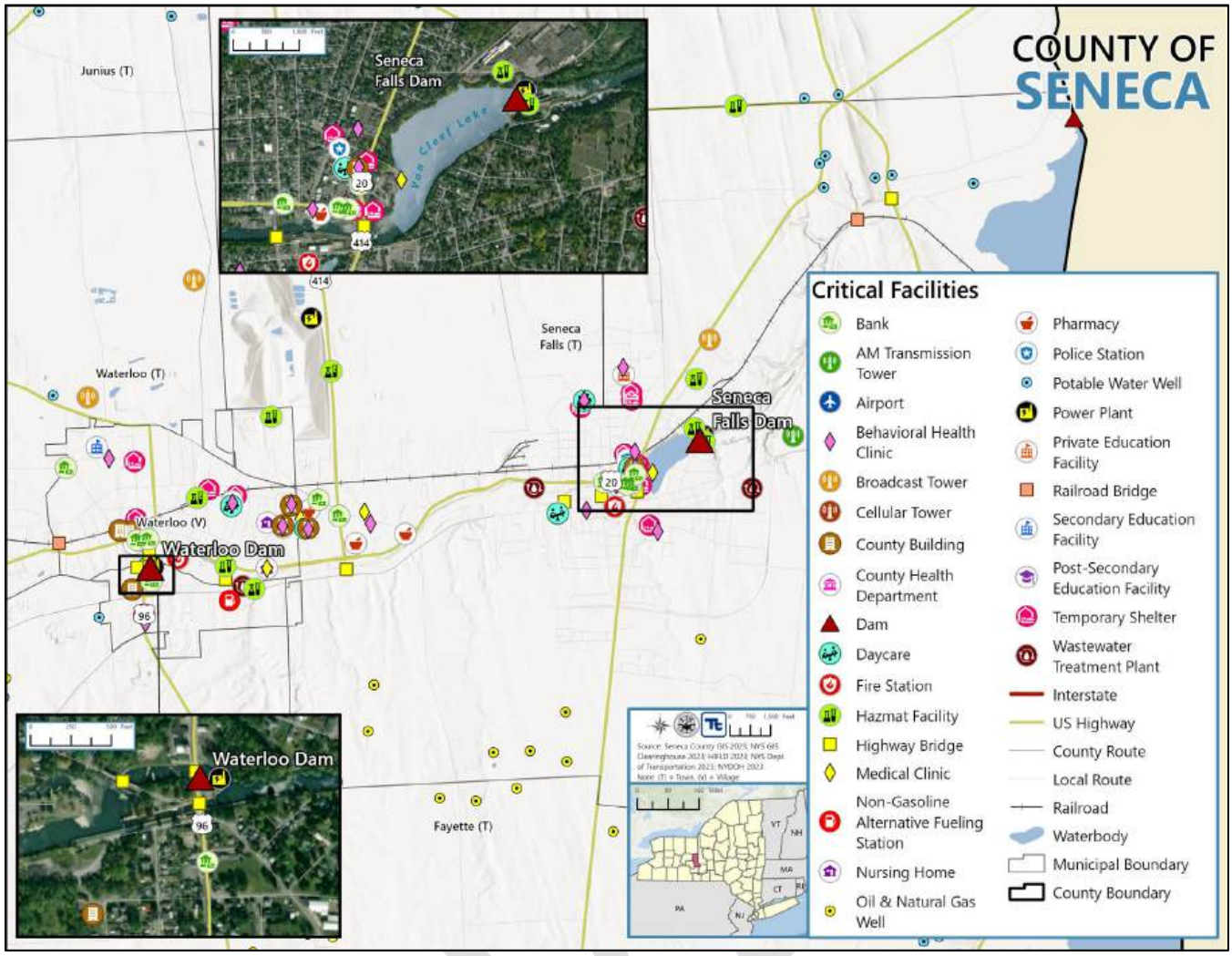


Figure 6-3. High Hazard Potential Dams and Nearby Critical Facilities



6.1.3 Extent

New York has seen significant property damage because of storm events and dam failures, including damage or loss of dams, bridges, roads, and buildings. Several state and federal agencies assign ratings to dams based on the potential consequences of the dam's failure. These ratings represent the hazard extent for dam failure. Two such rating systems are described in the sections below. All of these classifications are based on the consequences of dam failure, not the likelihood of failure occurring.

New York State Department of Environmental Conservation

The NYSDEC Bureau of Flood Protection and Dam Safety assigns hazard ratings to dams as follows, according to the potential impacts if the dam should fail. (NYSDEC 2009):

- **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 located 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 a dam that has been breached or removed, has failed or otherwise no longer materially impounds waters, or 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 (NYSDEC 2009).

U.S. Army Corps of Engineers

Table 6-2 lists USACE-developed classifications of hazard potentials of dam failures, based on potential consequences of a dam failure.

Table 6-2. USACE Dam Hazard 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 2014

6.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Seneca County has not been included in any major disaster (DR) or emergency (EM) declarations for dam failure-related events (FEMA 2024).

USDA Declarations

Since the previous Seneca County HMP, the County has not been included in any USDA declarations issued for dam failure-related events (USDA 2024).

Previous Events

There are no known dam failure-related events that impacted Seneca County since the County's previous HMP update. (Association of State Dam Safety Officials 2024, Stanford University 2018).

6.1.5 Probability of Future Occurrences

Probability Based on Past Events

Information on previous dam failure occurrences in the County was used to calculate the probability of future occurrence of such events. Based on historical records and input from the Steering Committee, the likely frequency of future occurrence of dam failure in the County is occasional.

Potential Effect of Climate Change on Hazard Probability

Projections of climate change for New York State and for the Central/Finger Lakes region that includes Seneca County are summarized in Chapter 3.6.4. Dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hygrograph changes, it is conceivable that the dam can lose some of its designed margin of safety. Loss of designed margin of safety may cause floodwaters more readily to overtop the dam or create unintended loads. This can increase the future probability of dam failure.

6.1.6 Cascading Impacts on Other Hazards

Potential secondary hazards of dam failure are downstream flooding, landslides around the reservoir perimeter, bank erosion on the rivers, and destruction of downstream habitat (FEMA 2013). 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.

6.2 VULNERABILITY AND IMPACT ASSESSMENT

The dam failure hazard is of significance to Seneca County because 10 dams are present across the County, two of which are identified as high hazard (Table 6-1) (USACE 2024). Dam failure inundation

maps and downstream hazard areas are considered sensitive information and are not made available in the Seneca County HMP. To assess Seneca County's risk from dam failure, a qualitative review was implemented.

6.2.1 Life, Health, and Safety

Overall Population

Dam failure may mimic flood events, depending on the size of the dam reservoir and breach. it can cause, in the most extreme case, loss of life or physical injury. It can cause persons to become displaced if flooding of structures occurs.

Dam failure impacts depend on the severity of the event and whether advance warning is possible. People living in or near the inundation areas are most vulnerable to the hazard. Other vulnerable populations include people traveling in inundated areas, or anyone whose access to emergency services is compromised during an event. The degree of impact varies and is not strictly measurable.

Socially Vulnerable Population

Vulnerable populations, while they may not have more exposure to the dam failure hazard, can experience exacerbated impacts from a dam failure and prolonged recovery after the event due to their physical and financial ability to react. The most vulnerable include the economically disadvantaged and the population over age 65. Economically disadvantaged populations may be more vulnerable if they lack the financial resources to evacuate. The population over age 65 is more vulnerable because they are more likely to need medical attention that may not be available due to isolation during a dam failure event. They also may have more difficulty evacuating.

Table 3-7 shows social vulnerability statistics for Seneca County and participating municipalities from the 2022 ACS 5-year estimates. Table 3-8 shows low-income populations based on United for ALICE data for 2022. The municipalities with the highest and lowest numbers and percentages in each social vulnerability category are listed in Table 6-3.

Table 6-3. Municipalities With Highest and Lowest Socially Vulnerable Populations

	Municipality Highest in Category		Municipality Lowest in Category	
Category	Number	Percent	Number	Percent
Population Over 65	Seneca Falls (T)	Interlake (V)	Lodi (V)	Junius (T)
	1,873	**24.9%**	**56**	**11.4%**
Population Under 5	Seneca Falls (T)	Lodi (V)	Ovid (V)	Ovid (V)
	435	**10.6%**	**11**	**2.1%**
Non-English-Speaking Population	Seneca Falls (T)	Ovid (V)	Covert (T), Interlaken (V), Lodi (T and V), Tyre (T)	
	115	**3.4%**	**0**	**0.0%**
Population With Disability	Seneca Falls (T)	Waterloo (V)	Lodi (V)	Romulus (T) and Fayette (T)
	1,792	**20.3%**	**49**	**9.2%**
Population Below Poverty Level	Seneca Falls (T)	Varick (T)	Lodi (V)	Romulus (T)

Category	Municipality Highest in Category		Municipality Lowest in Category	
	Number	Percent	Number	Percent
	1,399	**18.4%**	**28**	**6.8%**
Households Below ALICE Threshold (2022)	Seneca Falls (T)	Lodi (V)	Lodi (V)	Romulus (T)
	2,091	**64.9%**	**85**	**33.7%**

Note: All data from 2022 5-year ACS (see Table 3-7) except ALICE data from 2022 United for Alice (see Table 3-8).

6.2.2 General Building Stock

All buildings in the dam failure inundation zone are vulnerable to dam failure. Property closest to the dam inundation area has the greatest potential to experience the largest, most destructive surge of water. Widespread damage to buildings affected by an event would result in large costs to repair these locations.

6.2.3 Community Lifelines and Other Critical Facilities

Dam failure may impact critical facilities and infrastructure in the inundation zone. Dam failure can cut evacuation routes, limit emergency access, and create isolation issues. Widespread damage to infrastructure affected by an event would result in large costs to repair these locations. Utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for people in the inundation areas.

Flood waters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooding waterway. Water supplies and wastewater treatment could be off-line for weeks.

6.2.4 Economy

Dam failure events can significantly impact the local and regional economy. Businesses can be closed while flood waters retreat, and utilities are returned to a functioning state. Other impacts include tax loss associated with general building stock damage, impacts on utilities and infrastructure, and impacts on tourism. In areas that are directly flooded, renovations of commercial and industrial buildings may be necessary, disrupting associated services.

6.2.5 Natural, Historic, and Cultural Resources

Natural

The environment is vulnerable to several risks in the event of a dam failure. Water releases from dams can lead to scouring of riverbeds and banks. The inundation may introduce foreign elements into local waterways, resulting in destruction of downstream habitat and impacting animal and plant species, especially endangered species. The subsequent rush of water downstream can rapidly increase flow rate and turbidity of streams and rivers in minor dam failures or overwhelm terrestrial habitat with floodwaters in severe dam failure events.

Dam failures can often result in the release of hazardous materials, swept up in floodwaters or accumulated in sediment that is contained behind the dam as is often the case in areas that have had mining activities take place upstream. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals get added to flood waters. After the flood waters subside, contaminated and flood damaged building materials and contents must be properly disposed. Contaminated sediment must be removed from buildings, yards, and properties.

Historic

Historic buildings and structures, sites, monuments, districts, and historic documents are often irreplaceable, and may become damaged or destroyed in the flood waters following a dam failure.

Cultural

Cultural resources include “moveable heritage,” such as collections of artifacts, statuary, artwork, and important documents or repositories. These resources are housed in libraries, museums, archives, historical repositories, or historic properties. Flood waters following a dam failure create the largest risk to these resources.

6.3 CHANGE OF VULNERABILITY SINCE 2018 HMP

Seneca County remains vulnerable to the dam failure hazard. To estimate losses to these elements in the future, dam inundation areas and depths of flooding may be used to generate depth grids and better analyze vulnerability. Hazus could be used to estimate potential losses. Inspections of dams may inform the status of each dam and maintenance and mitigation measures that may be needed.

6.4 FUTURE CHANGES THAT MAY AFFECT RISK

6.4.1 Potential or Planned Development

Any new development in the dam failure inundation zone would represent increased assets at risk from the dam failure hazard. Specific areas of recent and future development are indicated in tables and maps included in Volume II of this plan.

6.4.2 Projected Changes in Population

The population of Seneca County decreased by about 4 percent from 2010 to 2020 and is projected to continue decreasing through 2040 (Cornell University 2018). Any changes in the density of population resulting from this shift could impact the number of persons exposed to the dam failure inundation hazard. Higher density can create issues for local residents during evacuation from a dam failure event and can impact commuters that travel into and out of Seneca County for work.

6.4.3 Climate Change

Seneca County is expected to experience increased precipitation and more frequent, intense storms. Excessive rainfall often causes a dam to overflow since these structures are designed partly based on assumptions about river flow and precipitation patterns. More frequent and intense precipitation can lead to more intense dam overtopping, potentially affecting a larger area and producing stronger water velocities that exacerbate damages to general building stock and critical facilities.

With the projected increase in global temperature, it is anticipated that sea levels will increase due to thermal expansion of warmer ocean waters and melting ice sheets and glaciers. Sea level rise can impact the amount of water in Lake Ontario, impacting inland communities whose lakes and rivers are connected to Lake Ontario (NASA n.d.).

7. DROUGHT

7.1 HAZARD PROFILE

7.1.1 Hazard Description

A drought is a period of unusually constant dry weather that persists long enough to cause deficiencies in water supply (surface or underground) that can last a short period or many years. Droughts are slow-onset hazards that over time can severely affect crops, municipal water supplies, recreational resources, and wildlife. If drought conditions extend over several years, the direct and indirect economic impacts can be significant. High temperatures, high winds, and low humidity can worsen drought conditions and make areas more susceptible to wildfire. In addition, human actions and demands for water resources can accelerate drought-related impacts (MitigateNY 2018). Droughts can be classified as one or more of the following types (NDMC 2023):

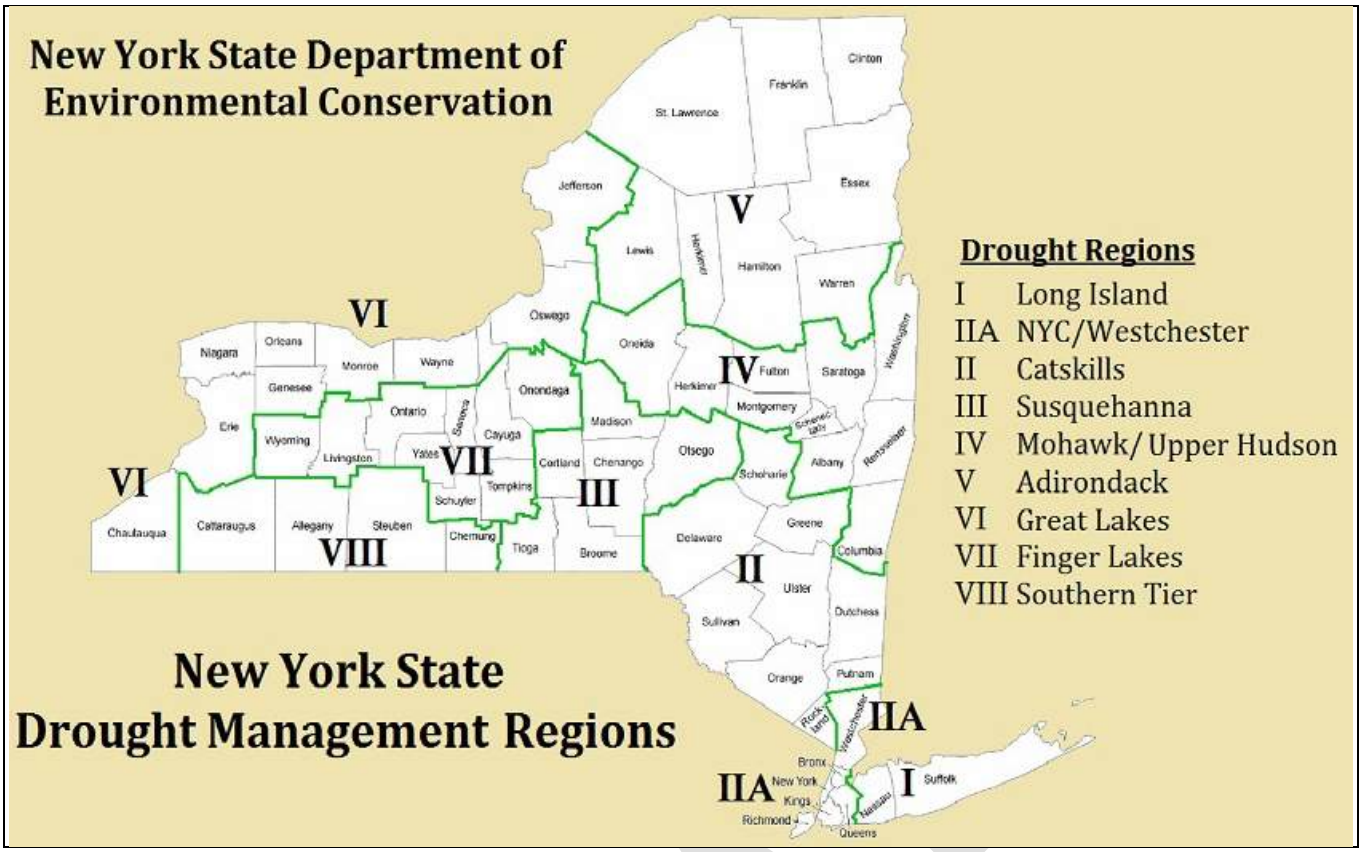
- **Meteorological** drought is a departure of precipitation from normal. It is defined solely by the relative degree of dryness. Due to climatic differences, what might be considered a drought in one location of the country may not be a drought in another location.
- **Agricultural** drought is when there is not enough water available for a particular crop to grow at a particular time due to precipitation shortages, soil water deficits, reduced groundwater or reservoir levels, and other parameters. Agricultural drought is defined in terms of soil moisture deficiencies relative to water demands of plant life.
- **Hydrological** drought when surface or subsurface water supply is below normal because periods of precipitation shortfalls (including snowfall) have lowered stream flows and reservoir, lake, and groundwater levels.
- **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. The supply of many economic goods depends on the weather (for example, water, forage, food grains, fish, and hydroelectric power).
- **Ecological** drought is a prolonged and widespread deficit in naturally available water supplies that creates multiple stresses across ecosystems.

7.1.2 Location

Droughts can occur in all parts of the United States and any time of the year. Drier regions are more susceptible to long-term or extreme drought conditions, while other areas tend to be more susceptible to short-term, less severe droughts. Variations in the precipitation amounts can lead to periods of dry weather and drought. In the State of New York, average precipitation amounts range from 60 inches in the Catskills to 28 inches in the Lake Champlain Valley (NYSDEC 2023).

The State of New York is divided into nine drought management regions. Drought status determinations are based on a State Drought Index, which uses New York State-specific attributes. In addition, local conditions may vary, so some areas of the state may make their own determinations of drought stage using locally focused criteria. Seneca County is located in Drought Management Region VII, which encompasses the Finger Lakes region of New York, as shown in Figure 7-1 (NYSDEC 2023).

Figure 7-1. NYSDEC Drought Management Regions of New York State



Source: NYSDEC 2023

7.1.3 Extent

When a drought occurs, the agricultural industry is most at risk in terms of economic impact and damage. According to the 2022 Census of Agriculture, Seneca County is home to 422 farms covering 103,156 acres (USDA 2024). Some farms have access to Seneca County Water Authority for tank loads during emergencies. Many dairy operations on the west side of Seneca County are on well water, while many horse operations in the County are on public water service. In cases of emergency, tank loads can be dumped into wells or on-site water tanks can be delivered. A minority of crop farmers in Seneca County have irrigation and access to an emergency water source.

The severity of a drought depends on moisture deficiency, duration, and size 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 Palmer Drought Severity Index (PDSI) is a commonly used drought indicator and is primarily based on soil conditions. These are typically the first indicators that a moisture deficit is present. As shown in Table 7-1, PDSI values range from negative 5 to positive 5, where positive values indicate wetter conditions and negative values represent drier conditions (NYSDEC 2023).

Table 7-1. PDSI 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
-2.0 to -2.99	Moderate drought
-3.0 to -3.99	Severe drought
-4.0 or less	Extreme drought

Source: NDMC 2013

The State of New York also tracks the Standardized Precipitation Evapotranspiration Index (SPEI) as an additional drought measurement tool. The SPEI, along with the PDSI, can be used to evaluate the levels of soil moisture and forecast potential impacts to agriculture within the state. The PDSI and SPEI are monitored to help the State understand potential impacts of drought on agricultural conditions (NYSDEC 2023).

Another drought indicator in New York State is the State Drought Index (SDI), developed by the NYSDEC. The SDI evaluates drought conditions on a more comprehensive basis by measuring whether numerous indicators reach dire thresholds. The data collected is compared against critical threshold values to show a normal or changeable drought condition. The indicators are weighted on a regional basis to reflect the unique circumstances of each drought management region. The State of New York uses the SDI to determine if any regions of the state are experiencing the following levels of drought conditions (NYSDEC 2023):

- **Normal** is considered the standard moisture soil level found throughout New York State.
- **Drought Watch** is the least severe of the stages; a drought watch is declared when a drought is developing. Public water suppliers begin to conserve water and urge customers to reduce water use.
- **Drought Warning** is more severe; voluntary water conservation is intensified. Public water suppliers and industries update and implement local drought contingency plans. Local agencies make plans in case of emergency declaration.
- **Drought Emergency** is issued by the Governor. The Disaster Preparedness Commission coordinates response. Mandatory local/county water restrictions may be imposed. Communities may need to access alternative water sources to avoid depleting water supplies, protect public health, and provide for essential uses.
- **Drought Disaster** triggers the implementation of drought plans. Water use is further restricted. The Governor may declare a disaster and request federal disaster assistance. Emergency legislation may be enacted. The STATE provides equipment and technical assistance to communities.

Table 7-2 lists the SDI index ranges for each drought stage.

Table 7-2. 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

7.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Seneca County has not been included in any federal major disaster (DR) or emergency (EM) declarations for drought-related events (FEMA 2024).

USDA Declarations

Since the previous Seneca County HMP, the County has not been included in any USDA declarations issued for drought-related events (USDA 2024).

Previous Events

Known drought-related hazard events that impacted Seneca County between January 2017 and October 2024 are listed in Table 7-3.

Table 7-3. Drought Events in Seneca County (2017 to 2024)

Event Date	Event Type	Disaster Declaration/Proclamation		Location Impacted	Description
		Number	County Included?		
February 14–March 16, 2017	Drought Watch	N/A	N/A	Statewide	All of New York remained in a drought watch. Some parts of the state had precipitation deficits of 16 inches since Nov. 1, 2015.
September 26–October 30, 2017	Drought	N/A	N/A	Countywide	Seneca County was in D0 drought status.
June 19–July 30, 2018	Drought	N/A	N/A	Statewide	Hot, dry conditions were starting to harm corn, soybeans, and other crops. Dry conditions also reduced hay production.

Event Date	Event Type	Disaster Declaration/Proclamation		Location Impacted	Description
		Number	County Included?		
June 22, 2020–May 10, 2021	Drought	N/A	N/A	Countywide	From June 22 to August 17, 2020, Seneca County was in D0 drought status. From August 18 to December 28, 2020, Seneca County was in D1 drought status. The County re-entered D0 drought status on December 29, 2020, and exited drought status on May 10, 2021.
May 17–November 14, 2022	Drought	N/A	N/A	Countywide	From May 17 to July 18, 2022, Seneca County was in D0 drought status. From July 19 to August 29, 2022, Seneca County was in D1 drought status. The County re-entered D0 drought status on August 30 and exited drought status on September 28, 2022.
July 29–August 28, 2022	Drought Watch	N/A	N/A	Western New York	Below-normal precipitation, low stream flows, and low groundwater levels prompted action to ensure adequate public water supplies. Local public water suppliers were urged to promote voluntary conservation and take actions to manage risk.
October 25–November 8, 2022	Drought	N/A	N/A	Countywide	Seneca County was in D0 drought status.
December 13, 2022–March 6, 2023	Drought	N/A	N/A	Countywide	Seneca County was in D0 drought status.
May 30–June 26, 2023	Drought	N/A	N/A	Countywide	Seneca County was in D0 drought status.
October 24–December 25, 2023	Drought	N/A	N/A	Countywide	Seneca County was in D0 drought status.
June 18–July 9, 2023	Drought	N/A	N/A	Countywide	Seneca County was in D0 drought status.

Source: National Drought Mitigation Center 2024; U.S. Drought Monitor 2024; FEMA 2024; NOAA NCEI 2024

7.1.5 Probability of Future Occurrences

Probability Based on Past Events

The above information on previous drought occurrences in the County was used to calculate the probability of future occurrence of such events. Based on risk factors for past occurrences, it is likely that droughts of varied severity will occur across New York State and Seneca County in the future. The County will continue to experience direct and indirect impacts of drought on occasion, with potential disruption or damage to agricultural activities and shortages in community water supplies. Based on historical records and input from the Steering Committee, the likely frequency of future occurrence of drought in the County is occasional.

Potential Effect of Climate Change on Hazard Probability

Since 1895 to 2022, New York State has become slightly wetter but has continued to experience short-term droughts, especially in the summer. Projections of future climate change for New York State and for the Central/Finger Lakes region that includes Seneca County are summarized in Chapter 3.6.4. Long, multiyear droughts are not expected to increase in New York State. However, short-term seasonal droughts lasting weeks or months could increase, especially in the summer. This is because of precipitation falling in more intense bursts with longer dry spells in between, as well as higher temperatures in the summer, causing more water to evaporate. Reduced snow cover may also play a role, as soils dry out sooner because snow melts earlier. The potential increase of short-term droughts may impact water systems, resulting in water shortages that will impact crop yields (Stevens & Lamie 2024).

In the Central Lakes region, the number of days per year with maximum temperatures over 90 to 95 °F and the total number of heat waves per year are expected to increase into the 2070s (Stevens & Lamie 2024). These increases in temperature have the potential to worsen drought conditions, elevating the risk for adverse impacts for Seneca County.

7.1.6 Cascading Impacts on Other Hazards

Drought can lead to increasing temperatures and evaporation of moisture, which are ideal conditions for wildfires. Dry, hot, and windy weather combined with dry vegetation is more susceptible to sparking wildfires when met with a spark created by humans or natural events, such as lightning (NIDIS 2023).

7.2 VULNERABILITY AND IMPACT ASSESSMENT

7.2.1 Life, Health, and Safety

Overall Population

The entire population of Seneca County (33,814 as of 2020) is vulnerable to drought events. 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 can also lead to loss of human life (NDMC 2023). 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 2020).

Socially Vulnerable Population

Groups that are more vulnerable to the impacts of drought include those with limited financial capacity to adapt to a changing environment and those in rural areas with poorly maintained or aging public infrastructure that cannot keep pace with increased water demand from the population. Drought can often result in impacts on food systems that will decrease food quality and availability. Some communities of color and low-income populations struggle to obtain nutritious food in ideal conditions; severe drought conditions are likely to further exacerbate this issue. (US EPA 2023).

Vulnerable populations include homeless persons, people over 65 years old, low-income or linguistically isolated populations, people with life-threatening illnesses, and residents who have limited access to water. These groups may require extra water supplies or need assistance to obtain water and are more likely to need medical attention.

Table 3-7 shows social vulnerability statistics for Seneca County and participating municipalities from the 2022 ACS 5-year estimates. Table 3-8 shows low-income populations based on United for ALICE data for 2022. The municipalities with the highest and lowest numbers and percentages in each social vulnerability category are listed in Table 7-4.

Table 7-4. Municipalities With Highest and Lowest Socially Vulnerable Populations

Category	Municipality Highest in Category		Municipality Lowest in Category	
	Number	Percent	Number	Percent
Population Over 65	Seneca Falls (T)	Interlake (V)	Lodi (V)	Junius (T)
	1,873	**24.9%**	**56**	**11.4%**
Population Under 5	Seneca Falls (T)	Lodi (V)	Ovid (V)	Ovid (V)
	435	**10.6%**	**11**	**2.1%**
Non-English-Speaking Population	Seneca Falls (T)	Ovid (V)	Covert (T), Interlaken (V), Lodi (T and V), Tyre (T)	
	115	**3.4%**	**0**	**0.0%**
Population With Disability	Seneca Falls (T)	Waterloo (V)	Lodi (V)	Romulus (T) and Fayette (T)
	1,792	**20.3%**	**49**	**9.2%**
Population Below Poverty Level	Seneca Falls (T)	Varick (T)	Lodi (V)	Romulus (T)
	1,399	**18.4%**	**28**	**6.8%**
Households Below ALICE Threshold (2022)	Seneca Falls (T)	Lodi (V)	Lodi (V)	Romulus (T)
	2,091	**64.9%**	**85**	**33.7%**

Note: All data from 2022 5-year ACS (see Table 3-7) except ALICE data from 2022 United for Alice (see Table 3-8).

7.2.2 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 where forested areas adjoin urbanized areas (high-density residential, commercial, and industrial).

7.2.3 Community Lifelines and Other Critical Facilities

Drought events generally do not impact buildings; however, droughts have the potential to impact agriculture-related facilities and critical facilities that are associated with water supplies such as potable water used with fire-fighting services.

Drought affects groundwater sources, but generally not as quickly as surface water supplies. Groundwater supplies generally take longer to recover. Reduced precipitation during a drought means that groundwater supplies are not replenished at a normal rate. This can lead to a reduction in groundwater levels and problems such as reduced pumping capacity or wells going dry. Shallow wells are more susceptible than deep wells. Reduced replenishment of groundwater affects streams also. Much of the flow in streams comes from groundwater, especially during the summer when there is less precipitation and after snowmelt ends. Reduced groundwater levels mean that even less water will enter streams when steam flows are lowest.

7.2.4 Economy

Drought causes many economic impacts on agriculture. In addition to reduced yields in crops and livestock, drought contributes to increased insect infestations, plant diseases, and wind erosion. Based on the 2022 Census of Agriculture, 422 farms were present in Seneca County, encompassing 103,156 acres of farmland. The average farm size was 244 acres. Seneca County farms had a total market value of products sold of $110,379,000, averaging $261,561.61 per farm (USDA 2024) .

Costs associated with drought-related agricultural losses are often passed on to consumers through increased prices or are offset through government disaster assistance programs. Prices for food, energy, and other products may increase as supplies decrease (NYS DHSES 2023). Indirect impacts of drought can include reduced supplies to downstream industries, such as food processors, and reduced demand for inputs, such as fertilizer and farm labor. As noted in the 2023 New York State HMP, economic impacts that could occur from drought include the following (NYS DHSES 2023):

- Decreased land values
- Loss to industries directly dependent on agricultural production (machinery and fertilizer manufacturers, food processors, dairies, etc.)
- Unemployment from 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

The recreation and tourism industries may also undergo a loss of income because of increased costs of food, energy, and other products as supplies decrease. Local shortages of certain goods trigger the need to import goods from outside the affected region. Reduced water supply affects the use of rivers and other water bodies. Hydropower production may be impacted by drought (NYS DHSES 2023).

7.2.5 Natural, Historic, and Cultural Resources

Natural

Drought can impact the environment because it can trigger wildfires, increase insect infestations, and exacerbate the spread of disease (CDC 2020). Droughts 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 because they are dependent on steady water levels and soil moisture availability to sustain growth (NIDIS 2023).

Historic

The primary impacts on historic resources from drought would be an increased risk of wildfires, which could threaten these assets, and impacts on structure foundations from the shrink-swell cycle of expansive soils.

Cultural

The primary impacts on cultural resources from drought would be an increased risk of wildfires, which could threaten these assets, and impacts on structure foundations from the shrink-swell cycle of expansive soils.

Droughts may impact the traditional and customary practices of Indigenous persons, who rely on healthy terrestrial ecosystems. These practices may include the collection of plants, animals, and minerals and other practices. Drought and its secondary impacts on watersheds and nearshore waters may impair, diminish, or impede the exercise of traditional and customary practices.

Drought impacts on agriculture in the County could also negatively impact events associated with agriculture, including farmers markets and harvest festivals.

7.3 CHANGE OF VULNERABILITY SINCE 2018 HMP

The total population across Seneca County has experienced a slight decrease since the previous HMP, which can place less stress on the water supply during a drought event. However, the average size of farms has increased since the 2017 USDA report by 6 percent, which may increase the overall stress on the water supply during a drought event.

7.4 FUTURE CHANGES THAT MAY AFFECT RISK

7.4.1 Potential or Planned Development

Any areas of new development in the County could be susceptible to drought. Specific areas of recent and future development are indicated in tables and maps included in Volume II of this plan.

7.4.2 Projected Changes in Population

The population of Seneca County decreased by about 4 percent from 2010 to 2020 and is projected to continue decreasing through 2040 (Cornell University 2018). Any changes in the distribution of the population can impact the source of water resources required to sustain the user demand of each household, agricultural operation, and business operation.

7.4.3 Climate Change

Certain conditions and practices can amplify the adverse impacts of changing weather patterns including degraded soils, simplified landscapes, and intensive inputs, which results in a positive feedback loop of continually worsening conditions. While current conditions have not yet significantly adversely impacted the agricultural sector within the County, it is anticipated that as temperatures rise and drought becomes more common and persistent, farms will decrease in number and their ability to grow necessary crops will be inhibited.

8. EARTHQUAKE

8.1 HAZARD PROFILE

8.1.1 Hazard Description

An earthquake is the sudden movement of the earth's surface caused by the release of stress accumulated within or along the edge of the earth's tectonic plates (FEMA 2013). Most earthquakes occur at the boundaries where the tectonic plates meet (faults). As plates continue to move and plate boundaries change over geologic time, weakened boundary regions become part of the interiors of the plates. These zones of weakness within the continents can cause earthquakes in response to stresses that originate at the edges of the plate or in the deeper crust. Although fewer than 10 percent of earthquakes occur within plate interiors, New York State is in an area where plate interior-related earthquakes occur (Shedlock and Pakiser 1997).

The closest plate boundary to the East Coast is the Mid-Atlantic Ridge, about 2,000 miles east of New York. Over 200 million years ago, when the continent Pangaea rifted apart to form the Atlantic Ocean, the northeast coast of America was a plate boundary. Being at the plate boundary, many faults were formed in the region. Although these faults are geologically old and are contained in a passive margin, they act as pre-existing planes of weakness and concentrated strain. When a strain exceeds the strength of the ancient fault, it ruptures, causing an earthquake (NPS 2020).

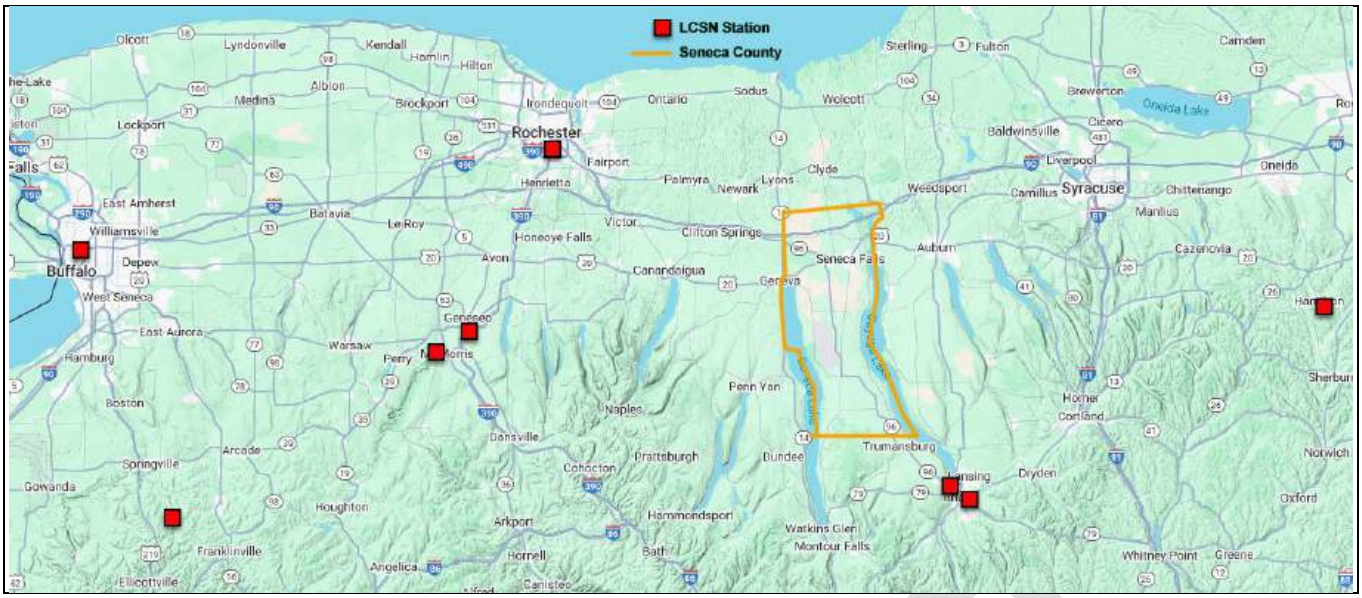
The earthquake hazard in New York State is often underestimated because other natural hazards occur more frequently and have had major events more recently than any major earthquake event (NYS DHSES 2023). However, the potential for earthquakes exists across all of northeastern United States. The New York City Area Consortium for Earthquake Loss Mitigation (NYCEM) ranks New York State as having the third highest earthquake activity level east of the Mississippi River (NYCEM 2003).

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

Earthquake Monitoring

The Lamont-Doherty Cooperative Seismographic Network (LCSN) monitors earthquakes that occur primarily in the northeastern United States. The goals of the monitoring project are to compile a complete earthquake catalog for this region, to assess the earthquake hazards, and to study the causes of the earthquakes in the region. The LCSN operates 40 seismographic stations in seven states: Connecticut, Delaware, Maryland, New Jersey, New York, Pennsylvania, and Vermont. No seismographic stations are located in Seneca County; however, there are several within the vicinity of Seneca County, as shown on Figure 8-1.

Figure 8-1. Lamont-Doherty Seismic Station Locations in the Western New York State Area



Source: FDSN n.d.

The USGS operates a global network of seismic stations to monitor seismic activity. While no seismic stations are located in New York State, nearby stations are positioned in State College, Pennsylvania, and Oak Ridge, Massachusetts, as shown on Figure 8-2.

Figure 8-2. USGS Seismic Stations near New York State

Source: USGS 2015
Note: The red circle indicates the approximate location of Seneca County.

Seismic Hazards

According to the U.S. Geological Society (USGS) Earthquake Hazards Program, an earthquake hazard is anything associated with an earthquake that may affect residents' normal activities (FEMA 2001). The program defines the following types of earthquake hazards (USGS 2012):

- **Surface faulting:** A displacement that reaches the earth's surface during slip along a fault. Commonly occurs with shallow earthquakes, which are those with a focal depth of less than 12 miles.
- **Ground motion (shaking):** The movement of the earth's surface from earthquakes. Ground motion or shaking is produced by waves that are generated by sudden slip on a fault and travel through the earth and along its surface.
- **Landslide**: A movement of surface material down a slope.
- **Liquefaction:** A process by which water-saturated sediment temporarily loses strength and acts as a fluid, like wet sand near the water at the beach. This effect can be caused by earthquake shaking.
- **Tectonic deformation:** A change in the original shape of a material due to stress and strain.
- **Seiche**: The sloshing of a closed body of water from earthquake shaking.

8.1.2 Location

Three regions of New York State have a higher seismic risk than other parts of the state (NYS DHSES 2014):

- The north and northeast third of the state, which includes the North Country/Adirondack region and a portion of the greater Albany-Saratoga region
- The southeast corner, which includes the greater New York City area and western Long Island
- The northwest corner, which includes Buffalo and its surrounding area

Seneca County lies in the greater Buffalo region of the state, placing it within an area of relatively elevated seismic activity.

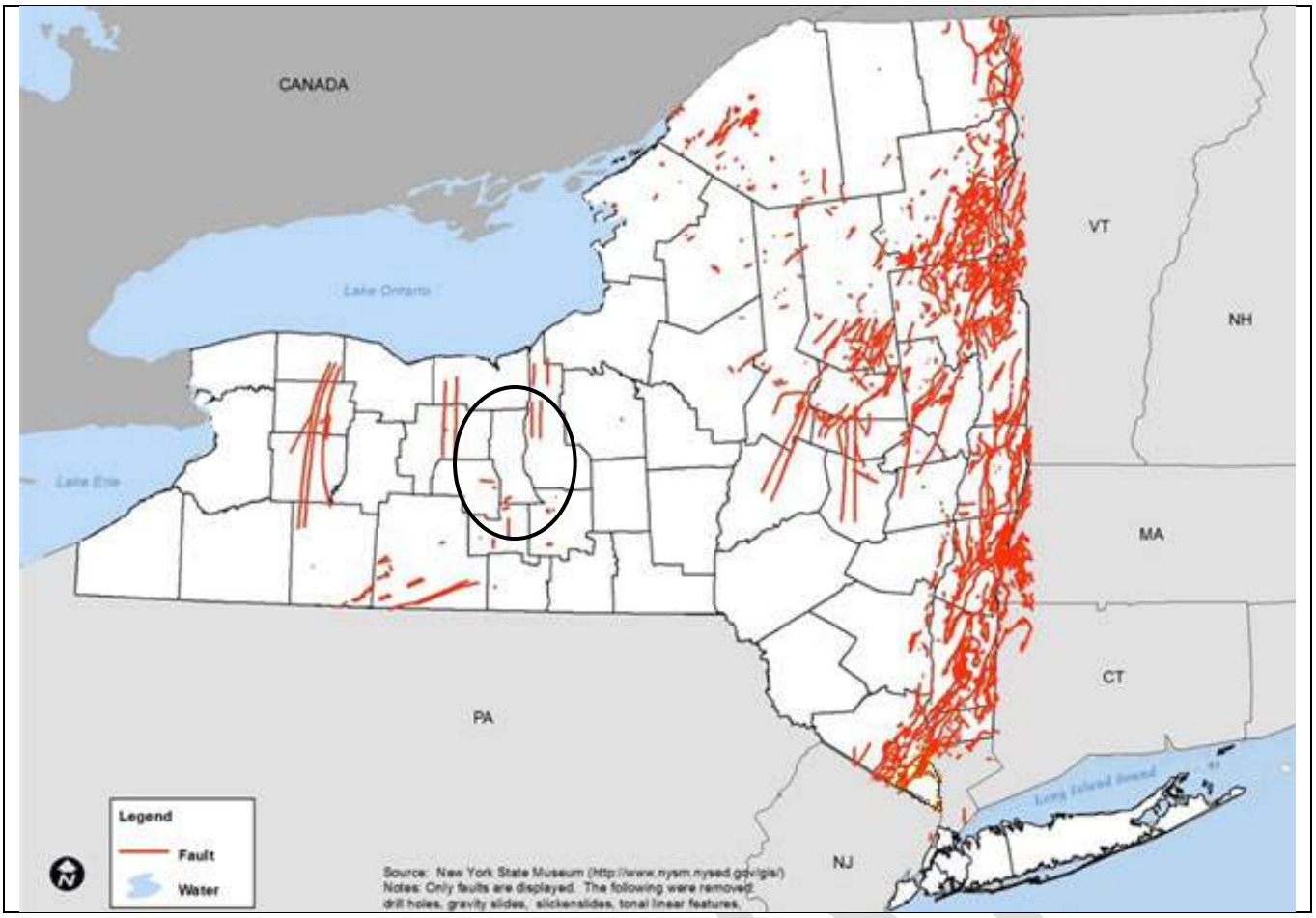
Faults

There are a number of mapped faults in or near Seneca County, as shown on Figure 8-3.

Soil Seismicity

The New York State Geological Survey conducted seismic shear-wave tests to categorize the state's surface geology according to the National Earthquake Hazard Reduction Program's (NEHRP) soil site classifications. These classifications are defined by their shear-wave velocity, which impacts the severity of an earthquake. The classification system ranges from Class A to Class E, as noted in Table 8-1, where Class A represents hard rock that reduces ground motions from an earthquake and Class E represents soft soils that amplify and magnify ground shaking and increase building damage.

Figure 8-3. Faults in New York State



Source: New York State Museum 2023
Note: Black circle indicates the approximate location of Seneca County

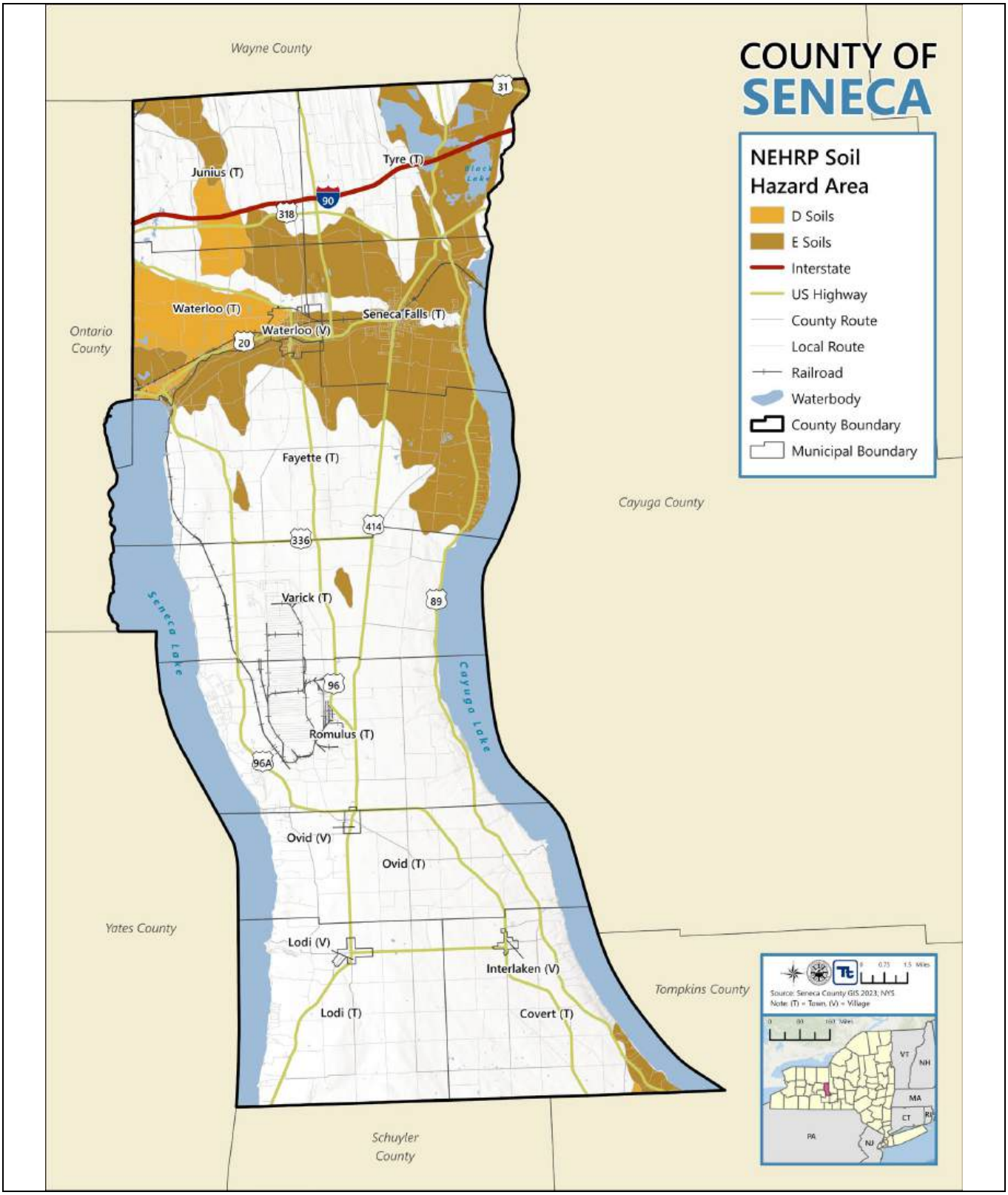
Table 8-1. NEHRP Soil Classifications

Soil Classification	Description
A	Hard rock
B	Rock
C	Very dense soil and soft rock
D	Stiff soils
E	Soft soils

Source: FEMA 2013

Class E soils include water-saturated mud and artificial fill. The strongest amplification of shaking is expected for this soil type. As seismic waves pass from hard rock to softer soils, the waves slow down, and their amplitude increases. Shaking tends to be stronger at locations with softer surface layers where seismic waves move more slowly. Ground motion above an unconsolidated landfill or soft soils can be more than 10 times stronger than at neighboring locations on rock (FEMA 2013). Figure 8-4 shows the locations of Soil Classes D and E in Seneca County.

Figure 8-4. NEHRP Soils in Seneca County



8.1.3 Extent

Earthquake severity is measured by magnitude and intensity. Magnitude describes the energy released at the focus of an earthquake; intensity describes the severity of shaking during the event.

Earthquake Magnitude

Magnitude is most commonly expressed using the moment magnitude (Mw) scale. This scale is based on the total moment release of the earthquake (the product of the distance a fault moved and the force required to move it). The scale is as follows:

- Great—Mw >8
- Major—Mw = 7.0–7.9
- Strong—Mw = 6.0–6.9
- Moderate—Mw = 5.0–5.9
- Light—Mw = 4.0–4.9
- Minor—Mw = 3.0–3.9
- Micro—Mw = 3.0–3.9

Earthquake Intensity

An earthquake has only one magnitude and one epicenter, but it produces a range of ground shaking at sites throughout the region. This shaking depends on the distance from the earthquake, the rock and soil conditions at sites, and variations in the propagation of seismic waves from the earthquake due to complexities in the structure of the earth's crust. The most commonly used intensity scale is the Modified Mercalli Intensity (MMI) scale. Ratings of the scale, as well as the perceived shaking and damage potential for structures, are shown in Table 8-2.

Peak Ground Acceleration

The intensity of felt shaking is based on the acceleration that the ground experiences as it shakes during an earthquake. Peak ground acceleration (PGA) is a measure of how hard the earth shakes at any location. It is expressed as a percentage of the acceleration due to gravity (%g). For example, a PGA of 100%g (an extremely strong ground motion) means that objects accelerate sideways at the same rate as if they had been dropped from a height (USGS 2019). Horizontal and vertical PGA varies with soil or rock type.

Table 8-3 shows the relationship of the MMI scale to PGA. Damage levels experienced in an earthquake vary with the intensity of ground shaking and with the seismic capacity of structures, as noted in Table 8-4.

National maps of earthquake shaking hazards are developed based on estimates of PGA. Professional engineering organizations use these maps to update seismic-risk maps and seismic design requirements used in building codes (Brown 2001) The USGS updated the National Seismic Hazard Maps in 2023, shown as Figure 8-5. The 2023 map represents the best available data, as determined by the USGS (USGS 2024).

Figure 8-6 shows the 500-year PGA for Seneca County; this mapping indicates that the event will not be felt.

Table 8-2. MMI Scale

Mercalli Intensity	Shaking	Description
I	Not Felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing automobiles may rock slightly. Vibrations are similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing automobiles rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very Strong	Felt by all. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Felt by all. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Felt by all. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Felt by all. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Source: USGS 2014

Table 8-3. MMI and PGA Equivalents

MMI	Acceleration (%g) (PGA)	Perceived Shaking	Potential Damage
I	<0.17	Not Felt	None
II – III	0.17–1.4	Weak	None
IV	1.4–3.9	Light	None
V	3.9–9.2	Moderate	Very Light
VI	9.2–18	Strong	Light
VII	18–34	Very Strong	Moderate
VIII	34–65	Severe	Moderate to Heavy
IX	65-124	Violent	Heavy
X	>124	Extreme	Very Heavy

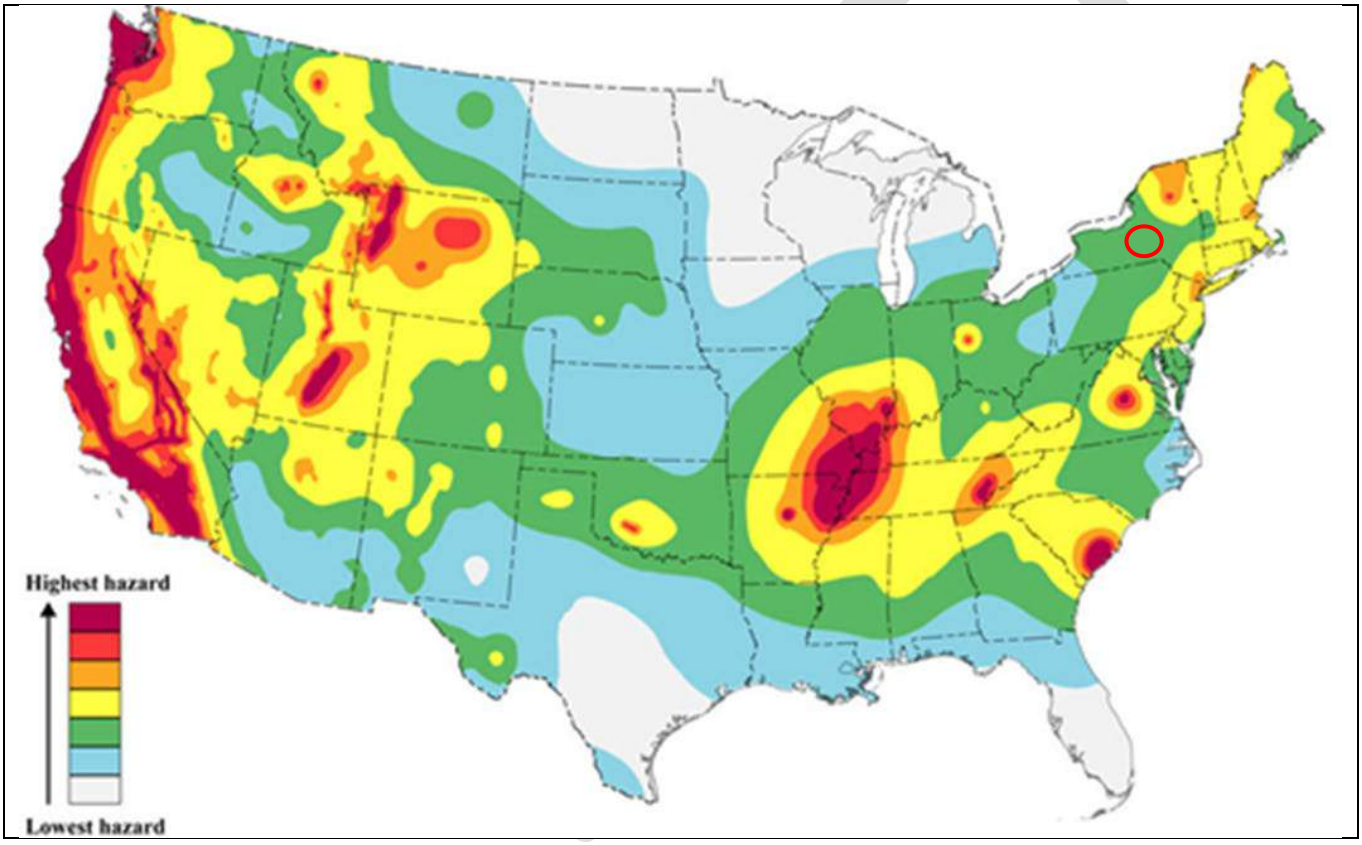
Source: Freeman et al. (Purdue University) 2004
Note: PGA = Peak Ground Acceleration

Table 8-4. Damage Levels Experienced in Earthquakes

PGA	Explanation of Damages
1–2%g	Motions are widely felt by people; hanging plants and lamps swing strongly, but damage levels, if any, are usually very low.
Below 10%g	Usually causes only slight damage, except in unusually vulnerable facilities.
10–20%g	May cause minor-to-moderate damage in well-designed buildings, with higher levels of damage in poorly designed buildings. At this level of ground shaking, only unusually poor buildings would be subject to potential collapse.
20–50%g	May cause significant damage in some modern buildings and very high levels of damage (including collapse) in poorly designed buildings.
≥50%g	May cause higher levels of damage in many buildings, even those designed to resist seismic forces.

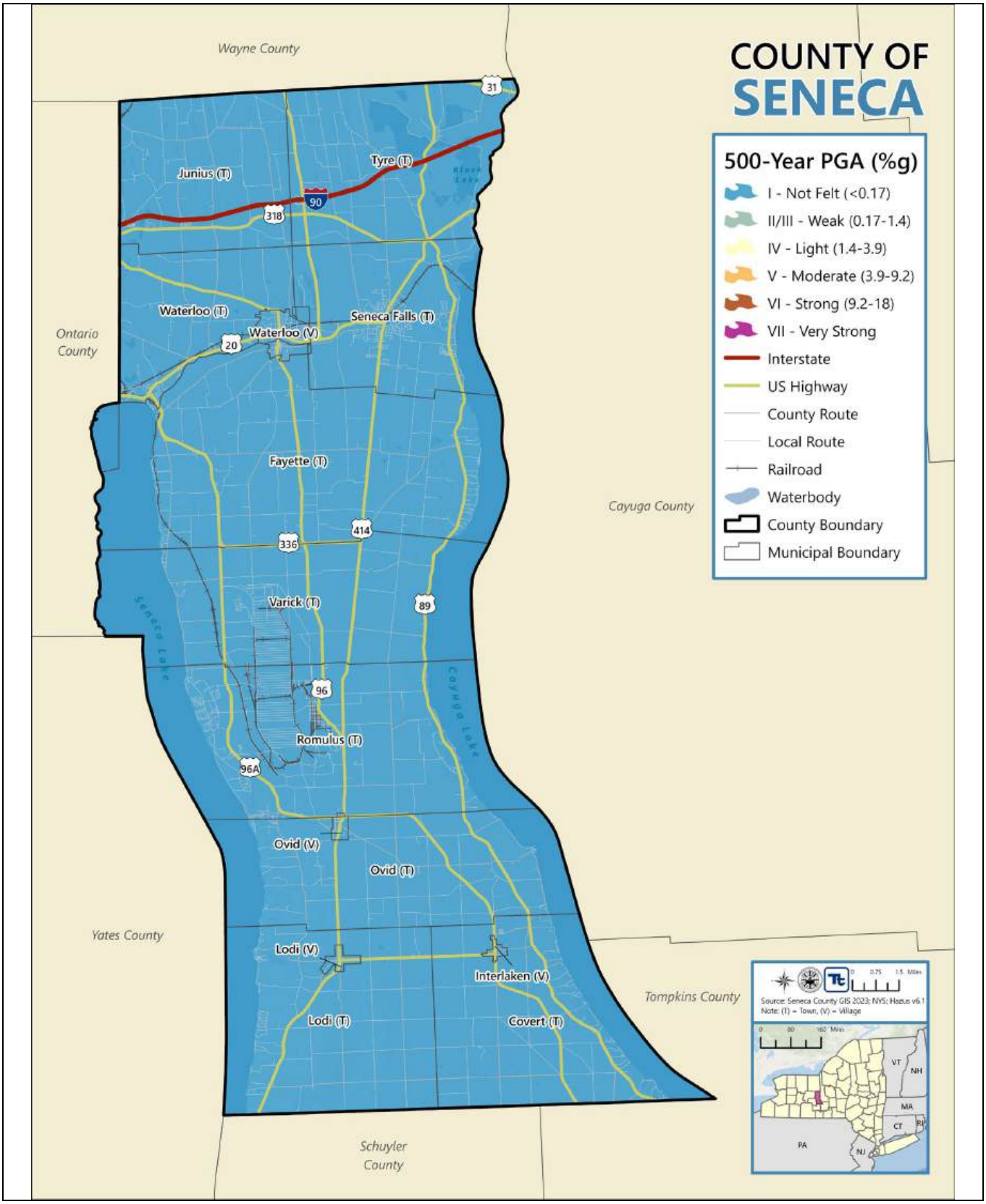
Source: USGS 2019
Note: %g = Peak Ground Acceleration

Figure 8-5. 2023 Long-Term National Seismic Hazard Map



Source: USGS 2024
Note: The red circle indicates the approximate location of Seneca County.

Figure 8-6. 500-Year Peak Ground Acceleration in Seneca County



8.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Seneca County has not been included in any federal major disaster (DR) or emergency (EM) declarations for earthquake-related events (FEMA 2024).

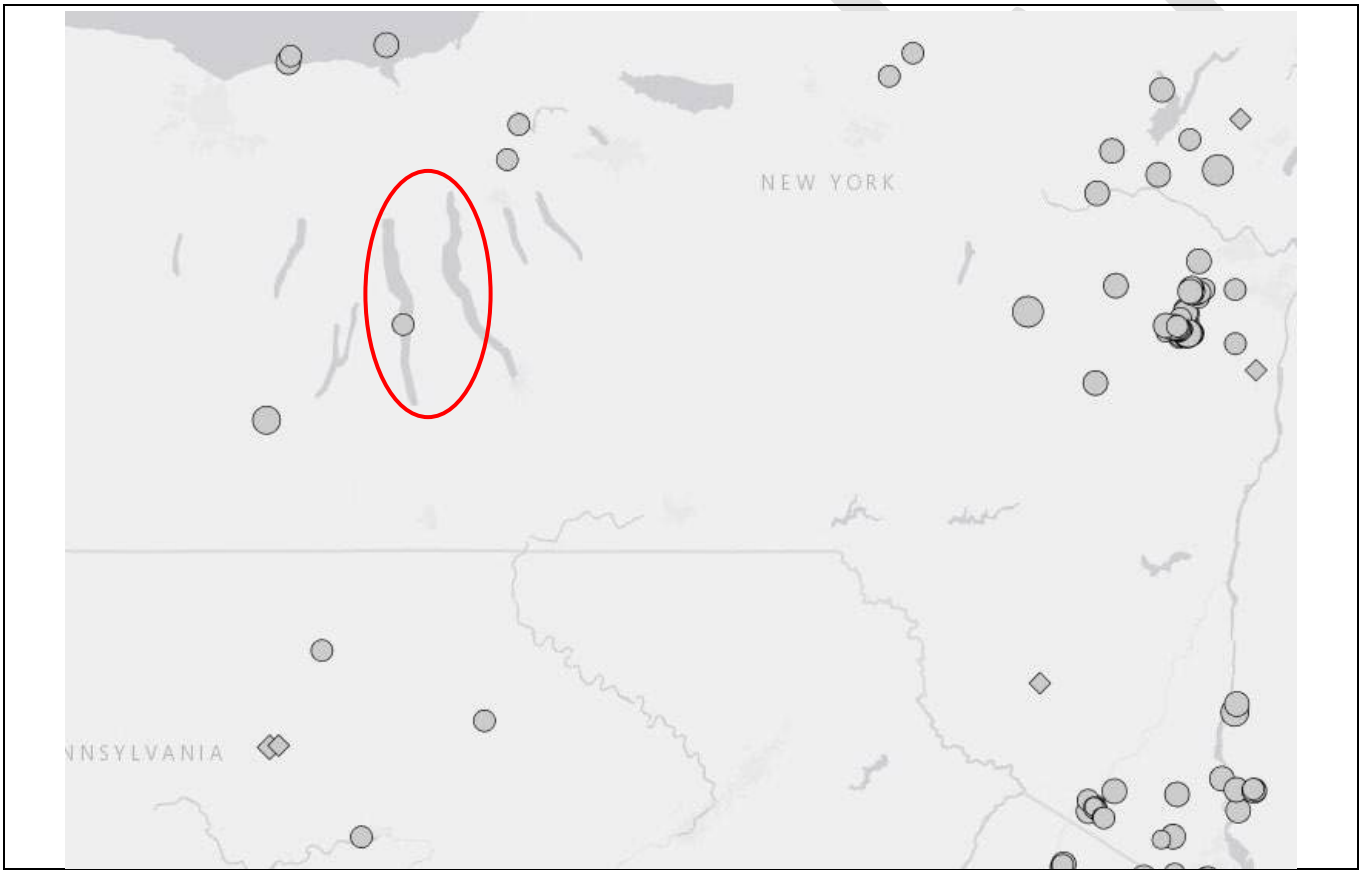
USDA Declarations

Since the previous Seneca County HMP, the County has not been included in any USDA declarations issued for earthquake -related events (USDA 2024).

Previous Events

No known earthquake hazard events impacted Seneca County between January 2018 and July 2024 (USGS 2024). Figure 8-7 illustrates historical earthquake epicenters across the northeast United States and in New York State between 1914 and 2024. There have been multiple earthquakes originating outside New York's borders that have been felt within the state. These quakes have come from Quebec and Massachusetts. Such events are considered significant for hazard mitigation planning because they could produce damage within the state in certain situations.

Figure 8-7. Earthquake Epicenters in the Northeast U.S. 1914 to 2024



Source: USGS 2024
Note: The red circle indicates the approximate location of Seneca County.

8.1.5 Probability of Future Occurrences

Probability Based on Past Events

Based on historical records and input from the Steering Committee, the likely frequency of future occurrence of earthquakes in the County is rare. Seneca County could experience direct and indirect impacts from earthquakes that affect the general building stock and local economy and induce secondary hazards such as igniting fires and causing utility failure.

Potential Effect of Climate Change on Hazard Probability

The impacts of global climate change on earthquake probability are still being studied, but earthquakes are thought to be affected by climate to some extent. As ice melts at a faster rate and water runs off, tremendous amounts of weight are shifted on the earth's crust. As the newly freed crust returns to its original, pre-glacier shape, it could cause seismic plates to slip and stimulate volcanic activity, according to research into prehistoric earthquakes and volcanic activity.

NASA and USGS scientists found that retreating glaciers in southern Alaska may be opening the way for future earthquakes (NASA 2024). However, given that glaciers are not located in New York State, these potential impacts are unlikely to be significant. Additionally, droughts may impact faults due to stress load changes from the lack of water in earth's crust, which may trigger an earthquake (NASA 2024).

8.1.1 Cascading Impacts on Other Hazards

USGS has been investigating the relationship earthquakes have with ground failure and coastal erosion (USGS n.d.). Soft and loose soils are more susceptible to earthquake events. Ground failure can become exacerbated due to earthquake events, causing land sliding and subsidence. Areas of steep slopes are at greater risk of ground failure during earthquakes (USGS n.d.). Further, residual impacts from earthquakes could alter the floodplain extent for Seneca County if ground failure occurs.

8.2 VULNERABILITY AND IMPACT ASSESSMENT

A vulnerability analysis was conducted for the County's assets (population, building stock, and critical facilities) using NEHRP soil data provided by New York State. Assets with their centroid in the Class D and E soil class hazard areas were totaled to estimate the numbers and values of buildings vulnerable to the earthquake hazard. Class D and E NEHRP soils are the two classes most susceptible to amplified ground motion during an earthquake.

A Level 2 Hazus analysis estimated a range of potential loss due to building damage for the 500-year mean return period (MRP) earthquake in Seneca County. The default assumption is a magnitude 7.0 earthquake.

8.2.1 Life, Health, and Safety

Overall Population

Table 8-5 presents the estimated population living in the NEHRP Soils Class D and E hazard areas. The Town of Seneca Falls has the greatest population in the hazard area, with 8,521 persons (94.4 percent of the town's total population).

Table 8-5. Population in the NEHRP Soils (D and E) Hazard Area

Jurisdiction	Total Population (U.S. Census Bureau 2020 Decennial)	Population in the NEHRP Soils (D and E) Hazard Area	
		Number of Persons	% of Jurisdiction Total
Covert (T)	1,568	127	8.1%
Fayette (T)	2,659	1,151	43.3%
Interlaken (V)	595	0	0.0%
Junius (T)	1,388	447	32.2%
Lodi (T)	1,228	0	0.0%
Lodi (V)	254	0	0.0%
Ovid (T)	2,342	0	0.0%
Ovid (V)	534	0	0.0%
Romulus (T)	3,174	0	0.0%
Seneca Falls (T)	9,027	8,521	94.4%
Tyre (T)	1,013	222	21.9%
Varick (T)	1,656	1	0.1%
Waterloo (T)	3,566	3,272	91.8%
Waterloo (V)	4,810	4,741	98.6%
Seneca County (Total)	33,814	18,482	54.7%

Source: U.S. Census Bureau 2020; NYS

In Seneca County, risk to public safety and loss of life from a low-magnitude earthquake would be minimal. The Hazus analysis for the 500-year MRP earthquake event found that there would be no displaced households or persons seeking short-term shelter as a result of that event. Likewise, the Hazus analysis found that the 500-year MRP earthquake event would cause no injuries or fatalities if it occurred at 2 a.m. and only a single injury if it occurred at 2 p.m. or 5 p.m.

The degree to which Seneca County residents are affected by potential earthquakes depends on factors such as the age and type of construction people live in, the soil type homes are located on, and the intensity of the earthquake. A strong correlation exists between structural building damage and the number of injuries and casualties from an earthquake event (NYCEM 2003). The risk is highest for those inside buildings that receive structural damage or people walking below building ornamentations and chimneys that are shaken loose by the earthquake.

Whether directly impacted or indirectly impacted, the entire population will be affected to some degree. Business interruption could keep people from working, road closures could isolate populations, and loss of utilities could impact populations that suffered no direct damage from an event itself.

Socially Vulnerable Population

The populations most vulnerable to the earthquake hazard include persons over age 65 and individuals living below the poverty threshold. Factors leading to this higher susceptibility include decreased mobility and financial ability to react during a hazard and the location and construction quality of their housing. Table 8-6 details on the number of vulnerable persons living in areas of Class D and E soils. Within the hazard area, the Town of Seneca Falls has the highest population over 65 (1,768), the largest population under 5 (411), the greatest non-English speaking population (109), the highest population of disabled persons (1,692), and the largest number of individuals living in poverty (1,321).

8.2.2 General Building Stock

Therefore, buildings located on NEHRP Soil Classes D and E have an increased risk of damage from an earthquake. Table 8-7 summarizes the number and replacement cost value of buildings in Seneca County on NEHRP Soil Classes D and E soils. The estimated 10,592 buildings within that hazard area, represents 45.1 percent of Seneca County's total general building stock inventory replacement cost value. The Town of Seneca Falls has the greatest number of buildings on Class D and E soils (4,250 buildings or 94.2 percent of its total building stock). Table 8-8 lists the buildings in the NEHRP Classes D and E hazard areas by general occupancy.

Most damage and loss caused by an earthquake is directly or indirectly the result of ground shaking (NYCEM 2003). There is a strong correlation between PGA and damage a building might undergo. A building's construction determines how well it can withstand the force of an earthquake. Unreinforced masonry buildings are most at risk during an earthquake because the walls are prone to collapse outward, whereas steel and wood buildings absorb more of the earthquake's energy. Additional attributes that affect a building's capability to withstand an earthquake's force include its age, number of stories, and quality of construction (NYCEM 2003).

The Hazus probabilistic earthquake model was applied to analyze the effects of the earthquake hazard on general building stock in Seneca County. Hazus considers building construction and age of building as part of the analysis. Building ages and building types from the custom general building stock inventory were incorporated into the Hazus model. Hazus evaluated potential building damage across the damage categories described in Table 8-9 (descriptions provided for a light wood-framed building; definitions for other building types are included in Hazus technical manual documentation).

Table 8-10 summarizes the estimated level of damage for the 500-year MRP earthquake event. For all occupancy classes, this analysis found that only 1.2 percent of buildings will experience any damage: 1.1 percent of residential buildings; 2.8 percent of commercial buildings; 2.5 percent of industrial buildings; and 1.4 percent of other buildings. Only 0.2 percent of all buildings would experience more than slight damage. Table 8-11 summarizes the estimated value of damage by structural general occupancy class for each jurisdiction. Hazus estimated $3,510,930 in total damage as a result of the 500-year earthquake event, representing less than 0.1 percent of the total replacement value for general building stock in Seneca County.

Table 8-6. Number of Vulnerable Persons Living in the NEHRP D and E Soils Hazard Area

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	Estimated Number of Vulnerable Persons Living in the NEHRP Soils (D and E) Hazard Area									
			Over 65	Percent of Jurisdiction Total	Under 5	Percent of Jurisdiction Total	Non-English Speaking	Percent of Jurisdiction Total	Disability	Percent of Jurisdiction Total	Poverty Level	Percent of Jurisdiction Total
Covert (T)	1,568	4.6%	31	8.1%	9	8.1%	0	0.0%	18	8.1%	9	8.1%
Fayette (T)	2,659	7.9%	229	43.3%	95	43.3%	6	43.3%	106	43.3%	113	43.3%
Interlaken (V)	595	1.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Junius (T)	1,388	4.1%	51	32.2%	22	32.2%	1	32.2%	52	32.2%	50	32.2%
Lodi (T)	1,228	3.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Lodi (V)	254	0.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Ovid (T)	2,342	6.9%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Ovid (V)	534	1.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Romulus (T)	3,174	9.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Seneca Falls (T)	9,027	26.7%	1,768	94.4%	411	94.4%	109	94.4%	1,692	94.4%	1,321	94.4%
Tyre (T)	1,013	3.0%	53	21.9%	9	21.9%	0	0.0%	38	21.9%	23	21.9%
Varick (T)	1,656	4.9%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Waterloo (T)	3,566	10.5%	677	91.7%	118	91.7%	4	91.7%	631	91.7%	367	91.7%
Waterloo (V)	4,810	14.2%	1,071	98.5%	233	98.7%	18	100.0%	961	98.6%	491	98.6%
Seneca County	33,814	100.0%	3,880	57.2%	897	49.3%	137	64.5%	3,497	64.5%	2,373	57.3%

Source: U.S. Census Bureau ACS 2023; NYS

Table 8-7. Number and Replacement Cost Value of Buildings Located on NEHRP D and E Soils

Jurisdiction	Total Buildings in Jurisdiction		Buildings on NEHRP Class D and E Soils			
	Number	RCV (Structure and Contents)	Count	% of Jurisdiction Total	Value	% of Jurisdiction Total
Covert (T)	1,636	$779,224,677	129	7.9%	$47,497,907	6.1%
Fayette (T)	2,738	$1,724,392,851	1,180	43.1%	$705,572,857	40.9%
Interlaken (V)	343	$165,977,588	0	0.0%	$0	0.0%
Junius (T)	1,280	$759,380,537	418	32.7%	$308,440,564	40.6%
Lodi (T)	1,472	$559,051,111	0	0.0%	$0	0.0%
Lodi (V)	214	$82,618,938	0	0.0%	$0	0.0%
Ovid (T)	1,782	$984,141,994	0	0.0%	$0	0.0%
Ovid (V)	325	$236,195,794	0	0.0%	$0	0.0%
Romulus (T)	1,934	$2,199,131,167	0	0.0%	$0	0.0%
Seneca Falls (T)	4,512	$3,285,546,078	4,250	94.2%	$3,013,622,032	91.7%
Tyre (T)	922	$673,717,328	187	20.3%	$96,797,836	14.4%
Varick (T)	1,628	$908,737,205	1	0.1%	$66,294	0.0%
Waterloo (T)	2,385	$1,104,762,862	2,171	91.0%	$1,004,826,393	91.0%
Waterloo (V)	2,289	$1,323,974,707	2,256	98.6%	$1,297,203,689	98.0%
Seneca County	23,460	$14,786,852,837	10,592	45.1%	$6,474,027,571	43.8%

Source: Seneca County GIS 2023; USACE, NSI 2022; NYS; RS Means 2022
Note: RCV is the estimated replacement cost value of both structure and contents.

Table 8-8. Buildings Located on NEHRP D and E Soils by General Occupancy Class

Jurisdiction	Residential	Commercial	Industrial	Other[a]
Covert (T)	107	18	0	4
Fayette (T)	864	97	14	205
Interlaken (V)	0	0	0	0
Junius (T)	314	32	0	72
Lodi (T)	0	0	0	0
Lodi (V)	0	0	0	0
Ovid (T)	0	0	0	0
Ovid (V)	0	0	0	0
Romulus (T)	0	0	0	0
Seneca Falls (T)	3,622	449	64	115
Tyre (T)	131	27	2	27
Varick (T)	1	0	0	0
Waterloo (T)	1,867	200	19	85
Waterloo (V)	2,057	148	18	33
Seneca County	8,963	971	117	541

Source: Seneca County GIS 2023; USACE, NSI 2022; NYS
a. Other = government, religion, agricultural, and education

Table 8-9. Example of Structural Damage State Definitions for a Light Wood-Framed Building

Damage Category	Description
Slight	Small plaster or gypsum-board cracks at corners of door and window openings and wall-ceiling intersections; small cracks in masonry chimneys and masonry veneer.
Moderate	Large plaster or gypsum-board cracks at corners of door and window openings; small diagonal cracks across shear wall panels exhibited by small cracks in stucco and gypsum wall panels; large cracks in brick chimneys; toppling of tall masonry chimneys.
Extensive	Large diagonal cracks across shear wall panels or large cracks at plywood joints; permanent lateral movement of floors and roof; toppling of most brick chimneys; cracks in foundations; splitting of wood sill plates and/or slippage of structure over foundations; partial collapse of room-over-garage or other soft-story configurations.
Complete	Structure may have large permanent lateral displacement, may collapse, or be in imminent danger of collapse due to cripple wall failure or the failure of the lateral load resisting system; some structures may slip and fall off the foundations; large foundation cracks.

Source: Hazus Technical Manual

Table 8-10. Buildings Damaged by General Occupancy for 100-Year MRP Earthquake Events

Occupancy Class	Total Number of Buildings in Occupancy	Severity of Expected Damage	Earthquake 100-Year	
			Building Count	Percent Buildings in Occupancy Class
Residential Buildings (Single and Multi-Family Dwellings)	13,746	None	13,592	98.9%
		Slight	127	0.9%
		Moderate	26	0.2%
		Extensive	1	<0.1%
		Complete	0	0.0%
Commercial Buildings	809	None	786	97.2%
		Slight	17	2.1%
		Moderate	5	0.6%
		Extensive	1	0.1%
		Complete	0	0.0%
Industrial Buildings	272	None	265	97.5%
		Slight	5	1.9%
		Moderate	2	0.6%
		Extensive	0	0.0%
		Complete	0	0.0%
Government, Religion, Agricultural, and Education Buildings	631	None	622	98.6%
		Slight	7	1.1%
		Moderate	2	0.2%
		Extensive	0	0.0%
		Complete	0	0.0%

Note: Due to differences in census tracts boundaries used in Hazus, the number of structures assessed is less than the County total

Table 8-11. Damage from the 500-Year MRP Earthquake Event

Jurisdiction	Total Replacement Cost Value (RCV)	500-Year MRP Estimated Losses[a]				
		Estimated Total Damage	Percent of Total RCV	Residential Damage	Commercial Damage	Damage for All Other Occupancies
Covert (T)	$779,224,677	$51,070	<0.1%	$21,247	$13,098	$16,725
Fayette (T)	$1,724,392,851	$399,870	<0.1%	$251,767	$68,343	$79,760
Interlaken (V)	$165,977,588	$363	<0.1%	$151	$93	$119
Junius (T)	$759,380,537	$125,723	<0.1%	$52,541	$28,736	$44,446
Lodi (T)	$559,051,111	$53,186	<0.1%	$27,963	$10,423	$14,800
Lodi (V)	$82,618,938	$715	<0.1%	$376	$140	$199
Ovid (T)	$984,141,994	$51,893	<0.1%	$27,281	$10,166	$14,446
Ovid (V)	$236,195,794	$576	<0.1%	$302	$109	$164
Romulus (T)	$2,199,131,167	$335,336	<0.1%	$284,123	$14,547	$36,667
Seneca Falls (T)	$3,285,546,078	$1,310,568	<0.1%	$408,890	$458,675	$443,003
Tyre (T)	$673,717,328	$153,582	<0.1%	$64,140	$35,251	$54,190
Varick (T)	$908,737,205	$95,793	<0.1%	$49,595	$13,121	$33,077
Waterloo (T)	$1,104,762,862	$856,744	0.1%	$344,626	$233,194	$278,925
Waterloo (V)	$1,323,974,707	$75,511	<0.1%	$29,897	$17,621	$27,992
Seneca County (Total)	**$14,786,852,837**	**$3,510,930**	**<0.1%**	**$1,562,899**	**$903,518**	**$1,044,513**

a. Losses shown represent replacement costs for buildings and contents

8.2.3 Community Lifelines and Other Critical Facilities

All community lifelines and other critical facilities in Seneca County are considered vulnerable to the earthquake hazard. Table 8-12 summarizes the number of critical facilities by lifeline category located on NEHRP soil classes D and E.

The Hazus earthquake model was used to estimate probability of each damage state category to the critical facilities in Seneca County for the 500-year MRP earthquake event. In addition, Hazus estimates the time to restore critical facilities to fully functional use. Results are presented as a probability of being functional at specified time increments (days after the event). For example, Hazus might estimate that a facility has a 5 percent chance of being fully functional on Day 3 and a 95 percent chance of being fully functional on Day 90. For the percent probability of sustaining damage, the minimum and maximum damage estimated value for that facility type is presented.

Table 8-13 summarizes the Hazus results for community lifelines for a 500-year MRP earthquake event. Hazus estimates that community lifelines will be nearly 100 percent functional from the first day after the event, with functionality reaching only as low as 97.2 percent for hazardous materials lifelines. Functionality would exceed 99 percent for all categories by Day 7. For all categories, the probability of experiencing more than slight damage is less than 1 percent.

Table 8-12. Number of Critical Facilities Located Exposed to NEHRP D and E Soils, by Lifeline Category

Jurisdiction	Number of Facilities in NEHRP Soils (D&E) Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Number	% of Jurisdiction Total
Covert (T)	0	0	0	0	0	0	2	13	0	15	11.7%
Fayette (T)	0	28	0	3	0	2	7	22	0	62	24.9%
Interlaken (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Junius (T)	4	1	0	0	0	2	1	6	0	14	22.6%
Lodi (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Lodi (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Ovid (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Ovid (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Romulus (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Seneca Falls (T)	9	11	8	3	24	10	9	15	3	92	89.3%
Tyre (T)	0	0	0	0	0	2	8	6	0	16	25.4%
Varick (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Waterloo (T)	9	0	0	1	1	3	2	62	0	78	80.4%
Waterloo (V)	3	2	5	3	14	13	6	2	1	49	100.0%
Seneca County	**25**	**42**	**13**	**10**	**39**	**32**	**35**	**126**	**4**	**326**	**24.5%**

Source: Seneca County GIS 2023, NYS GIS Clearinghouse 2023, NYSDOH 2023, NYSDOT 2023, HIFLD 2023; NYS

Table 8-13. Damage and Loss of Functionality for Community Lifelines in Seneca County for the 500-Year MRP Earthquake Event

	Average Percent Probability of Sustaining Damage					Average Percent Functionality			
	None	Slight	Moderate	Extensive	Complete	Day 1	Day 7	Day 30	Day 90
Communications	97.6%	1.8%	0.5%	<0.1%	0.0%	97.6%	99.4%	99.9%	99.9%
Energy	97.7%	1.8%	0.5%	<0.1%	0.0%	97.7%	99.4%	99.9%	99.9%
Food, Hydration, Shelter	97.5%	1.9%	0.6%	0.1%	0.0%	97.4%	99.3%	99.9%	99.9%
Hazardous Materials	97.2%	2.1%	0.6%	0.1%	0.0%	97.2%	99.3%	99.9%	99.9%
Health and Medical	98.8%	1.1%	0.1%	<0.1%	0.0%	98.7%	99.8%	99.9%	99.9%
Safety and Security	97.5%	1.9%	0.5%	<0.1%	0.0%	97.5%	99.3%	99.9%	99.9%
Transportation	99.9%	0.1%	<0.1%	<0.1%	0.0%	99.9%	99.9%	100.0%	100.0%
Water Systems	98.5%	1.2%	0.3%	<0.1%	0.0%	98.4%	99.6%	99.9%	99.9%

Source: Seneca County GIS 2023, NYS GIS Clearinghouse 2023, NYSDOH 2023, NYSDOT 2023, HIFLD 2023

8.2.4 Economy

Earthquake impacts on the economy include loss of business function, damage to inventory, relocation costs, wage loss, and rental loss due to the repair/replacement of buildings. Damage to roadway segments and railroad tracks due to ground failure would interrupt regional transportation and distribution of materials. Earthquakes can significantly affect bridges, many of which provide the only access to certain neighborhoods. Because softer soils generally follow floodplain boundaries, bridges that cross watercourses are considered vulnerable. Another key factor in the degree of vulnerability is the age of facilities and infrastructure, which correlates with standards in place at times of construction.

Hazus estimates the volume of debris that may be generated as a result of an earthquake event to enable the study region to prepare to manage debris removal and disposal. Debris estimates are divided into two categories (FEMA 2022):

- Reinforced concrete and steel that require special equipment to break it up before it can be transported
- Brick, wood, and other debris that can be loaded directly onto trucks with bulldozers

For the 500-year MRP earthquake event, shown in Table 8-14, Hazus estimates a total of 2,322 tons of debris will be generated countywide; the Township of Seneca Falls will generate the most debris.

Table 8-14. Debris Generated by the 500-Year MRP Earthquake Event

Jurisdiction	Debris Generated by the 500-Year MRP Earthquake Event (tons)		
	Brick/Wood	Concrete/Steel	Total
Covert (T)	24	6	30
Fayette (T)	185	64	249
Interlaken (V)	0	0	0
Junius (T)	54	12	66
Lodi (T)	32	6	38
Lodi (V)	0	0	0
Ovid (T)	31	6	37
Ovid (V)	0	0	0
Romulus (T)	218	64	282
Seneca Falls (T)	688	245	933
Tyre (T)	66	15	81
Varick (T)	54	16	70
Waterloo (T)	367	124	491
Waterloo (V)	33	11	44
Seneca County	1,752	570	2,322

8.2.5 Natural, Historic, and Cultural Resources

Natural

According to USGS, earthquakes can cause damage to the surface of the Earth in various forms, depending on the magnitude and distribution of the event. Surface faulting is one of the major seismic components of earthquakes that can create wide ruptures in the ground. Ruptures can have a direct impact on the landscape and natural environment because they can tear apart plant roots or disconnect habitats for miles, isolating animal species (USGS n.d.).

Furthermore, ground failure because of soil liquefaction can have an impact on soil pores and retention of water resources. The greater the seismic activity and liquefaction properties of the soil, the more likely it is that drainage of groundwater can occur, which depletes water resources. In areas where there is higher pressure of groundwater retention, the pores can build up more pressure and make soil behave like a fluid rather than a solid, increasing the risk of localized flooding and deposition or accumulation of silt (USGS n.d.).

Earthquakes can cause large and sometimes disastrous landslides and mudslides. Any steep slope is vulnerable to slope failure, often as a result of loss of cohesion in clay-rich soils. Landslides that fall into streams may significantly impact fish and wildlife habitat, as well as affecting water quality. Hillsides that provide wildlife habitat can be lost for prolong periods of time due to landslides.

Historic

Earthquake events could damage property in and around historical landmarks. Many historical buildings and homes are not built to withstand earthquakes and are more vulnerable than other structures.

Cultural

Earthquake events damage property in and around cultural landmarks.

8.3 CHANGE OF VULNERABILITY SINCE 2018 HMP

All of Seneca County remains vulnerable to earthquakes. New analyses for this HMP were conducted using the 2020 decennial census. The building inventory was updated using RSMeans 2022 values, which is more current and reflects replacement cost versus the building stock improvement values reported in the 2018 HMP. Additional building stock updates include updates to the critical facility inventory provided by Seneca County. Furthermore, since the 2018 HMP, an updated version of Hazus was released (v6.1). This updated model includes longer historical records to pull from to generate probabilistic events. Further, a boundary was mapped for NEHRP soil classes D and E.

8.4 FUTURE CHANGES THAT MAY AFFECT RISK

8.4.1 Potential or Planned Development

Vulnerability to earthquakes in newly developed areas will be similar to existing vulnerabilities within the County. Current building codes require seismic provisions that should render new construction less vulnerable to seismic impacts than older, existing construction that may have been built using lower construction standards. Specific areas of recent and future development are indicated in tables and maps included in Volume II of this plan.

8.4.2 Projected Changes in Population

The population of Seneca County decreased by about 4 percent from 2010 to 2020 and is projected to continue decreasing through 2040 (Cornell University 2018). Any changes in the density of population can impact the number of persons exposed to the earthquake hazard. People who move into older buildings may increase their overall vulnerability to earthquakes. Current building codes require seismic provisions that should render new construction less vulnerable to seismic impacts.

8.4.3 Climate Change

Secondary impacts of earthquakes could be magnified by future climate change. Soils saturated by more frequent or intense storms could more easily experience liquefaction during seismic activity. Dams storing increased volumes of water from changes in the climate could fail during seismic events.

9. EXTREME TEMPERATURES

9.1 HAZARD PROFILE

9.1.1 Hazard Description

Extreme temperature includes both heat and cold events, which can have a significant impact on 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 temperatures that are typical for the area. Varying land elevations, character of the landscape, and proximity to large bodies of water play a significant role in temperatures.

Extreme Cold

Extreme cold events occur when temperatures drop well below what is normal for an area. For example, near-freezing temperatures are considered “extreme cold” in regions relatively unaccustomed to winter weather. In regions that are subjected to temperatures below freezing on a regular basis, “extreme cold” might be used to describe temperatures below 0 °F. For the purposes of this HMP, extreme cold is defined as when the ambient air temperature drops to 0 ºF or below (NWS n.d.). It also considers wind chill, which is 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.

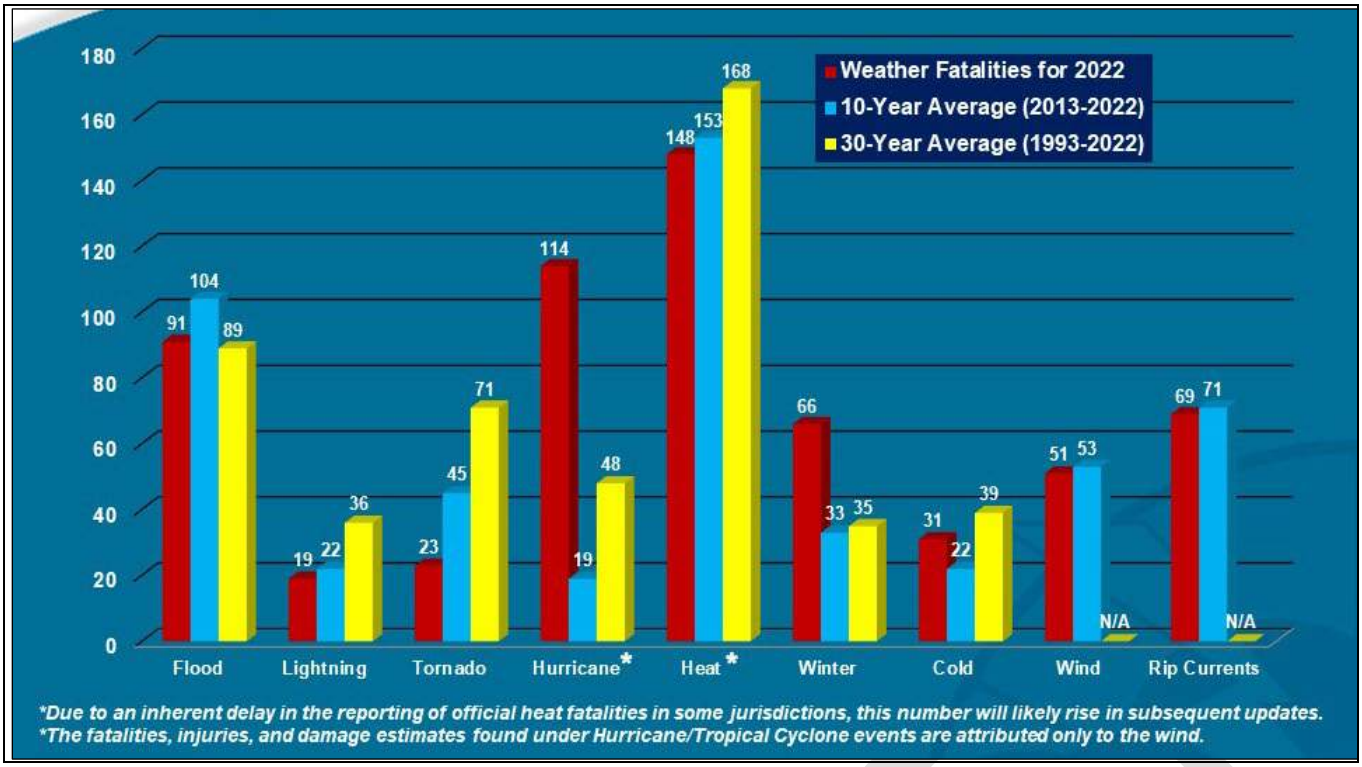
Extreme Heat

Extreme heat is defined as temperatures that hover 10 °F or more above the average high temperature for a region for an extended period (CDC 2012). A heat wave is a period of abnormally and uncomfortably hot and unusually humid weather. Humid conditions occur when a dome of high atmospheric pressure traps hazy, damp air near the ground. A heat wave will typically last two or more days (NOAA 2009).

Extreme heat days in New York State are defined as individual days with maximum temperatures at or above 90 °F or 95 °F, depending on location. Heat waves are defined as three consecutive days with maximum temperatures above 90°F (NYSERDA 2014).

Extreme heat is the number one weather-related cause of death in the United States. On average, nearly 150 people die each year in the United States from excessive heat (NWS 2022). Figure 9-1 shows the number of weather fatalities based on a 10-year average and a 30-year average.

Figure 9-1. Average Number of Weather-Related Fatalities in the U.S.



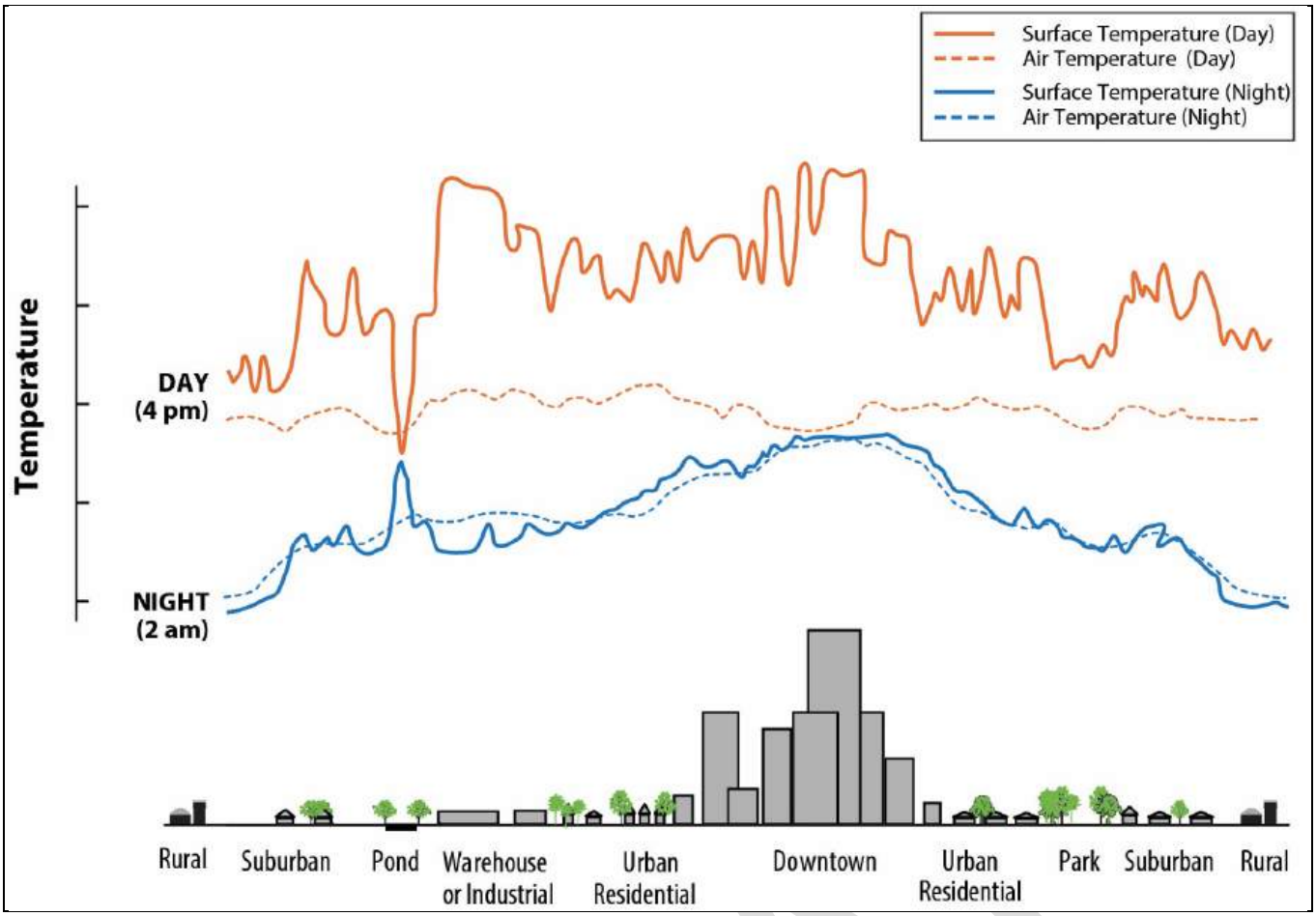
Source: NWS 2022

Urbanization exacerbates risk during an extreme heat event. As urban areas develop, buildings, roads, and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist become impermeable and dry. These changes cause urban areas to become warmer than the surrounding areas, forming an “island” of higher temperatures. A “heat island” is a built up area that is hotter than nearby rural areas. The annual mean air temperature of a city with more than 1 million people can be 2 ºF to 5 ºF warmer than its surroundings. In the evening, the difference in air temperatures can be as high as 22ºF.

As shown in Figure 9-2, surface temperatures vary more than atmospheric air temperatures during the day, though they are generally similar at night. On a hot, sunny day, the sun can heat dry, exposed urban surfaces to temperatures 50 ºF to 90 ºF hotter than the air. The dips and spikes in surface temperatures over a pond area show how water maintains a nearly constant temperature day and night because it does not absorb the sun’s energy the same way as buildings and paved surfaces. Parks, open land, and bodies of water can create cooler areas within a city. Temperatures are typically lower at suburban-rural borders than in downtown areas.

Heat islands can affect communities by increasing peak energy demand during the summer, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and death, and water quality degradation (EPA 2019).

Figure 9-2. Heat Island Effect



Source: U.S. EPA 2023

9.1.2 Location

Extreme Cold

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 impact human life and property. Extreme cold temperatures occur throughout most of the winter season and generally accompany most winter storm events throughout the state (NYS DHSES 2023).

Extreme Heat

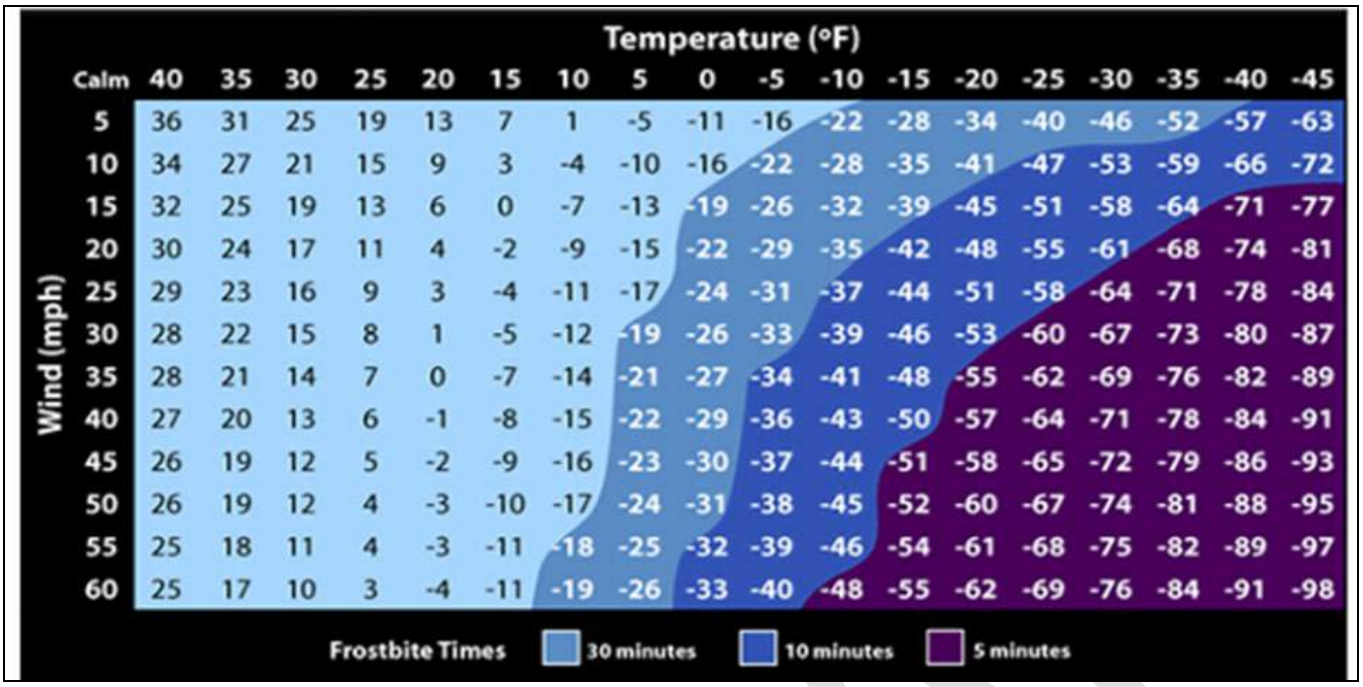
Extreme heat can occur anywhere and generally will cover an entire county. However, there can be spot locations that are somewhat cooler (e.g., a shady park near a stream) or hotter (e.g., urban areas because their built environment holds the heat) (NYS DHSES 2023). Extreme heat exists throughout the state for most of the summer, except for areas with high altitudes (Cornell University n.d.).

9.1.3 Extent

Extreme Cold

The extent (severity or magnitude) of extreme cold temperatures is generally measured through the Wind Chill Temperature (WCT) Index (see Figure 9-3). Wind chill represents what the air temperature feels like to the human skin due to the combination of cold temperatures and winds blowing on exposed skin. The colder the air temperature and the higher the wind speeds, the colder it will feel on skin (NOAA n.d.).

Figure 9-3. Wind Chill Index



Source: NWS 2001

Several health hazards are related to extreme cold temperatures (CDC 2023):

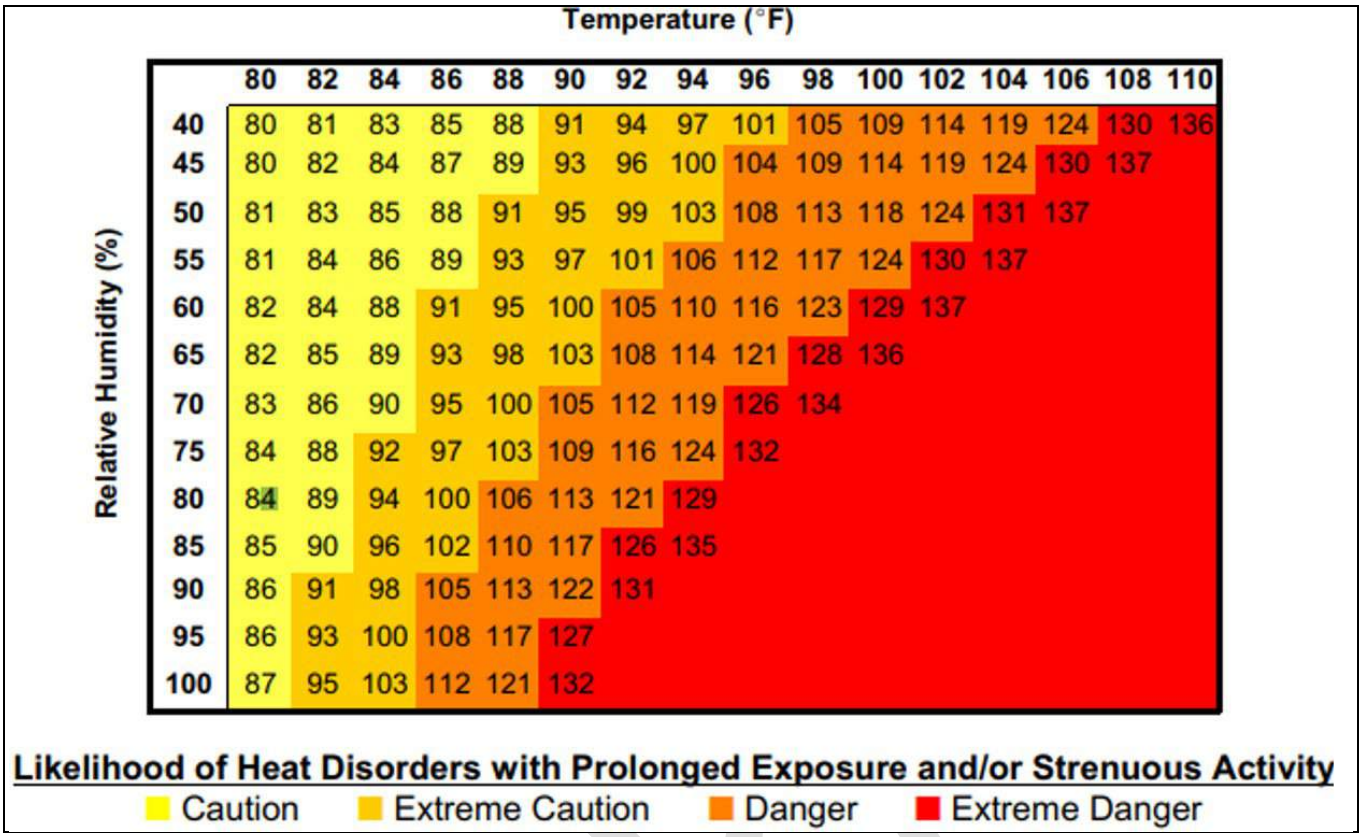
- **Frostbite** is damage to body tissue caused by extreme cold. A wind chill of -20°F will cause frostbite in 30 minutes. Frostbite can cause a loss of feeling and a white or pale appearance in extremities.
- **Hypothermia** is a condition brought on when the body temperature drops to less than 95 °F, and it can be deadly. Warning signs of hypothermia include uncontrollable shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness, and apparent exhaustion.

Extreme cold 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 (CDC 2012).

Extreme Heat

The extent of extreme heat temperatures is generally measured through the heat index, identified in Figure 9-4. The heat index measures apparent temperature of the air as it increases with the relative humidity. The values are determined for shady, light wind conditions. Exposure to full sun can increase the index by up to 15 °F (NYS DHSES 2023). The National Weather Service (NWS) provides alerts when the heat index approaches hazardous levels. Table 9-1 explains these alerts. Table 9-2 describes health hazards related to extreme heat.

Figure 9-4. NWS Heat Index Chart-Shaded Areas



Source: NWS 2023

Table 9-1. 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.

Table 9-2. 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 2023

In the event of an extreme heat advisory, the NWS does the following (NYSDEC 2023):

- Includes heat index values in 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

9.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Seneca County has not been included in any federal major disaster (DR) or emergency (EM) declarations for extreme temperature-related events (FEMA 2024).

USDA Declarations

Table 9-3 lists the USDA declarations issued for extreme temperature-related events since the previous Seneca County HMP (USDA 2024).

Table 9-3. USDA Declarations for Extreme Temperature Events in Seneca County (2018 to 2023)

Event Date	Event Type	USDA Declaration Number
January 15, 2021	Frost, Freeze	S4903
January 15, 2021	Frost, Freeze	S4904

Source: USDA 2024

Previous Events

Table 9-4 lists the known extreme temperature event that impacted Seneca County between January 2018 and July 2024.

Table 9-4. Extreme Temperature Events in Seneca County (2018 to 2024)

Event Date	Event Type	Disaster Declaration/Proclamation		Location Impacted	Description
		Number	County Included?		
January 22, 2022	Extreme Cold	N/A	N/A	Countywide	An Arctic high pressure brought cold air to Central New York. Low temperatures were as low as -25°F.

Source: NOAA NCEI 2024, FEMA 2024

9.1.5 Probability of Future Occurrences

Probability Based on Past Events

Based on historical local extreme temperature events (see Table 9-5, it is anticipated that Seneca County will continue to experience direct and indirect impacts of extreme temperature events annually. The likely frequency of future occurrence of extreme temperature in the County is occasional.

Table 9-5. Probability of Future Extreme Temperature Events in Seneca County

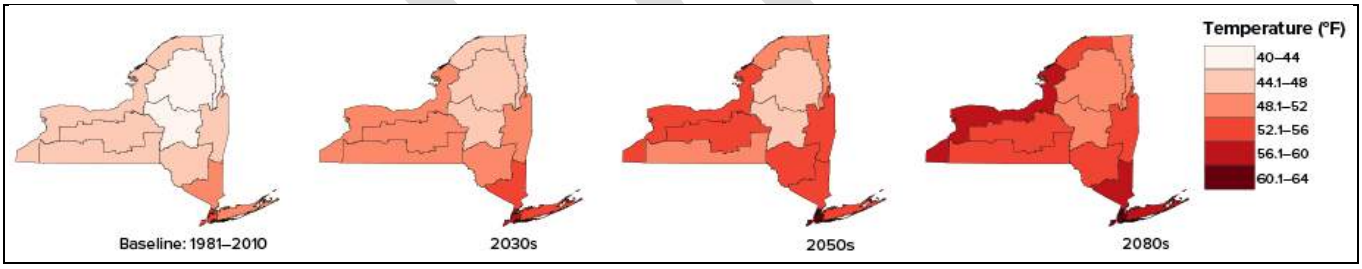
Hazard Type	Occurrences Between 1996 and 2024	% Chance of Occurring in Any Given Year
Heat	3	10.71%
Excessive Heat	1	3.57%
Extreme Cold/Wind Chill	2	7.14%
Total	**6**	**21.42%**

Source: NOAA NCEI 2024
Note: The NCEI database used as a source for this table has limited data before 1996. Therefore, the evaluation of future hazard probability is based only on data from 1996 and later.

Potential Effect of Climate Change on Hazard Probability

Climate change is expected to increase the severity and frequency of extreme heat events in Seneca County. New York State has warmed more rapidly than the national average, and winter is warming faster than other seasons. Extremely hot days are happening more often, and multiday heat waves are expected to occur more often and last longer in the upcoming decades. Figure 9-5 depicts predicted average temperature increases for New York State (Stevens & Lamie 2024).

Figure 9-5. Projected Annual Average Temperature in New York State



Source: Stevens & Lamie 2024 2023

In Seneca County and the Central Lakes region, temperatures are estimated to increase by as much as 7.4 ºF by the 2050s and as much as 14.3ºF by 2100, relative to the 1981–2010 base period (Stevens & Lamie 2024). Table 9-6 summarizes predicted extreme heat and cold days in the region in upcoming decades.

Table 9-6. Changes in Extreme-Temperature Events in the Central Lakes Region

# Days Per Year	Baseline	Future Projections at Various Probability Percentiles		
		10th Percentile	50th Percentile	90th Percentile
2030s				
Days per Year over 90 °F	9	15	19	42
Days per Year over 95 °F	1	3	6	15
Days per Year below 32 °F	134	89	110	118
Days per Year below 0 °F	8	0.9	2	4
Number of Heat Waves	0.8	2	2	5
Average Length of Heat Waves (days)	4	4	4	5
Maximum Heat Index	96	102	104	108
Days per Year Heat Index is over 85 °F	17	30	39	52
Days per Year Heat Index is over 95 °F	1	5	8	15
2050s				
Days per Year over 90 °F	9	19	35	63
Days per Year over 95 °F	1	4	11	33
Days per Year below 32 °F	134	64	102	114
Days per Year below 0 °F	8	0.2	1	3
Number of Heat Waves	0.8	2	4	8
Average Length of Heat Waves (days)	4	4	5	6
Maximum Heat Index	96	104	109	116
Days per Year Heat Index is over 85 °F	17	39	54	75
Days per Year Heat Index is over 95 °F	1	8	16	30
2070s				
Days per Year over 90 °F	9	27	42	77
Days per Year over 95 °F	1	6	19	49
Days per Year below 32 °F	134	27	89	110
Days per Year below 0 °F	8	0	0.1	2
Number of Heat Waves	0.8	3	5	9
Average Length of Heat Waves (days)	4	5	5	7
Maximum Heat Index	96	107	114	126
Days per Year Heat Index is over 85 °F	17	47	66	99
Days per Year Heat Index is over 95 °F	1	12	24	54

Source: Stevens & Lamie 2024 2023

Extremely cold days are becoming less common in New York State as the climate continues to warm. The number of days per year with temperatures below freezing or 0 °F is projected to decrease across the state (Stevens & Lamie 2024).

9.1.6 Cascading Impacts on Other Hazards

Extreme heat events may accelerate evaporation rates, drying out the air and soils. Extreme heat can also dry out terrestrial species, making them more susceptible to catching fire. Extreme variation in temperatures could create ideal atmospheric conditions for severe storms or worsen the outcome of winter storm during freezing and thawing periods.

Depending on severity, duration, and location; extreme heat events can lead to secondary hazards such as dust storms, droughts, wildfires, water shortages, and power outages. These secondary hazards can result in widespread impacts such as economic costs in transportation, agriculture, production, energy, and infrastructure; and losses of ecosystems, wildlife habitats, and water resources (NYS DHSES 2023).

9.2 VULNERABILITY AND IMPACT ASSESSMENT

9.2.1 Life, Health, and Safety

Overall Population

Extreme temperature events have potential health impacts, including injury and death. Milder winters resulting from a warming climate can reduce illness and injuries associated with extreme cold temperatures and reallocate them to extreme heat events. The entire population of Seneca County (33,814) is exposed to the extreme temperature hazard.

Particular risks are faced by people who overexert during work or exercise during extreme heat events or experience extended exposure to the outdoors during extreme cold events.

Socially Vulnerable Population

The following populations are most at risk from extreme cold and heat events (CDC 2022, CDC 2005):

- The elderly, who are less able to withstand temperature extremes because of their age, health conditions, and limited mobility to access shelters
- Children up to 4 years of age
- Individuals who are physically ill (such as with heart disease or high blood pressure)
- Low-income persons who cannot afford proper heating and cooling

Table 3-7 shows social vulnerability statistics for Seneca County and participating municipalities from the 2022 ACS 5-year estimates. Table 3-8 shows low-income populations based on United for ALICE data for 2022. The municipalities with the highest and lowest numbers and percentages in each social vulnerability category are listed in Table 9-7.

Table 9-7. Municipalities With Highest and Lowest Socially Vulnerable Populations

Category	Municipality Highest in Category		Municipality Lowest in Category	
	Number	Percent	Number	Percent
Population Over 65	Seneca Falls (T)	Interlake (V)	Lodi (V)	Junius (T)
	1,873	**24.9%**	**56**	**11.4%**
Population Under 5	Seneca Falls (T)	Lodi (V)	Ovid (V)	Ovid (V)
	435	**10.6%**	**11**	**2.1%**
Non-English-Speaking Population	Seneca Falls (T)	Ovid (V)	Covert (T), Interlaken (V), Lodi (T and V), Tyre (T)	
	115	**3.4%**	**0**	**0.0%**
Population With Disability	Seneca Falls (T)	Waterloo (V)	Lodi (V)	Romulus (T) and Fayette (T)
	1,792	**20.3%**	**49**	**9.2%**
Population Below Poverty Level	Seneca Falls (T)	Varick (T)	Lodi (V)	Romulus (T)
	1,399	**18.4%**	**28**	**6.8%**
Households Below ALICE Threshold (2022)	Seneca Falls (T)	Lodi (V)	Lodi (V)	Romulus (T)
	2,091	**64.9%**	**85**	**33.7%**

Note: All data from 2022 5-year ACS (see Table 3-7) except ALICE data from 2022 United for Alice (see Table 3-8).

9.2.2 General Building Stock

All buildings in the County are exposed to the extreme temperature hazard. Extreme heat generally does not impact buildings; however, elevated summer temperatures increase the energy demand for cooling. Losses can be associated with the overheating of heating, ventilation, and air conditioning (HVAC) systems.

Extreme cold temperature events can damage buildings through freezing/bursting pipes and freeze/thaw cycles, as well as increasing vulnerability to home fires. Additionally, manufactured homes (mobile homes) and antiquated or poorly constructed facilities can have inadequate capabilities to withstand extreme temperatures.

9.2.3 Community Lifelines and Other Critical Facilities

All critical facilities in the County are exposed to the extreme temperature hazard; however, direct impacts are expected to be minimal. Impacts on 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 “brownouts,” created by increased usage from air conditioners, appliances, and similar equipment. 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. During extreme temperature events, facilities serving as warming or cooling shelters may be opened. Power supply is vital at these facilities.

9.2.4 Economy

Extreme temperature events 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 a 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. Examples of income loss include reduced income for farmers, and for retailers and others who provide goods and services to farmers. The recreation and tourism industries may also undergo a loss of income because of increased costs of food, energy, and other products as supplies decrease. Some local shortages of certain goods trigger the need to import goods from outside the affected region (NYS DHSES 2023).

Based on the 2022 Census of Agriculture, 422 farms were present in Seneca County, encompassing 103,156 acres of total farmland. The average farm size was 244 acres. Seneca County farms had a total market value of products sold of $110,379,000, averaging $261,561.61 per farm.

9.2.5 Natural, Historic, and Cultural Resources

Natural

Extreme temperature events can have a major impact on the environment. Freezing and warming weather patterns can 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. These extreme temperature events can also affect the surrounding ecosystems which can destroy food webs and deplete resources in the environment.

Historic

Proper strategies help safeguard buildings and their contents. Sudden and dramatic fluctuations in heating or cooling should be minimized. Slower heating and cooling give building materials and stored contents time to acclimate to new temperatures in the building and corresponding new humidity levels (CCAHA 2019).

Extreme heat can increase the risk of ignition of fires and their propagation. Fire causes material loss and deformation of cultural heritage assets and may also increase the probability of cracking or splitting in built structures. Under extreme heat, stones can face both macro (e.g., cracking of stones, soot accumulation, color change in stone containing iron) and micro degradation (e.g., mineralogical and textural changes), leading to potential structural instability. The long-term impacts include weakened stones and increased susceptibility to deterioration processes such as salt weathering and temperature cycling (Sesana, et al. 2021).

Cultural

Cultural heritage sites, particularly those exposed to the elements, are subject to weathering. Temperature is a potential threat to these sites as it exacerbates the expected rates of decay and contributes to the appearance of new decay. Extreme temperature may aggravate the physical, chemical, and biological mechanisms, causing degradation by affecting the structure or composition of building materials (Sesana, et al. 2021).

9.3 CHANGE OF VULNERABILITY SINCE 2018 HMP

Seneca County's overall vulnerability has not changed, and the entire County will continue to be exposed and vulnerable to extreme temperature events.

9.4 FUTURE CHANGES THAT MAY AFFECT RISK

9.4.1 Potential or Planned Development

The ability of new development to withstand extreme temperature impacts lies in sound land use practices and consistent enforcement of codes and regulations for new construction. As a relatively rural county, Seneca County is fortunate to have areas of greenery that decrease the overall county's vulnerability to heat waves. However, as the County increases development, preservation of such spaces can become more difficult. New development will change the landscape where buildings, roads, and other infrastructure potentially replace open land and vegetation. Surfaces that had been permeable and moist will become impermeable and dry. These changes cause urban areas to become warmer than the surrounding areas forming heat islands. Specific areas of recent and new development are indicated in tables and maps included in the jurisdictional annexes in Volume II of this plan.

9.4.2 Projected Changes in Population

The population of Seneca County decreased by about 4 percent from 2010 to 2020 and is projected to continue decreasing through 2040 (Cornell University 2018). Any changes in the density of population may require utility system upgrades to keep up with utility demands (e.g., water, electric) during extreme temperature events to prevent increased stresses on these systems. Additionally, by increasing development, green space preservation will need to continue to be a priority to mitigate increased heat islands.

9.4.3 Climate Change

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 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.

10. FLOOD

10.1 HAZARD PROFILE

10.1.1 Hazard Description

Floods are one of the most common natural hazards in the U.S. They can develop slowly over a period of days or develop quickly, with disastrous effects that can be local (impacting a neighborhood or community) or regional (affecting entire river basins and multiple counties or states) (FEMA 2007). Flooding potential is influenced by climatology, meteorology, and topography (elevations, latitude, and waterbodies and waterways). Severity depends on the amount of water that accumulates in a period of time as well as the land's ability to manage this water. When it rains, soil acts as a sponge. When the land is saturated or frozen, infiltration into the ground slows and any more water that accumulates must flow as runoff (Harris 2008).

As defined in the 2023 New York State HMP (NYS DHSES 2023), flooding is a general and temporary condition of partial or complete inundation on normally dry land as a result of the following:

- Riverine overbank flooding
- Flash floods
- Alluvial fan floods
- Mudflows or debris floods
- Dam-break floods
- Local draining or high groundwater levels
- Fluctuating lake levels
- Ice jams
- Urban flooding

As determined by the HMP Steering Committee, the main flood types of concern for Seneca County are riverine, flash, stormwater/urban, lakeshore, and ice jam.

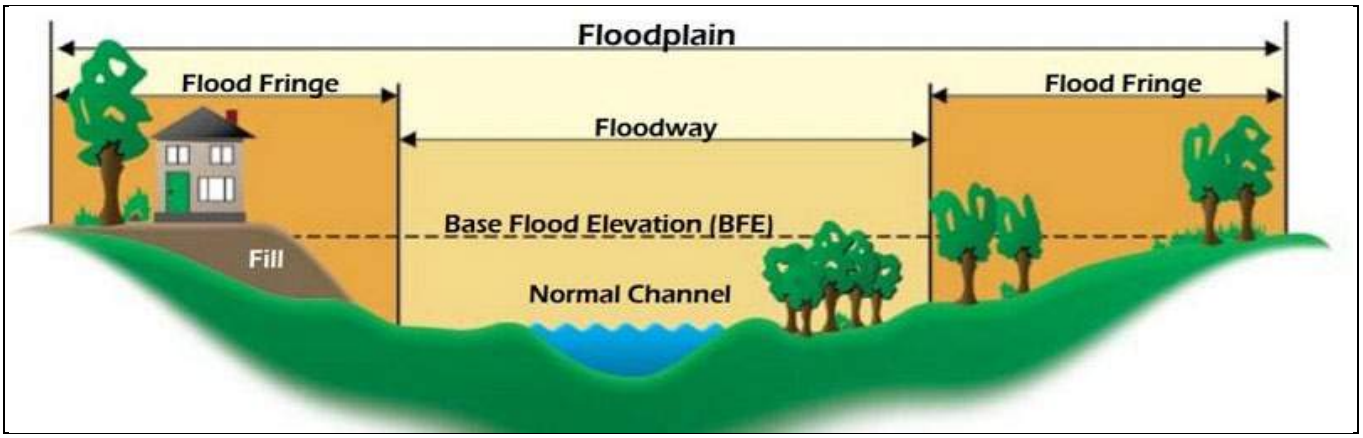
Floodplains

A floodplain is the land adjoining a river, stream, ocean, lake, or other water body that becomes inundated with water during a flood. It consists of the following components (FEMA 2019c):

- **Floodway** is the channel of a river or other waterway and the adjacent land areas that are under water or reserved to carry and discharge the overflow of water caused by flooding.
- **Flood fringe** is the area within the floodplain but outside the floodway. This area extends from the outer banks of a floodway to the river valley, where the elevation begins to rise.

Figure 10-1 depicts the flood hazard area, the flood fringe, and the floodway areas of a floodplain.

Figure 10-1. Characteristics of a Floodplain



Source: FEMA 2022

The 1 percent annual chance floodplain, also referred to as the special flood hazard area (SFHA), is the area that has requirements for flood insurance and floodplain management regulations (FEMA 2020b). This is the area inundated by a flood that has a 1 percent chance of being equaled or exceeded in any given year.

Although the 1 percent annual chance flood is sometimes called the "100-year" flood, it is statistically possible for such events to occur over much shorter intervals than 100 years. Similarly the 0.2 percent annual chance flood is sometimes called the 500-year flood, but it cannot be assumed that such a flood won't occur more often than once every 500 years.

Flood Maps

FEMA maps of floodplains identify the SFHA. Areas outside of the SFHA can be subject to flooding and may even act as an unofficial floodplain. Flooding outside of the SFHA area may include stormwater or urban flooding and flash flooding. Additional definitions relating to flood maps can be seen in Figure 10-1.

Table 10-1. Flood Map Terms

Term	Description
Special Hazard Flood Areas (SFHAs)	Labeled as Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30.
Zone B or Zone X (shaded)	Moderate flood hazard areas and are the areas between the limits of the 1 percent annual chance flood and the 0.2 percent-annual-chance flood.
Zone C or Zone X (unshaded)	Areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2 percent-annual-chance flood.

Source: FEMA 2020

Floodplain mapping is based on known flooding conditions. The mapped boundaries of floodplains are affected by changes in land use, the amount of impervious surface, placement of obstructing structures, changes in precipitation and runoff patterns, improvements in technology for measuring topographic features, and utilization of different hydrologic modeling techniques. Urban and stormwater flooding and future conditions (e.g., sea level rise and rainfall areas) are not reflected in FEMA floodplain mapping. As such, FEMA floodplain maps may underestimate flood risk in some areas.

Flood Types

Riverine Flooding

Riverine floods are the most common flood type. They occur along channels, which are defined ground features that carry water through and out of a watershed. A channel may be a river, creek, stream, or ditch. When a channel receives too much water, the excess water flows over its banks and inundates low-lying areas (FEMA 2019).

Flash Flooding

Flash floods are defined by the National Weather Service (NWS) as floods caused by heavy or excessive rainfall in a short period of time, generally less than 6 hours (NWS 2015). A flash flood results from 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 can occur 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 (NWS 2019). Flash floods are usually characterized by raging torrents after heavy rains that rip through riverbeds, urban streets, or mountain canyons. They can occur within minutes or a few hours of excessive rainfall.

Lakeshore Flooding

Lakeshore flooding occurs when water is driven onto land from an adjacent lake. This generally occurs during significant storms; for the Finger Lakes, usually in conjunction with high water levels.

Stormwater/Urban Flooding

Heavy rainfall that overwhelms a developed area's stormwater infrastructure causing flooding of streets, underpasses, low-lying areas, or storm drains is commonly referred to as urban flooding. Such conditions may produce flooding in areas other than delineated floodplains or along recognizable channels. Unlike riverine and lakeshore flooding, urban flooding is not mapped and studied by FEMA.

If local drainage infrastructure cannot accommodate intense precipitation through a combination of infiltration and surface runoff, water may accumulate and cause flooding. Drainage systems are designed to remove surface water from developed areas as quickly as possible to prevent localized flooding on streets and other urban areas. The systems make use of a closed conveyance system that channels water away from an urban area to surrounding streams. This bypasses the natural processes of water filtration through the ground, containment, and evaporation of excess water. Because drainage systems reduce the amount of time the surface water takes to reach surrounding streams, flooding in those streams can occur more quickly and reach greater depths than prior to development in that area (Harris 2008).

Urban flooding can be worsened by aging and inadequate infrastructure and overdevelopment of land. During winter and spring, frozen ground and snow accumulations may contribute to inadequate drainage and localized ponding. The growing number of extreme rainfall events that produce intense precipitation are resulting in increased urban flooding (Center for Disaster Resilience 2016).

Flooding issues of this nature generally occur in areas with flat gradients and generally increase with urbanization, which speeds the accumulation of floodwaters because of impervious areas. Street flooding can result unless channels have been improved to account for the increased flows (FEMA 1997).

Ice Jam Flooding

An ice jam occurs when pieces of floating ice are carried with a stream's current and accumulate behind an obstruction to the stream flow. 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 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 2018b). Freeze-up jams occur when floating ice slows or stops 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 2018c).

Ice jams are common in the northeast United States. According to USACE, New York State ranks second in the United States for total number of ice jam events, with over 1,600 incidents documented between 1867 and 2015. Areas of the state that include characteristics lending to ice jam flooding are the northern counties of the Finger Lakes region and far western New York, the Mohawk Valley of central and eastern New York, and the North Country (NYS DHSES 2023).

10.1.2 Location

Riverine Flooding

In Seneca County, floodplains line the rivers and streams and the lakeshore areas. Locations of flood zones in Seneca County as depicted on the FEMA preliminary Digital Flood Insurance Rate Map (DFIRM) are illustrated in Figure 10-2 and the total land area in the floodplain, exclusive of waterbodies, is summarized in Table 10-2. Refer to Volume II for a map of each jurisdiction depicting the floodplains.

Flash Flooding

Flash flood characterized by fast-moving water and damaging impacts requires a steep topography that is seen along the banks of rivers and lakes within Seneca County. In the southern zone along Cayuga Lake in the Towns of Covert and Romulus, and to a lesser extent on Seneca Lake in the Towns of Lodi and Ovid, there are steep slopes along the lakeshores that pose a flash flood risk for property owners on the hillsides above the lakes as well as those on the shoreline. When heavy rains affect upland areas, there are many culverts, ditches, and channels that carry runoff to the lakes; they can quickly be overwhelmed, sending torrents of powerful, fast-moving water downhill (Seneca County 2018).

Figure 10-2. FEMA Flood Hazard Areas in Seneca County

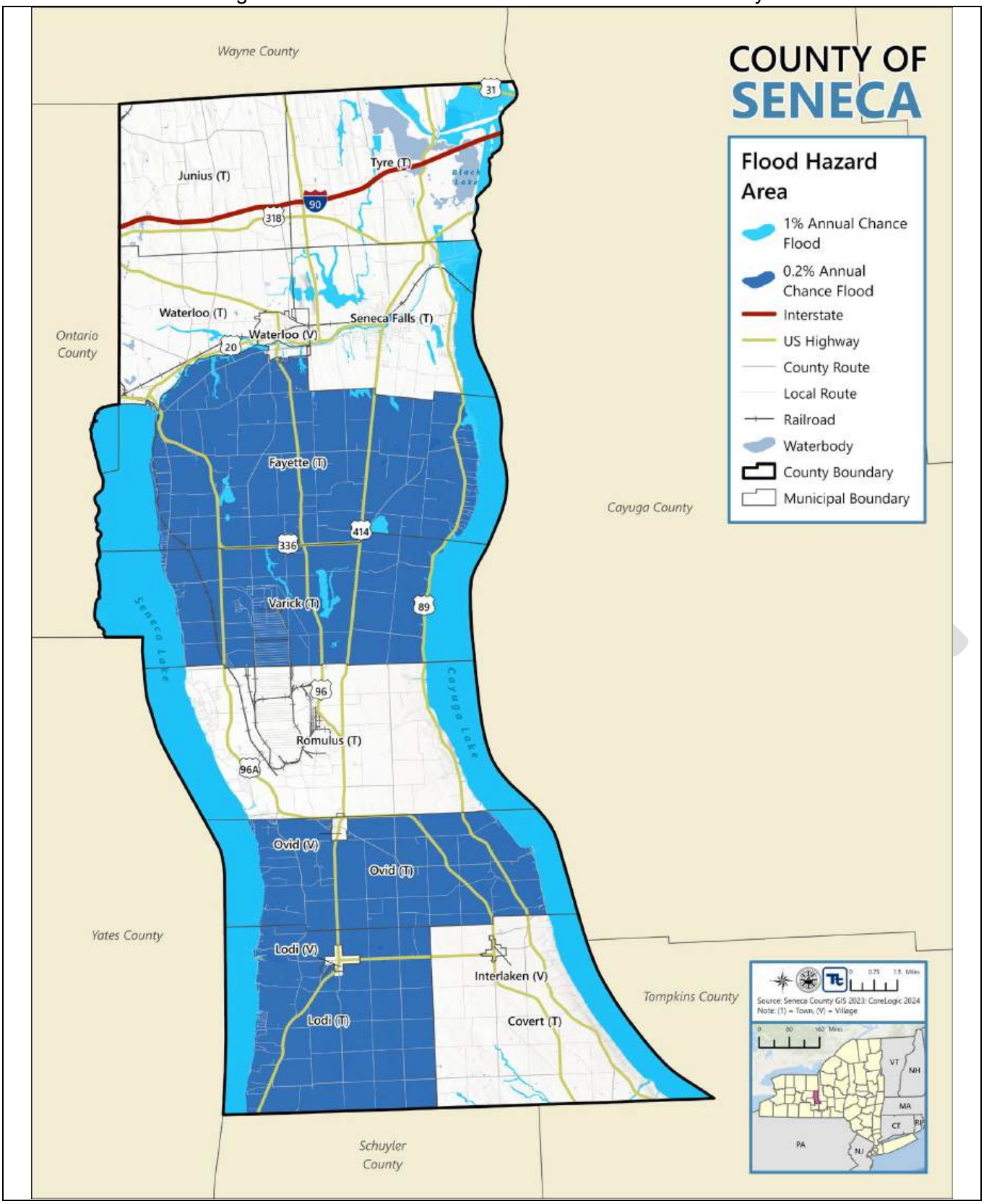


Table 10-2. Area in Seneca County Exposed to 1 Percent and 0.2 Percent Annual Chance Flood

Jurisdiction	Total Land Area (Excluding Water Bodies) (acres)	Land Area (Excluding Water Bodies) in the Flood Hazard Area (acres)			
		1% Annual Chance Flood		0.2% Annual Chance Flood	
		Total Area (Acres)	% of Jurisdiction Total	Total Area (Acres)	% of Jurisdiction Total
Covert (T)	20,240	307	1.5%	319	1.6%
Fayette (T)	35,511	1,060	3.0%	34,834	98.1%
Interlaken (V)	340	0	0.0%	0	0.0%
Junius (T)	17,114	0	0.0%	0	0.0%
Lodi (T)	22,231	99	0.4%	21,556	97.0%
Lodi (V)	684	0	0.0%	60	8.8%
Ovid (T)	19,981	81	0.4%	19,491	97.5%
Ovid (V)	530	0	0.0%	22	4.1%
Romulus (T)	24,244	186	0.8%	220	0.9%
Seneca Falls (T)	15,679	1,978	12.6%	2,016	12.9%
Tyre (T)	18,700	2,943	15.7%	2,943	15.7%
Varick (T)	20,593	541	2.6%	20,578	99.9%
Waterloo (T)	14,828	410	2.8%	411	2.8%
Waterloo (V)	2,764	87	3.2%	119	4.3%
Seneca County	213,440	7,692	3.6%	102,569	48.1%

Source: Seneca County, GIS 2023; CoreLogic 2024

Stormwater/Urban Flooding

Stormwater/urban flooding is not mapped by the state or FEMA but is most likely to occur in highly developed areas with high percentages of impervious surface that contribute to high rates of runoff. Locations that have undersized stormwater components or stormwater components that are prone to becoming clogged or failing often experience stormwater flooding.

Lakeshore Flooding

The lakeshores of Cayuga and Seneca Lakes have traditionally been susceptible to flooding. There are 72 miles of lakeshore in Seneca County on Cayuga and Seneca Lakes, mainly occupied by permanent, single-family homes and seasonal cottages. Other dominant lakeshore uses are state parks and waterfront recreation (Seneca County 2018):

Ice Jam Flooding

Obstructions that can cause ice jams include river bends, mouths of tributaries, points where the river slope decreases, dams, and bridges. 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.

10.1.3 Extent

Riverine Flooding

Generally, floods are long-term events that last for several days. The frequency and severity of riverine flooding are measured using a discharge probability, which is the probability that a certain river discharge (flow) level will be equaled or exceeded in a given year—such as the 1 percent annual chance flood shown on FEMA flood maps.

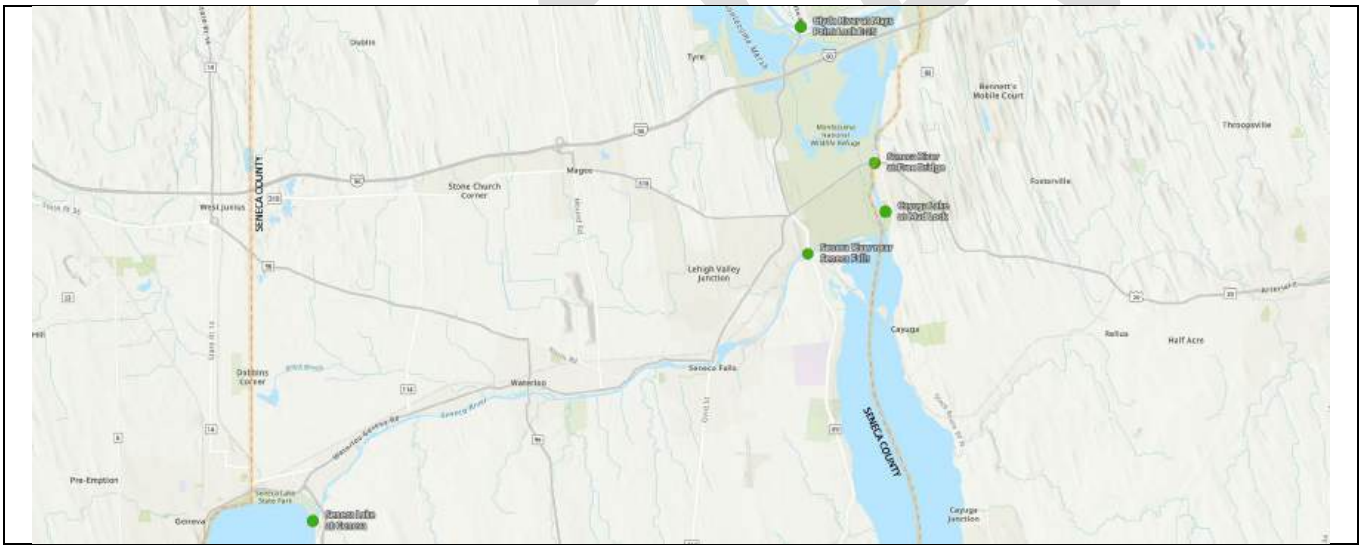
Flood studies use historical records to determine the probability of occurrence for different discharge levels. The USGS National Water Information System collects surface water data from more than 850,000 stations across the country. The time-series data describes stream levels, stream flow (discharge), reservoir and lake levels, surface water quality, and rainfall. The data is collected by automatic recorders and manual field measurements at the gage locations. USGS uses stream gages to determine the severity of flood at different points along a body of water. The USGS website provides details about each of the gages and the gage heights of flooding events. The NWS defines flood stages for the gages. The five stream gages in or adjacent to Seneca County that provide critical flood data for waterways affecting the County are listed in Table 10-3 and their locations are shown in Figure 10-3.

Table 10-3. Gages in Seneca County

Gage Site Number	Site Name	Flood Stage Height
04232505	Seneca Lake at Geneva	448.0
04232730	Seneca River near Seneca Falls	Not Available
04233500	Cayuga Lake at Mud Lock	385.0
0423406130	Seneca River at Free Bridge Corners	Not Available
Unknown	Clyde River at Mays Point Lock	Not Available

Source: NWS 2023; USGS 2023

Figure 10-3. River Stream Gages in or Adjacent to Seneca County



Source: NWS 2023

The NWS classifies riverine flood severity based on its potential threat to the public and property. The agency has defined the following levels of flooding (NOAA 2021):

- **Minor Flooding**—Minimal or no property damage, but possibly some public threat or inconvenience.
- **Moderate Flooding**—Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.
- **Major Flooding**—Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.

On the Seneca River, considerable modifications have been made since the river was first adapted for navigation in 1813. The elevation of the Seneca River over its length changes, but each section of the river is relatively flat because water levels are regulated by canal locks. As a result, Seneca River flood events are commonly inundating or overflow-type flooding where water rises and spreads but lacks the destructive power of other riverine floods. In periods of heavy rain and high river volumes, flows can still be forceful enough to damage roads, homes, and other structures (Seneca County 2018).

Flash Flooding

The extent of a flash flood is consistent with that of a riverine flood.

Stormwater/ Urban Flooding

Currently, there is no measurement used to further define the severity of stormwater/urban flooding.

Lakeshore Flooding

Flooding along the lakeshores of Cayuga and Seneca Lakes can happen when there is an extended period of higher-than-normal precipitation. This occurs most often in early spring when high lake levels combine with rains and snowmelt. Such flooding can impact shoreline properties even when other inland parts of the County are not affected. The National Weather Service issues the following alerts related to lakeshore flooding (NWS 2024):

- A Lakeshore Flood Advisory is issued when minor lakeshore flooding that could pose a threat to life and/or property is occurring or is imminent in the next 12 hours.
- A Lakeshore Flood Watch is issued when flooding that could pose a serious threat to life and/or property is possible within the next 12 to 48 hours.
- A Lakeshore Flood Warning is issued when flooding that poses a serious threat to life and/or property is occurring or is imminent in the next 12 to 24 hours.

Many of the structures on Seneca County's lakeshores are older wood-frame seasonal residences, although the number of permanent residences and higher-end seasonal homes is increasing. Structural densities along the lakeshores are low, as homes are situated lengthwise along the shoreline, but there are pockets where 10 or 20 cottages form shoreline clusters (Seneca County 2018).

Lakeshore flooding is usually an inundating type of flood where water slowly rises around and into the lower levels of structures, affecting foundations, floors, utilities, contents, and landscape. It is not the kind of violent flooding associated with flash floods and high-velocity riverine flooding In some cases, strong winds can drive water higher and exacerbate damage (Seneca County 2018).

Ice Jam

Ice jam flooding events often occur suddenly and are difficult to predict, allowing for little time to prepare for and warn of an event. The size of the snowpack and the rate of snowmelt controls the extent of an ice jam (Rokaya 2018).

10.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Seneca County has been included in four major disaster (DR) or emergency (EM) declarations for flood-related events, as listed in Table 10-4 (FEMA 2024).

Table 10-4. FEMA Declarations for Hazard Events in Seneca County (2017 to 2023)

Event Date	Declaration Date	Declaration Number	Description
June 23, 1972	June 23, 1972	DR-338	Tropical Storm Agnes
May 13–June 17, 2004	August 3, 2004	DR-1534	Severe Storms and Flooding
October 27–November 8, 2012	October 28, 2012	EM-3351	Hurricane Sandy
August 13, - August 15, 2018	October 1, 2018	DR-4397	Severe Storms and Flooding

Source: FEMA 2023

USDA Declarations

Table 10-5 lists the known flood-related event that impacted Seneca County between 2018 and 2024. For events prior to 2018, refer to the previous Seneca County HMP.

Table 10-5. USDA Declarations for Flood Events in Seneca County (2018 to 2024)

Event Date	Event Type	USDA Declaration Number
July 10 -16, 2024	Tornado, hurricane, high wind, flash flood, excessive rain, hail	S5739

Source: USDA 2024

Previous Events

Table 10-6 lists known flood-related events in Seneca County from January 2017 to July 2024.

10.1.5 Probability of Future Occurrences

Probability Based on Past Events

Seneca County will continue to experience annual flooding events. Based on historical records (Table 10-7) and input from the Steering Committee, the likely frequency of future occurrence of flood in Seneca County is frequent.

Table 10-6. Flood Events in Seneca County (2017 to 2024)

Event Date	Event Type	Disaster Declaration/Proclamation		Location Impacted	Description
		Number	County Included?		
January 12, 2018	Ice Jam	N/A	N/A	Town of Tyre, Town of Seneca Falls	A thaw for several days allowed much of the snowpack to melt into river runoff. Combined with rainfall of 1 to 2 inches, this was enough to loosen the river ice cover throughout central New York. Moving ice jammed along bridges and narrows on main stem rivers and tributaries, which resulted in numerous areas of minor to moderate flood impacts. An ice jam on the Seneca River caused minor lowland flooding from Montezuma to Weedsport.
August 14, 2018	Flash Flood	DR-4397	Yes	Village of Lodi	Thunderstorms caused severe flash flooding and major damage in several locations. A cliffside was washed into Seneca Lake. Multiple water rescues and evacuations were required. A woman trapped in the wreckage of her home was rescued by small boat. $1.2 million in property damage occurred in the Village of Lodi.
August 18, 2021	Flash Flood	N/A	N/A	Town of Ovid	The remnants of Tropical Storm Fred moved across the northeast United States August 18 – 20. In the Town of Ovid, severe flash flooding caused a structure to collapse and resulted in widespread street flooding, with $170,000 in property damage.
October 26, 2021	Flash Flood	N/A	N/A	Village of Waterloo, Town of Seneca Falls	Rainfall totaling 3 to 5 inches rainfall led to widespread flash flooding. Numerous roads and a few homes were flooded. Many roads were closed, and a state of emergency was in effect. $100,000 in property damage occurred in the Village of Waterloo. $150,000 in property damage occurred in the Town of Seneca Falls.
April 5, 2023	Flood	N/A	N/A	Town of Seneca Falls, Town of Waterloo	Numerous basements and cars were flooded in Seneca Falls and the Border Town area of the Town of Waterloo. Approximately $20,000 in property damage was reported in the Town of Seneca Falls.. Street flooding occurred in the Town of Waterloo, with vehicles stuck in water. $20,000 in property damage was reported.
June 20, 2024	Flash Flood	N/A	N/A	Town of Romulus	Thunderstorms produced up to 3.0 inches of rain in a short time, causing local creeks and streams to flood. Water flooded portions of County Road 129.

Source: NOAA NCEI 2024, FEMA 2024

Table 10-7. Probability of Future Flood Events in Seneca County

Hazard Type	Occurrences Between 1996 and 2024	Percent Chance of Occurring in Any Given Year
Lakeshore Flood	0	0.00%
Flash Flood	15	53.57%
Flood	2	7.14%
Ice Jam	1	3.57%
Total	18	57.1%

Source: NOAA NCEI 2023, FEMA 2023
Note: The NCEI database used as a source for this table has limited data before 1996. Therefore, the evaluation of future hazard probability is based only on data from 1996 and later.

Potential Effect of Climate Change on Hazard Probability

From 1965 to 2015, floods in New York's rivers and streams became larger and happened more frequently. Projections of climate change for New York State and for the Central/Finger Lakes region that includes Seneca County are summarized in Chapter 3.6.4. Table 10-8 presents the range of projected changes in mean annual precipitation for the Central Lakes region. Downpours are likely to increase in frequency and intensity, which has the potential to heighten the risk of riverine flooding. Many of New York's lakes have seen ice freezing later and thawing earlier since the late 19th and early 20th century. Warming temperatures make ice jams less likely (Stevens & Lamie 2024).

Table 10-8. Mean Annual Changes in Precipitation in the Central Lakes

Decade	Projected Percent Change in Mean Annual Precipitation at Various Probability Percentiles				
	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2030s	-1%	1%	4%	7%	9%
2040s	-1%	3%	6%	8%	10%
2050s	0%	3%	6%	10%	11%
2060s	0%	4%	8%	11%	13%
2070s	0%	6%	9%	12%	14%
2080s	2%	7%	10%	13%	17%
2100	-3%	5%	11%	17%	22%

Source: Stevens & Lamie 2024

10.1.6 Cascading Impacts on Other Hazards

Erosion

Riverine flooding often results in bank erosion. This is especially true in the upper courses of rivers with steep gradients, where floodwaters may pass quickly and without much property damage, but scour the banks, edging properties closer to the floodplain or causing them to fall in. Flooding is also responsible for hazards such as landslides when high flows over-saturate soils on steep slopes, causing them to fail.

Public Health

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 to 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 n.d.).

Floodwaters also 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

The best level of mitigation for these public health impacts is to be aware that they can occur, educate the public on prevention, and be prepared to deal with them in responding to flood events.

Utility Disruption

Floods of any type have the potential to impact water and power utilities, which may impact public and private use, as well as cause disruption to critical infrastructure. Flooding's harmful effects on the water supply include the following:

- **Water Supply Contamination**—Excess floodwater can contaminate private drinking water sources, such as wells and springs. Floodwater picks up debris, increasing the number of bacteria, sewage, and other industrial waste and chemicals into the water source or leaky pipes. Excess water also makes it more difficult for water treatment plants to treat the water efficiently and effectively. If there is a contamination at any step of the water flow process, this puts consumers at risk of exposure to dangerous toxins that could result in serious harm, such as wound infections, skin rashes, gastrointestinal illnesses, and tetanus; in extreme cases, death may occur.
- **Disruption to Clean Drinking and Cooking Water**—In the event of having access only to contaminated water, consumers are unable to cook or clean in their home until the water is certified as safe. Depending on the severity of the flood and the storm, this could take days, months, or, in some cases, even years. Without access to clean drinking and cooking water, consumers ultimately become reliant on bottled water. In impoverished communities, this is even more detrimental because those affected may not have the economic means to purchase sufficient bottled water. Moreover, in a flood, retail locations are often inaccessible or low on supplies of bottled water.

Floodwaters can also cause damage to power utilities. In particular, floods may disrupt utilities if a building's service panel, generator, meter, etc. are not elevated above the flood protection level. Oversaturated soils from periods of heavy rain and flooding may cause utility poles to tip over or fall completely, interrupting the power grid for a potentially large area, especially if the transformer is impacted.

Dam Failure

Severe weather, which is often a precursor to flooding events, can result in large quantities of rain upstream of a dam that will ultimately be impounded by the dam. This can raise water levels behind the dam, resulting in overtopping of the dam or flooding of properties upstream of the dam. Should the flooding result in a dam failure, the water behind the dam, including flood waters, may inundate jurisdictions downstream of the dam. More information on dam failure can be found in Chapter 6.

10.1.7 NFIP Statistics

Of the 14 municipalities in Seneca County, 11 actively participate in the National Flood Insurance Program (NFIP)—the Town of Junius, the Village of Interlaken, and the Village of Ovid currently do not. Table 10-9 summarizes policies, claims, and repetitive loss (RL) statistics for Seneca County. As of November 2023, there were 97 NFIP policies in Seneca County. There have been 105 claims made, totaling over $900,000 for damage to structures and contents.

Table 10-9. NFIP Statistics in Seneca County

Municipality	# Policies	# Claims	Total Loss Payments	# RL Prop.
Covert (T)	11	8	$88,502.66	1
Fayette (T)	17	11	$63,758.45	1
Interlaken (V)[a]	n/a	n/a	n/a	n/a
Junius (T)[a]	n/a	n/a	n/a	n/a
Lodi (T)	13	7	$231,879.05	1
Lodi (V)	0	2	$26,785.74	0
Ovid (T)	8	23	$336,891.65	4
Ovid (V)[a]	n/a	n/a	n/a	n/a
Romulus (T)	8	7	$756.08	0
Seneca Falls (T)	18	35	$138,788.35	3
Tyre (T)	1	0	$0.00	0
Varick (T)	12	8	$16.646.08	0
Waterloo (T)	5	2	$2,077.00	0
Waterloo (V)	4	2	$2,147.53	0
Seneca County	97	105	$908,232.59	10

Source: NFIP 2023
Note: Data current as of November 2023.
a. The Town of Junius, Village of Interlaken, and Village of Ovid do not currently participate in the NFIP.

There are 10 NFIP RL properties in the County. A property is considered an RL property if it has two or more reported losses of more than $1,000 each within 10 years of each other and at least 10 days apart. The majority of properties within the RL occupancy class are single-family residences. Data on severe repetitive loss properties, which are defined by additional numbers and values of reported losses, was not available for Seneca County.

Local NFIP compliance is described in the jurisdictional annexes in Volume II. To enhance their flood damage prevention programs and their future compliance with the NFIP, several municipalities propose actions in their mitigation strategies to ensure that their floodplain administrators complete training on floodplain management and the NFIP or update their flood damage prevention ordinance.

Floodplain management officials often find it to be difficult to communicate the benefits of mitigation to some property owners where insurance rates are likely to stay high even after mitigation due to factors such as proximity to flood sources and frequency of flooding. Continued shifts in flood insurance costs, coverage, impacts on mitigation of flood-prone properties, and potential updates to federal insurance requirements will be monitored by Seneca County throughout the period of performance of this HMP.

10.2 VULNERABILITY AND IMPACT ASSESSMENT

The 1 percent and 0.2 percent annual chance flood events were examined to evaluate the County's risk from flood hazards. These flood events are generally considered by planners and evaluated under federal programs such as the NFIP. Additional information on the methodology used for this analysis can be found in Chapter 4.2.2.

10.2.1 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 adequate warning time is provided to residents. The vulnerable population consists of those living in or near floodplain areas who could be impacted should a flood event occur. It also includes people traveling in flooded areas, or whose access to emergency services is compromised during a flood.

Overall Population

The DFIRM flood boundaries were used to estimate population exposure to the 1 percent and 0.2 percent annual chance flood events. Table 10-10 summarizes the results. There are 1,644 residents living in the 1 percent annual chance floodplain or 4.9 percent of the County's total population. There are 9,083 residents living in the 0.2 percent annual chance floodplain, or 26.9 percent of the County's total population. The Town of Seneca Falls has the greatest number of residents living in the 1 percent annual chance floodplain, with 352 residents; the Town of Fayette has the greatest number of residents living in the 0.2 percent annual chance floodplain, with 2,656 residents. The number of casualties resulting from flooding is limited based on advance weather forecasting, blockades, and warnings. Injuries and deaths generally are not anticipated if proper warning and precautions are in place. Ongoing mitigation efforts should help to avoid the most common injuries, which result from persons trying to cross flooded roadways or channels during a flood.

Table 10-10. Population in the 1 Percent and 0.2 Percent Annual Chance Flood Hazard Areas

Jurisdiction	Total Population (2020 Census)	Estimated Population Living in the Flood Hazard Area			
		1% Annual Chance Flood Hazard Area		0.2% Annual Chance Flood Hazard Area	
		Number of Persons	Percent of Total	Number of Persons	Percent of Total
Covert (T)	1,568	218	13.9%	218	13.9%
Fayette (T)	2,659	218	8.2%	2,656	99.9%
Interlaken (V)	595	0	0.0%	0	0.0%
Junius (T)	1,388	0	0.0%	0	0.0%
Lodi (T)	1,228	131	10.7%	1,225	99.8%
Lodi (V)	254	0	0.0%	30	11.8%
Ovid (T)	2,342	149	6.4%	2,342	100.0%
Ovid (V)	534	0	0.0%	24	4.5%
Romulus (T)	3,174	268	8.4%	270	8.5%
Seneca Falls (T)	9,027	352	3.9%	357	4.0%
Tyre (T)	1,013	32	3.2%	32	3.2%
Varick (T)	1,656	174	10.5%	1,656	100.0%
Waterloo (T)	3,566	91	2.6%	91	2.6%
Waterloo (V)	4,810	11	0.2%	182	3.8%
Seneca County	33,814	1,644	4.9%	9,083	26.9%

Source: U.S. Census Bureau 2020; Seneca County GIS 2023; CoreLogic 2024

Socially Vulnerable Population

Some populations experience exacerbated impacts and prolonged recovery from flooding due to factors including their physical and financial ability to react or respond during a flood event. The most vulnerable are the economically disadvantaged and the population over age 65. Economically disadvantaged populations may be more vulnerable because they lack financial resources to evacuate. People over age 65 are more vulnerable because they are more likely to need medical attention that may not be available due to isolation during a flood event, and they may have more difficulty evacuating.

Table 10-11 presents the estimated socially vulnerable populations living in the 1 percent annual chance flood hazard area. There are 321 persons over the age of 65 years, 98 persons under the age of 5 years, 6 non-English speakers, 221 persons with a disability, and 194 living in poverty located in the 1 percent annual chance flood hazard area.

Table 10-12 presents the estimated socially vulnerable populations living in the 0.2 percent annual chance flood hazard areas. There are 1,821 persons over the age of 65 years, 654 persons under the age of 5 years, 50 non-English speakers, 1,080 persons with a disability, and 1,232 living in poverty located in the 0.2 percent annual chance flood hazard area.

Table 10-11. Number of Vulnerable Persons Living in the 1 Percent Annual Chance Flood Hazard Area

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	Estimated Number of Vulnerable Persons Living in the 1 Percent Annual Chance Flood Hazard Area									
			Over 65	Percent of Jurisdiction Total	Under 5	Percent of Jurisdiction Total	Non-English Speaking	Percent of Jurisdiction Total	Disability	Percent of Jurisdiction Total	Poverty Level	Percent of Jurisdiction Total
Covert (T)	1,568	4.6%	52	13.8%	16	13.7%	0	0.0%	30	13.8%	15	13.9%
Fayette (T)	2,659	7.9%	43	8.1%	18	8.2%	1	6.7%	20	8.2%	21	8.0%
Interlaken (V)	595	1.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Junius (T)	1,388	4.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Lodi (T)	1,228	3.6%	27	10.5%	8	9.8%	0	0.0%	13	10.2%	14	10.2%
Lodi (V)	254	0.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Ovid (T)	2,342	6.9%	29	6.3%	9	6.1%	1	3.8%	21	6.2%	26	6.4%
Ovid (V)	534	1.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Romulus (T)	3,174	9.4%	34	8.3%	11	8.2%	0	0.0%	24	8.2%	18	8.3%
Seneca Falls (T)	9,027	26.7%	73	3.9%	17	3.9%	4	3.5%	70	3.9%	54	3.9%
Tyre (T)	1,013	3.0%	7	2.9%	1	2.6%	0	0.0%	5	2.9%	3	2.9%
Varick (T)	1,656	4.9%	36	10.5%	15	10.2%	0	0.0%	19	10.4%	32	10.5%
Waterloo (T)	3,566	10.5%	18	2.4%	3	2.3%	0	0.0%	17	2.5%	10	2.5%
Waterloo (V)	4,810	14.2%	2	0.2%	0	0.0%	0	0.0%	2	0.2%	1	0.2%
Seneca County	**33,814**	**100.0%**	**321**	**4.7%**	**98**	**5.4%**	**6**	**2.8%**	**221**	**4.1%**	**194**	**4.7%**

Source: U.S. Census Bureau ACS 2023; Seneca County GIS 2023; CoreLogic 2024

Table 10-12. Number of Vulnerable Persons Living in the 0.2 Percent Annual Chance Flood Hazard Area

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	Estimated Number of Vulnerable Persons Living in the 0.2 Percent Annual Chance Flood Hazard Area									
			Over 65	Percent of Jurisdiction Total	Under 5	Percent of Jurisdiction Total	Non-English Speaking	Percent of Jurisdiction Total	Disability	Percent of Jurisdiction Total	Poverty Level	Percent of Jurisdiction Total
Covert (T)	1,568	4.6%	52	13.8%	16	13.7%	0	0.0%	30	13.8%	15	13.9%
Fayette (T)	2,659	7.9%	529	99.8%	219	99.5%	14	93.3%	243	99.6%	261	99.6%
Interlaken (V)	595	1.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Junius (T)	1,388	4.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Lodi (T)	1,228	3.6%	256	99.6%	81	98.8%	0	0.0%	127	99.2%	136	99.3%
Lodi (V)	254	0.8%	6	10.7%	3	11.1%	0	0.0%	5	10.2%	3	10.7%
Ovid (T)	2,342	6.9%	458	99.8%	148	100.0%	25	96.2%	339	100.0%	406	99.8%
Ovid (V)	534	1.6%	5	4.5%	0	0.0%	0	0.0%	3	4.1%	3	4.0%
Romulus (T)	3,174	9.4%	34	8.3%	11	8.2%	0	0.0%	24	8.2%	18	8.3%
Seneca Falls (T)	9,027	26.7%	74	4.0%	17	3.9%	4	3.5%	70	3.9%	55	3.9%
Tyre (T)	1,013	3.0%	7	2.9%	1	2.6%	0	0.0%	5	2.9%	3	2.9%
Varick (T)	1,656	4.9%	341	99.7%	147	100.0%	7	100.0%	181	99.5%	304	99.7%
Waterloo (T)	3,566	10.5%	18	2.4%	3	2.3%	0	0.0%	17	2.5%	10	2.5%
Waterloo (V)	4,810	14.2%	41	3.8%	8	3.4%	0	0.0%	36	3.7%	18	3.6%
Seneca County	**33,814**	**100.0%**	**1,821**	**26.83%**	**654**	**35.95%**	**50**	**23.47%**	**1,080**	**19.91%**	**1,232**	**29.73%**

Source: U.S. Census Bureau ACS 2023; Seneca County GIS 2023; CoreLogic 2024

10.2.2 General Building Stock

Vulnerable buildings are those located in the flood hazard zone. Table 10-13 summarizes these results for the 1 percent and 0.2 percent annual chance flood hazard areas.

There are 1,168 buildings located in the 1 percent annual chance flood hazard area with an estimated $356 million of replacement cost value (i.e., building and content replacement costs). This represents 2.4 percent of the County's total general building stock inventory.

There are 8,370 buildings located in the 0.2 percent annual chance flood hazard area with an estimated $4 billion of building stock and contents exposed. This represents 29.9 percent of the County's total general building stock inventory.

Table 10-14 lists the buildings in the flood hazard areas by general occupancy.

10.2.3 Community Lifelines and Other Critical Facilities

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 the planning area to many service providers needing to get to vulnerable populations or to make repairs. Utilities such as overhead power, cable, and phone lines could also be vulnerable due to utility poles damaged by standing water. Loss of these utilities could create isolation issues for the inundation zones.

Flooding can cause extensive damage to public utilities and disruptions to delivery of services. Flooding can cause isolation if bridges are washed out or blocked by water or debris, health problems due to water and sewer systems that are flooded or backed up, drinking water contamination if floodwaters carry pollutants into water supplies, and urban flooding if culverts become blocked with debris. Loss of power and communications may occur, and drinking water and wastewater treatment facilities may be temporarily out of operation.

Table 10-15 and Table 10-16 summarize the number of critical facilities exposed to the 1 percent and 0.2 percent annual chance flood hazard areas by jurisdiction.

Mitigation planning should consider means to reduce impact on critical facilities and ensure enough emergency services remain when a significant event occurs. If short-term functionality of critical facilities in the County is impacted by flooding, facilities of neighboring municipalities may need to increase support response functions. Actions addressing shared services agreements are included in Volume II of this plan.

Table 10-13. Buildings in the 1 Percent and 0.2 Percent Annual Chance Flood Hazard Areas

Jurisdiction	Jurisdiction Total Buildings		1% Annual Chance Flood Hazard Area				0.2% Annual Chance Flood Hazard Area			
			Number of Buildings		Replacement Cost Value		Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Jurisdiction Total	Value	% of Jurisdiction Total	Count	% of Jurisdiction Total	Value	% of Jurisdiction Total
Covert (T)	1,636	$779,224,677	194	11.9%	$47,347,402	6.1%	194	11.9%	$47,347,402	6.1%
Fayette (T)	2,738	$1,724,392,851	168	6.1%	$50,952,848	3.0%	2,736	99.9%	$1,723,572,994	100.0%
Interlaken (V)	343	$165,977,588	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Junius (T)	1,280	$759,380,537	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Lodi (T)	1,472	$559,051,111	130	8.8%	$29,012,116	5.2%	1,469	99.8%	$557,012,511	99.6%
Lodi (V)	214	$82,618,938	0	0.0%	$0	0.0%	23	10.7%	$5,195,711	6.3%
Ovid (T)	1,782	$984,141,994	86	4.8%	$24,756,230	2.5%	1,777	99.7%	$980,130,332	99.6%
Ovid (V)	325	$236,195,794	0	0.0%	$0	0.0%	13	4.0%	$11,449,950	4.8%
Romulus (T)	1,934	$2,199,131,167	126	6.5%	$49,401,383	2.2%	128	6.6%	$49,612,873	2.3%
Seneca Falls (T)	4,512	$3,285,546,078	211	4.7%	$71,706,198	2.2%	213	4.7%	$72,301,547	2.2%
Tyre (T)	922	$673,717,328	43	4.7%	$22,205,949	3.3%	43	4.7%	$22,205,949	3.3%
Varick (T)	1,628	$908,737,205	138	8.5%	$37,820,220	4.2%	1,628	100.0%	$908,737,205	100.0%
Waterloo (T)	2,385	$1,104,762,862	62	2.6%	$18,452,762	1.7%	62	2.6%	$18,452,762	1.7%
Waterloo (V)	2,289	$1,323,974,707	10	0.4%	$4,401,735	0.3%	84	3.7%	$19,741,748	1.5%
Seneca County	23,460	$14,786,852,837	1,168	5.0%	$356,056,844	2.4%	8,370	35.7%	$4,415,760,986	29.9%

Source: Seneca County GIS 2023; USACE, NSI 2022; RS Means 2022; CoreLogic 2024

Table 10-14. Buildings in the 1 Percent and 0.2 Percent Annual Chance Flood Hazard Areas by General Occupancy Class

Jurisdiction	Number of Buildings in Flood Hazard Area, by Occupancy Class							
	1% Annual Chance Flood Hazard Area				0.2% Annual Chance Flood Hazard Area			
	Residential	Commercial	Industrial	Other[a]	Residential	Commercial	Industrial	Other[a]
Covert (T)	185	9	0	0	185	9	0	0
Fayette (T)	164	2	0	2	1,994	143	24	575
Interlaken (V)	0	0	0	0	0	0	0	0
Junius (T)	0	0	0	0	0	0	0	0
Lodi (T)	127	3	0	0	1,188	29	0	252
Lodi (V)	0	0	0	0	23	0	0	0
Ovid (T)	85	0	0	1	1,330	43	0	404
Ovid (V)	0	0	0	0	12	0	0	1
Romulus (T)	115	11	0	0	116	11	0	1
Seneca Falls (T)	150	59	0	2	152	59	0	2
Tyre (T)	19	14	0	10	19	14	0	10
Varick (T)	131	2	0	5	1,243	20	1	364
Waterloo (T)	52	10	0	0	52	10	0	0
Waterloo (V)	5	2	3	0	79	2	3	0
Seneca County	1,033	112	3	20	6,393	340	28	1,609

Source: Seneca County GIS 2023; USACE, NSI 2022; CoreLogic 2024

a. Other = government, religion, agricultural, and education

Table 10-15. Critical Facilities in the 1 Percent Annual Chance Flood Hazard Area, by Lifeline Category

Jurisdiction	Number of Critical Facilities in the 1 Percent Annual Chance Flood Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Number	% of Jurisdiction Total
Covert (T)	0	0	0	0	0	1	6	3	0	10	7.8%
Fayette (T)	0	2	0	0	0	0	4	0	0	6	2.4%
Interlaken (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Junius (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Lodi (T)	0	0	0	0	0	0	1	18	0	19	11.0%
Lodi (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Ovid (T)	0	0	0	0	0	0	3	3	0	6	4.3%
Ovid (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Romulus (T)	0	0	0	0	0	1	1	1	0	3	2.6%
Seneca Falls (T)	0	2	0	0	1	2	6	2	0	13	12.6%
Tyre (T)	0	0	0	0	0	1	8	1	0	10	15.9%
Varick (T)	0	3	0	0	0	0	1	1	0	5	4.3%
Waterloo (T)	0	0	0	0	0	0	1	0	0	1	1.0%
Waterloo (V)	0	1	0	0	0	1	5	0	0	7	14.3%
Seneca County	0	8	0	0	1	6	36	29	0	80	6.0%

Source: Seneca County GIS 2023, NYS GIS Clearinghouse 2023, NYSDOH 2023, NYSDOT 2023, HIFLD 2023; CoreLogic 2024

Table 10-16. Critical Facilities in the 0.2 Percent Annual Chance Flood Hazard Area, by Lifeline Category

Jurisdiction	Number of Critical Facilities in the 0.2 Percent Annual Chance Flood Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Number	% of Jurisdiction Total
Covert (T)	0	0	0	0	0	1	6	3	0	10	7.8%
Fayette (T)	3	149	3	3	0	3	10	77	0	248	99.6%
Interlaken (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Junius (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Lodi (T)	0	0	0	0	0	0	1	1	0	2	16.7%
Lodi (V)	2	0	1	0	0	1	7	159	0	170	123.2%
Ovid (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Ovid (V)	4	0	0	2	0	1	10	120	0	137	118.1%
Romulus (T)	0	0	0	0	0	1	1	1	0	3	2.9%
Seneca Falls (T)	0	2	0	0	1	2	6	2	0	13	20.6%
Tyre (T)	0	0	0	0	0	1	8	1	0	10	8.7%
Varick (T)	11	51	2	1	0	5	4	41	0	115	118.6%
Waterloo (T)	0	1	0	0	0	1	5	0	0	7	14.3%
Waterloo (V)	0	0	0	0	0	0	1	0	0	1	0.1%
Seneca County	20	203	6	6	1	16	59	405	0	716	53.7%

Source: Seneca County GIS 2023, NYS GIS Clearinghouse 2023, NYSDOH 2023, NYSDOT 2023, HIFLD 2023; CoreLogic 2024

10.2.4 Economy

Flood events can significantly impact the local and regional economy. This includes tax loss associated with general building stock damage, business interruption, and impacts on tourism. In areas that are directly flooded, renovations of commercial and industrial buildings may be necessary, disrupting associated services. After the floodwaters subside, contaminated and flood-damaged building materials and contents must be properly disposed of. Contaminated sediment must be removed from buildings, yards, and properties.

10.2.5 Natural, Historic, and Cultural Resources

Natural

The environmental impacts of a flood can include significant water quality and debris-disposal issues. Floodwaters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate 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.

In addition, severe erosion from flooding can negatively impact local ecosystems. The erosion of riverbanks can cause additional flooding in locations that otherwise may have not experienced flooding conditions.

Historic

Historic places and institutions are vulnerable to impacts from flooding. Historic buildings face structural damage during flood events. Historic structures often are not built to modern building code requirements, including design flood elevation and construction standards. Historic resources and structures were often built close to waterways, increasing their flood risk.

Cultural

Cultural institutions, parks and open spaces, community facilities, and religious institutions are all vulnerable to impacts from flooding. Venues such as museums face structural damage during flood events, with additional risk of damage to important cultural artifacts housed within them. Parks, recreation, and community space closures due to flood events can disrupt residents' lives and hinder access to community services. Parks and recreational areas are often located near waterways. Although these facilities often experience flooding, they are positioned with flooding in mind, as many parks are considered as open space to disallow development.

10.3 CHANGE OF VULNERABILITY SINCE 2018 HMP

The entire County continues to be vulnerable to the flood hazard. Since the 2018 analysis, population statistics have been updated using the 2020 Decennial Census. The general building stock was updated using RSMeans 2022 building valuations to estimate replacement cost value for each building in the

inventory. This provides an up-to-date look at the entire building stock for Seneca County and gives more accurate results for the exposure and loss estimation analysis. Additionally, the 2018 critical facility dataset was updated by the County and includes FEMA community lifelines.

10.4 FUTURE CHANGES THAT MAY AFFECT RISK

10.4.1 Potential or Planned Development

Chapter 3 identifies areas targeted for future growth and development across the County. Any new development located in the SFHA could be impacted by riverine flooding. Development in areas outside of the SFHA can be impacted by urban flooding and by flooding events that are less frequent but more severe. Specific areas of recent and new development are indicated in tables and maps included in Volume II of this plan.

10.4.2 Projected Changes in Population

The population of Seneca County decreased by about 4 percent from 2010 to 2020 and is projected to continue decreasing through 2040 (Cornell University 2018). Any changes in the density of population can create issues for local residents during evacuation of a flood event. Historically, flooding and debris have severely impacted transportation corridors and infrastructure. As areas continue to be cleared for new development and runoff increases, the population in the County will remain exposed to this hazard.

10.4.3 Climate Change

Climate defines the type, frequency, and intensity of weather events. Both globally and at the local scale, climate change has the potential to alter the prevalence and severity of events that exacerbate flooding. Warmer temperatures may lead to an increase in frequency of storms, thus leading to more weather events that can cause floods.

11. LANDSLIDE

11.1 HAZARD PROFILE

11.1.1 Hazard Description

A landslide is a process that results in the downward and outward movement of slope-forming materials (NYS Geological Survey n.d.). Landslide materials can consist of natural rock, soil, artificial fill, or any combination of these (NYS DHSES 2014). The materials move by falling, toppling, sliding, spreading, or flowing (NYS Geological Survey n.d.).

Landslide Types

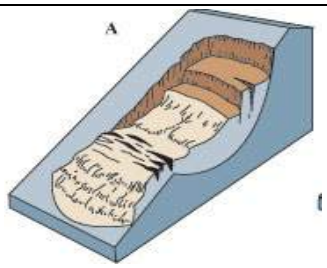
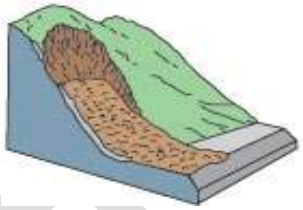
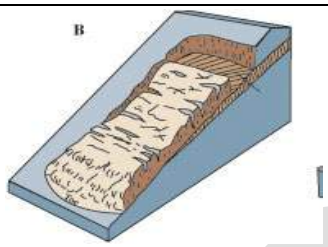
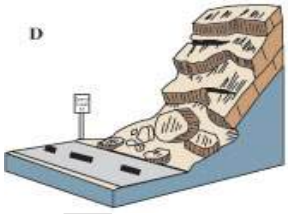
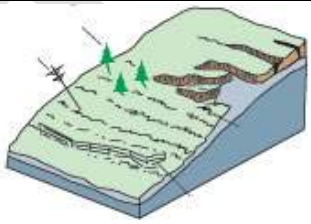
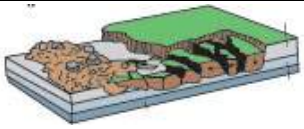
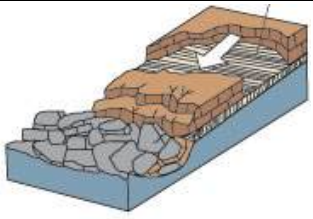
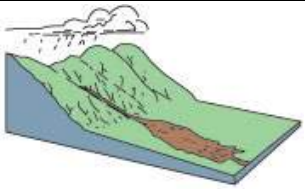
Figure 11-1 shows common landslide types as classified by the USGS. All these types of landslides are considered aggregately in USGS landslide mapping.

Landslide Warning Signs

The New York State Division of Homeland Security and Emergency Services (NYS DHSES), identified the following as warning signs of landslides (NYS-DHSES n.d.):

- Springs, seeps, or saturated ground in areas not typically wet
- New cracks or unusual bulges in the ground, street pavements, or sidewalks
- Soil, sidewalks, or stairs pulling away from foundations
- Ancillary structures, such as decks and patios, tilting or moving away from the house
- Tilting or cracking of concrete floors and foundations
- Broken water lines or other underground utilities
- Offset telephone poles, trees, retaining walls or fences
- Sunken or down-dropped roadbeds
- Rapid increase in creek water levels, accompanied by increase in turbidity
- Sudden decrease in creek water levels when rain is falling or suddenly stopped
- Sticking doors and windows
- Collapsed pavement, mud, fallen rocks, or other indications of debris flow seen when driving (embankments along roadsides are particularly susceptible to landslides)

Figure 11-1. Common Landslides Types

Rotational slides—Slides in which the surface of rupture is curved upward, and the slide movement rotates parallel to the ground surface. 	**Debris avalanches—**Debris flows that travel faster than about 10 miles per hour (mph). Speeds in excess of 20 mph are not uncommon, and speeds in excess of 100 mph can occur. The slurry can travel miles from its source, growing as it descends, picking up trees, boulders, cars, and anything else in its path. 
Translational slides—Slides in which the mass moves along a roughly flat surface with little rotation. 	**Earthflows—**Landslides with an "hourglass" shape. The slope material liquefies and runs out, forming a bowl or depression at the head. 
Falls—Abrupt movements of geologic materials, such as rocks and boulders, that become detached from steep slopes or cliffs. Falls are strongly influenced by gravity, weathering, and the presence of water in a mineral's pores. 	**Creep—**Slow, steady, downward movements of slope-forming soil or rock. Creep is indicated by curved tree trunks, bent fences, or retaining walls, tilted poles or fences, and small soil ripples or ridges. 
Topples—Slides involving the forward rotation of a unit about some point under the actions of gravity and forces exerted by surrounding objects or by fluids in cracks. 	**Lateral Spreads—**Slides on very gentle slopes or flat terrain caused by liquefaction, the process whereby saturated, loose, sediments are transformed from a solid into a liquefied state. The failure starts suddenly in a small area and spreads rapidly. 
Block slide—Rapid landslides in which loose soil, rock, organic matter, air, and water mobilize as a slurry that flows downslope. Commonly caused by intense surface water flow due to heavy rain or rapid snowmelt that erodes loose soil or rock on steep slopes. 	**Debris flows—**Rapid landslides in which loose soil, rock, organic matter, air, and water mobilize as a slurry that flows downslope. Commonly caused by intense surface water flow due to heavy rain or rapid snowmelt that erodes loose soil or rock on steep slopes. 

Source: U.S. Geological Survey 2006, USGS 2004

Landslide Causes

Both natural and human-caused changes to the environment can trigger a landslide hazard event. Examples of natural changes include heavy rain, snow melt, earthquakes, and steepening of slopes by erosion. Examples of human-caused changes include steepening of slopes by construction practices, and changes in groundwater levels from overconsumption.

These changes can trigger a landslide through several factors, such as changes in slope, increased load size, shocks or vibrations, changes in water content, groundwater movements, front actions, weathering of rocks, and the removal of vegetation from inclined surfaces. Areas that are characterized by these factors are considered landslide hazard areas. Examples of common landslide hazard areas include previous landslide areas, the base of steep slopes, the base of drainage channels, developed hillsides, and areas recently burned by wildfires (NYS-DHSES n.d.).

11.1.2 Location

Natural variables such as soil properties, topographic position, and slope establish the overall risk of the landslide hazard in a given area. Figure 11-2 shows the landslide hazard areas in Seneca County based on terrain slopes throughout the County. Figure 11-3 illustrates the soil regions of New York. Seneca County is characterized by a mix of limey soils on glacial till over rolling terrain, deep acid soils on glacial till over hilly terrain, and coarse textured soils on sands and gravel. These soil characteristics are common for counties that are located near a freshwater body, such as Seneca and Cayuga Lakes. Loose grain soils on rolling or hilly terrain are prime components for landslide susceptibility because of their instability and downslope potential.

Impacts associated with landslides in Seneca County have been limited to specific sites in sparsely developed areas; usually private driveways, public roads, shoulders, bridges, improved drainage ways and culverts. Due to the nature of their terrain and bodies of water that flow through them, the Town of Covert, the Town of Lodi, and the Town of Romulus have historically been most susceptible to movement of land. These areas have historically recognized landslide as a hazard in their mitigation planning (Seneca County 2018).

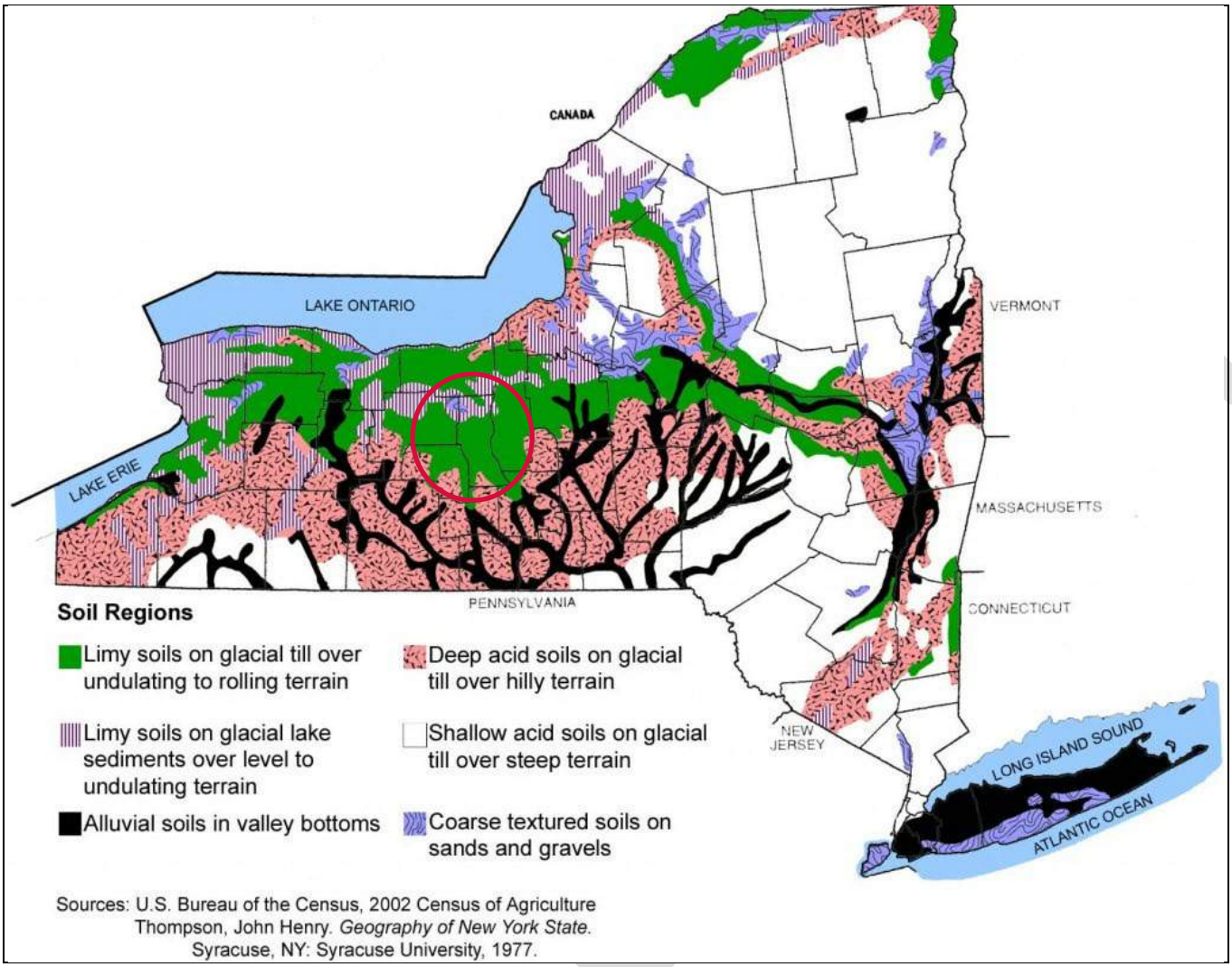
11.1.3 Extent

The extent of the landslide risk is often represented by landslide incidence and susceptibility (D. H. Radbruch-Hall 1982):

- Landslide incidence is the number of landslides that have occurred in a given geographic area. High incidence means greater than 15 percent of a given area has been involved in landsliding, medium incidence means that 1.5 to 15 percent of an area has been involved, and low incidence means that less than 1.5 percent of an area has been involved.
- Landslide susceptibility is the probable degree of response of geologic formations to cutting or loading of slopes or unusually high precipitation. It depends on slope angle and the geologic material underlying the slope. Landslide susceptibility only identifies areas potentially affected and does not imply a time frame when a landslide might occur. High, medium, and low susceptibility are delimited by the same percentages as those used for classifying the incidence of landsliding.

Figure 11-2. Landslide Hazard Areas in Seneca County Based on Slope

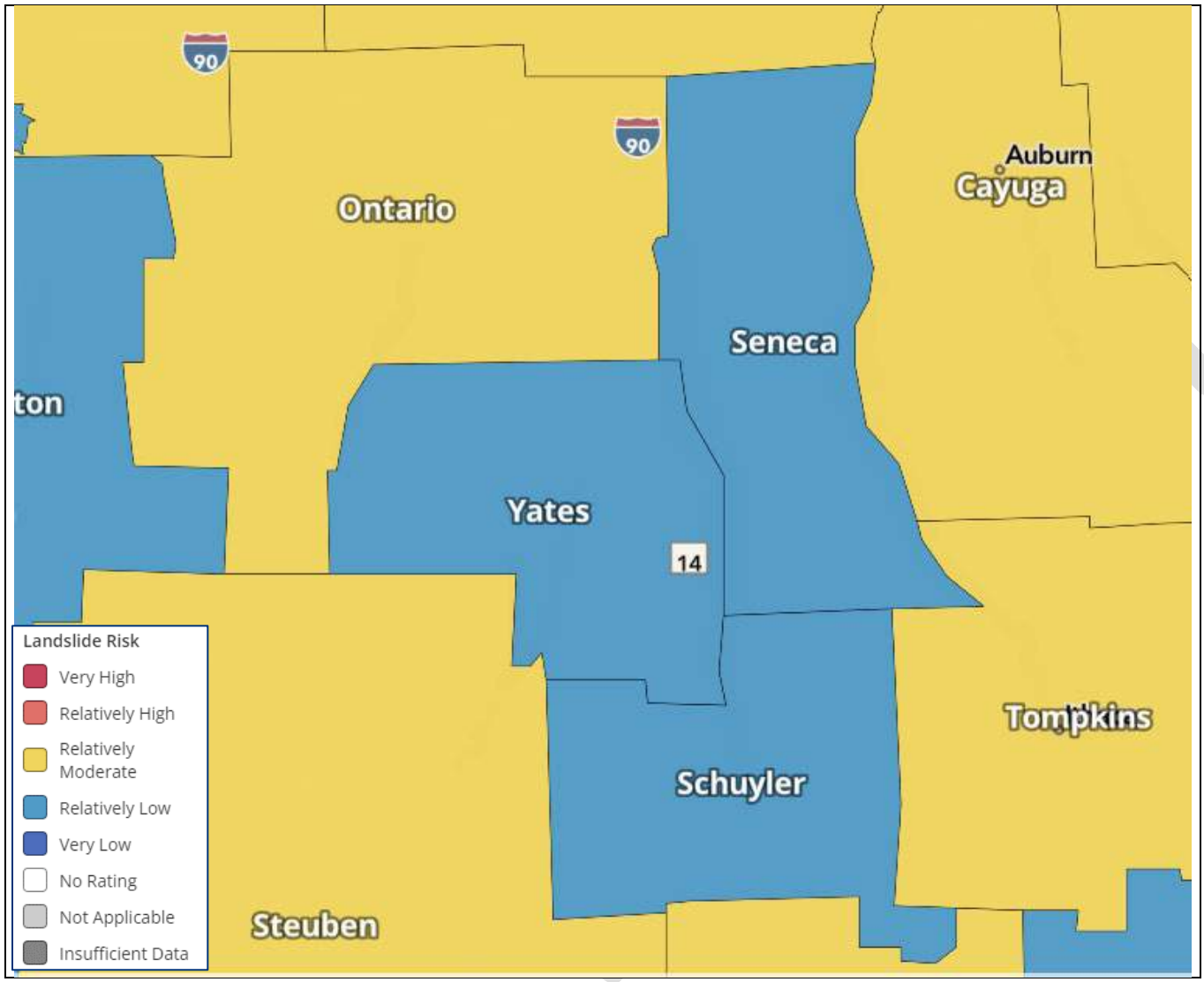
Figure 11-3. Soil Regions of New York



Source: U.S. Census Bureau, 2002.
Note: Red Circle indicates Seneca County Soil Region

The "Landslide Overview Map of the Coterminous United States" shows that Seneca County overall has low incidence and susceptibility to landslides (Radbruch-Hall, et al. 1982). Figure 11-4 shows landslide risk at the County scale from FEMA's National Risk Index. The map indicates that Seneca County has a relatively low risk from landslides. However, several neighboring counties have a relatively moderate susceptibility to landslides; this could have secondary or cascading impacts on Seneca County if a landslide occurs along a county boundary (EPA 2023).

Figure 11-4. National Risk Index, Landslide Risk Index Score Using the County Scale



Source: FEMA 2019

11.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Seneca County has not been included in any major disaster (DR) or emergency (EM) declarations for landslide-related events (FEMA 2024).

USDA Declarations

Since the previous Seneca County HMP, the County has not been included in any USDA declarations issued for landslide-related events (USDA 2024).

Previous Events

There are no known landslide-related events that impacted Seneca County since the County's previous HMP update. (Association of State Dam Safety Officials 2024, Stanford University 2018).

11.1.5 Probability of Future Occurrences

Probability Based on Past Events

According to a New York State Geological Survey (NYSGS) Landslide Inventory Study, New York State can expect, on average, two major landslides each year; a greater number of smaller but still significant slides, slumps, or flows each year; and at least one landslide causing a fatality once every 12 years.

Documentation on landslides in Seneca County is sparse. Based on historical records and input from the Steering Committee, the likely frequency of future occurrence of landslides in Seneca County is rare.

Potential Effect of Climate Change on Hazard Probability

Projections of climate change for New York State and for the Central/Finger Lakes region that includes Seneca County are summarized in Chapter 3.6.4. Recent studies show that climate change is impacting slow-moving landslides, which is where the land creeps downhill only a few inches or feet each year. A NASA study found that landslides are directly related to the frequency and intensity of precipitation events (NASA 2022).

Climate change may increase the probability of more frequent, intense storms with varying duration. Increase in global temperature could affect the snowpack and its ability to hold and store water. Warming temperatures also could increase the occurrence and duration of droughts, which would increase the probability of wildfire, reducing the vegetation that helps to support steep slopes. All these factors would increase the probability of landslide occurrences.

11.1.6 Cascading Impacts on Other Hazards

Landslides can cause secondary effects such as blocking roads, which can isolate residents and businesses and delay commercial, public, and private transportation. Other potential problems can result from landslides if vegetation or poles on slopes are knocked over, causing losses to power and communication lines. Water utilities may become breached with excess debris and/or contaminants carried by landslide events. Landslides also have the potential of destabilizing the foundation of structures, which may result in monetary loss for residents. Landslides can damage rivers or streams, potentially harming water quality, fisheries, and spawning habitat. Landslides can contribute to instances of flooding if the collapsed soil and sediment block streams, causing waters to flow outside of their banks.

11.2 VULNERABILITY AND IMPACT ASSESSMENT

A vulnerability analysis was conducted by overlaying landslide hazard area data on the updated mapping of population, building stock, and critical facilities. Hazard areas were defined as locations with high (>20 percent grade) or moderate (15 to 20 percent grade) slopes, as shown in Figure 11-2.

11.2.1 Life, Health, and Safety

Generally, a landslide is an isolated incident that impacts the population within the immediate vicinity. Therefore, the population living immediately downslope of high landslide incidence hazard areas are particularly vulnerable. In addition to displacing residents, landslides can block or damage major roadways and inhibit travel for emergency responders or populations trying to evacuate.

Overall Population

Table 11-1 summarizes the estimated population exposed to the landslide hazard by municipality. Based on the analysis, an estimated 696 residents, or 2.1 percent of the County's population, are in the moderate-slope landslide hazard area. The Town of Seneca Falls has the greatest population in the moderate-slope landslide hazard area (169 persons). An estimated 841 residents, or 2.5 percent of the County's population, are in the high-slope landslide hazard area. The Town of Romulus has the greatest number of individuals in the high-slope hazard area (172 persons).

Table 11-1. Population Living in the Landslide Hazard Areas

		Estimated Population in Landslide Hazard Areas			
		Moderate Slopes (15% - 20%)		High Slopes (>20%)	
Jurisdiction	Total Population (U.S. Census 2020)	Number of Persons	% of Total	Number of Persons	% of Total
Covert (T)	1,568	74	4.7%	89	5.7%
Fayette (T)	2,659	63	2.4%	82	3.1%
Interlaken (V)	595	0	0.0%	0	0.0%
Junius (T)	1,388	39	2.8%	29	2.1%
Lodi (T)	1,228	57	4.6%	63	5.1%
Lodi (V)	254	8	3.1%	5	2.0%
Ovid (T)	2,342	68	2.9%	77	3.3%
Ovid (V)	534	8	1.5%	8	1.5%
Romulus (T)	3,174	88	2.8%	172	5.4%
Seneca Falls (T)	9,027	169	1.9%	171	1.9%
Tyre (T)	1,013	35	3.5%	37	3.7%
Varick (T)	1,656	34	2.1%	61	3.7%
Waterloo (T)	3,566	42	1.2%	31	0.9%
Waterloo (V)	4,810	11	0.2%	16	0.3%
Seneca County	33,814	696	2.1%	841	2.5%

Source: U.S. Census Bureau 2020; NYS GIS Clearinghouse 2012; Northrop Grumman, Advanced GEOINT Solutions Operating Unit 2014

Socially Vulnerable Population

Economically disadvantaged populations, including those living below the poverty level, are more vulnerable to landslides because they are likely lack financial resources for evacuation. The population over age 65 and those living with a disability are also more vulnerable because they are more likely to need medical attention that may not be available due to isolation during a landslide event, and they may have more difficulty evacuating. Children under 5 may be more vulnerable because they are dependent on others for essential needs and mobility. Individuals that are not proficient in English may be unable to

interpret emergency warning messages to evacuate or providing resources to protect or mitigate damage to themselves and/or their property.

Table 3-7 shows social vulnerability statistics for Seneca County and participating municipalities from the 2022 ACS 5-year estimates. Table 3-8 shows low-income populations based on United for ALICE data for 2022.

Table 11-2 presents the estimated numbers of vulnerable persons living in the moderate-slope landslide hazard area. There are 131 persons over the age of 65 years, 34 persons under the age of 5 years, 2 non-English speakers, 96 persons with a disability, and 79 living in poverty located in the moderate-slope landslide hazard area.

Table 11-3 presents the estimated numbers of vulnerable persons living in the high-slope landslide hazard area. There are 156 persons over the age of 65 years, 43 persons under the age of 5 years, 2 non-English speakers, 111 persons with a disability, and 93 living in poverty located in the high-slope landslide hazard area.

11.2.2 General Building Stock

Table 11-4 shows the estimates of Seneca County's general building stock in the moderate- and high-slope landslide hazard areas by jurisdiction. Table 11-5 lists the buildings in the hazard areas by general occupancy.

The risk assessment estimated that there are 536 buildings in the moderate-slope landslide hazard area, representing 2.3 percent of the total number of buildings in the County and 1.7 percent of the total general building stock replacement cost value (RCV). The Town of Seneca Falls has the greatest number of buildings in the moderate-slope landslide hazard area—82 buildings representing 1.8 percent of its total building count and 1.0 percent of its total RCV.

The risk assessment estimated that there are 668 buildings in the high-slope landslide hazard area, representing 2.8 percent of the total number of buildings in the County and 2.6 percent of the total general building stock RCV. The Town of Seneca Falls has the greatest number of buildings in the high-slope landslide hazard area—113 buildings representing 2.5 percent of its total building count and 3.1 percent of its total RCV.

In both hazard areas, the residential occupancy represents the greatest number of buildings in the moderate- and high-slope landslide hazard areas, accounting for 430 and 513 structures, respectively.

Table 11-2. Vulnerable Persons Living in the Moderate-Slope Landslide Hazard Area

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	Estimated Number of Vulnerable Persons Living in the Moderate-Slope (15% - 20%) Landslide Hazard Area									
			Over 65	Percent of Jurisdiction Total	Under 5	Percent of Jurisdiction Total	Non-English Speaking	Percent of Jurisdiction Total	Disability	Percent of Jurisdiction Total	Poverty Level	Percent of Jurisdiction Total
Covert (T)	1,568	4.6%	17	4.5%	5	4.3%	0	0.0%	10	4.6%	5	4.6%
Fayette (T)	2,659	7.9%	12	2.3%	5	2.3%	0	0.0%	5	2.0%	6	2.3%
Interlaken (V)	595	1.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Junius (T)	1,388	4.1%	4	2.5%	1	1.5%	0	0.0%	4	2.5%	4	2.6%
Lodi (T)	1,228	3.6%	12	4.7%	3	3.7%	0	0.0%	6	4.7%	6	4.4%
Lodi (V)	254	0.8%	1	1.8%	0	0.0%	0	0.0%	1	2.0%	0	0.0%
Ovid (T)	2,342	6.9%	13	2.8%	4	2.7%	0	0.0%	9	2.7%	11	2.7%
Ovid (V)	534	1.6%	1	0.9%	0	0.0%	0	0.0%	1	1.4%	1	1.3%
Romulus (T)	3,174	9.4%	11	2.7%	3	2.2%	0	0.0%	8	2.7%	6	2.8%
Seneca Falls (T)	9,027	26.7%	35	1.9%	8	1.8%	2	1.7%	33	1.8%	26	1.9%
Tyre (T)	1,013	3.0%	8	3.3%	1	2.6%	0	0.0%	6	3.4%	3	2.9%
Varick (T)	1,656	4.9%	7	2.0%	3	2.0%	0	0.0%	3	1.6%	6	2.0%
Waterloo (T)	3,566	10.5%	8	1.1%	1	0.8%	0	0.0%	8	1.2%	4	1.0%
Waterloo (V)	4,810	14.2%	2	0.2%	0	0.0%	0	0.0%	2	0.2%	1	0.2%
Seneca County	**33,814**	**100.0%**	**131**	**1.9%**	**34**	**1.9%**	**2**	**0.9%**	**96**	**1.8%**	**79**	**1.9%**

Source: U.S. Census Bureau ACS 2023; NYS GIS Clearinghouse 2012; Northrop Grumman, Advanced GEOINT Solutions Operating Unit 2014

Table 11-3. Vulnerable Persons Living in the High-Slope Landslide Hazard Area

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	Estimated Number of Vulnerable Persons Living in the High-Slope (>20%) Landslide Hazard Area									
			Over 65	Percent of Jurisdiction Total	Under 5	Percent of Jurisdiction Total	Non-English Speaking	Percent of Jurisdiction Total	Disability	Percent of Jurisdiction Total	Poverty Level	Percent of Jurisdiction Total
Covert (T)	1,568	4.6%	21	5.6%	6	5.1%	0	0.0%	12	5.5%	6	5.6%
Fayette (T)	2,659	7.9%	16	3.0%	6	2.7%	0	0.0%	7	2.9%	8	3.1%
Interlaken (V)	595	1.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Junius (T)	1,388	4.1%	3	1.9%	1	1.5%	0	0.0%	3	1.9%	3	1.9%
Lodi (T)	1,228	3.6%	13	5.1%	4	4.9%	0	0.0%	6	4.7%	7	5.1%
Lodi (V)	254	0.8%	1	1.8%	0	0.0%	0	0.0%	1	2.0%	0	0.0%
Ovid (T)	2,342	6.9%	15	3.3%	4	2.7%	0	0.0%	11	3.2%	13	3.2%
Ovid (V)	534	1.6%	1	0.9%	0	0.0%	0	0.0%	1	1.4%	1	1.3%
Romulus (T)	3,174	9.4%	22	5.4%	7	5.2%	0	0.0%	15	5.1%	11	5.1%
Seneca Falls (T)	9,027	26.7%	35	1.9%	8	1.8%	2	1.7%	34	1.9%	26	1.9%
Tyre (T)	1,013	3.0%	8	3.3%	1	2.6%	0	0.0%	6	3.4%	3	2.9%
Varick (T)	1,656	4.9%	12	3.5%	5	3.4%	0	0.0%	6	3.3%	11	3.6%
Waterloo (T)	3,566	10.5%	6	0.8%	1	0.8%	0	0.0%	6	0.9%	3	0.8%
Waterloo (V)	4,810	14.2%	3	0.3%	0	0.0%	0	0.0%	3	0.3%	1	0.2%
Seneca County	**33,814**	**100.0%**	**156**	**2.3%**	**43**	**2.4%**	**2**	**0.9%**	**111**	**2.0%**	**93**	**2.2%**

Source: U.S. Census Bureau ACS 2023; NYS GIS Clearinghouse 2012; Northrop Grumman, Advanced GEOINT Solutions Operating Unit 2014

Table 11-4. General Building Stock Located in the Landslide Hazard Areas

Jurisdiction	Jurisdiction Total Buildings		Moderate Landslide (15% - 20%) Hazard Area				High Landslide (>20%) Hazard Area			
			Number of Buildings		Replacement Cost Value		Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Jurisdiction Total	Value	% of Jurisdiction Total	Count	% of Jurisdiction Total	Value	% of Jurisdiction Total
Covert (T)	1,636	$779,224,677	72	4.4%	$31,582,103	4.1%	88	5.4%	$34,866,228	4.5%
Fayette (T)	2,738	$1,724,392,851	62	2.3%	$41,892,821	2.4%	77	2.8%	$37,940,398	2.2%
Interlaken (V)	343	$165,977,588	1	0.3%	$1,221,374	0.7%	1	0.3%	$809,852	0.5%
Junius (T)	1,280	$759,380,537	37	2.9%	$13,910,547	1.8%	34	2.7%	$19,042,192	2.5%
Lodi (T)	1,472	$559,051,111	64	29.9%	$21,695,671	26.3%	72	4.9%	$23,087,557	4.1%
Lodi (V)	214	$82,618,938	6	0.4%	$1,876,769	0.3%	4	1.9%	$818,907	1.0%
Ovid (T)	1,782	$984,141,994	53	16.3%	$27,756,960	11.8%	57	3.2%	$28,907,058	2.9%
Ovid (V)	325	$236,195,794	5	0.3%	$1,910,017	0.2%	6	1.8%	$3,601,217	1.5%
Romulus (T)	1,934	$2,199,131,167	49	2.5%	$21,872,210	1.0%	84	4.3%	$64,700,537	2.9%
Seneca Falls (T)	4,512	$3,285,546,078	82	1.8%	$31,983,816	1.0%	113	2.5%	$101,150,322	3.1%
Tyre (T)	922	$673,717,328	34	3.7%	$25,577,131	3.8%	41	4.4%	$22,380,710	3.3%
Varick (T)	1,628	$908,737,205	35	2.1%	$17,962,578	2.0%	56	3.4%	$23,600,057	2.6%
Waterloo (T)	2,385	$1,104,762,862	29	1.3%	$11,384,526	0.9%	25	1.0%	$11,116,479	1.0%
Waterloo (V)	2,289	$1,323,974,707	7	0.3%	$3,205,339	0.3%	10	0.4%	$7,066,826	0.5%
Seneca County	**23,460**	**$14,786,852,837**	**536**	**2.3%**	**$253,831,864**	**1.7%**	**668**	**2.8%**	**$379,088,340**	**2.6%**

Source: Seneca County GIS 2023; USACE, NSI 2022; RS Means 2022; NYS GIS Clearinghouse 2012; Northrop Grumman, Advanced GEOINT Solutions Operating Unit 2014

Table 11-5. Number and Value of Buildings in the Landslide Hazard Areas, by Occupancy Class

Jurisdiction	Moderate-Slope (15% - 20%) Landslide Hazard Area				High-Slope (>20%) Landslide Hazard Area			
	Residential	Commercial	Industrial	Other[a]	Residential	Commercial	Industrial	Other[a]
Covert (T)	63	3	0	6	76	1	0	11
Fayette (T)	48	4	1	9	62	3	0	12
Interlaken (V)	0	0	1	0	0	1	0	0
Junius (T)	28	1	0	8	21	0	0	13
Lodi (T)	56	1	0	7	62	0	0	10
Lodi (V)	6	0	0	0	4	0	0	0
Ovid (T)	39	0	0	14	44	2	0	11
Ovid (V)	4	1	0	0	4	2	0	0
Romulus (T)	38	5	0	6	74	4	0	6
Seneca Falls (T)	72	6	0	4	73	1	1	38
Tyre (T)	21	0	0	13	22	0	0	19
Varick (T)	26	0	0	9	46	1	0	9
Waterloo (T)	24	3	0	2	18	2	1	4
Waterloo (V)	5	1	0	1	7	2	1	0
Seneca County	**430**	**25**	**2**	**79**	**513**	**19**	**3**	**133**

Source: Seneca County GIS 2023; USACE, NSI 2022; RS Means 2022; NYS GIS Clearinghouse 2012; Northrop Grumman, Advanced GEOINT Solutions Operating Unit 2014

a. Other = government, religion, agricultural, and education

11.2.3 Community Lifelines and Other Critical Facilities

Landslides can cause significant physical damage to critical facilities and community lifelines that may interrupt key services and resources in the region. They can cause significant damage to buildings and the supply chains that provide health and medical, public safety and security, and food, water, and shelter services. If these facilities and lifelines are not functional during or after an emergency, the County may experience cascading impacts, like additional injuries or health issues or prolonged economic impacts, if a significant number of displaced individuals cannot access temporary or transitional housing.

Access to major roads is crucial to life-safety after a disaster event and to response and recovery operations. Landslides can block egress and ingress on roads and bridge, causing isolation for neighborhoods, traffic problems, and delays for public and private transportation. This can result in economic losses for businesses. Landslides can knock out bridge abutments or significantly weaken the soil supporting them, making them hazardous for use. Landslides can block travel along rail lines, and it is not as easy to detour a rail line as it is to detour a local road or highway.

Power lines are generally elevated above steep slopes; but the towers supporting them can be subject to landslides. A landslide could trigger failure of the soil underneath a tower, causing it to collapse and take down the lines. Power and communication failures due to landslides can create problems for vulnerable populations and businesses. For example, for individuals that rely on medical equipment, a prolonged power outage can present serious health risks or complications. Similarly, water systems can become dammed or contaminated by landslide materials.

Table 11-6 and Table 11-7 summarize the number of critical facilities in the moderate- and high-slope landslide hazard areas, by lifeline category.

11.2.4 Economy

Landslides can impose direct and indirect impacts on society. Direct costs include the actual damage sustained by buildings, property, and infrastructure. Indirect costs, such as clean-up costs, business interruption, loss of tax revenues, reduced property values, and loss of productivity are difficult to measure. Additionally, landslides threaten transportation corridors, fuel and energy conduits, and communication lines.

11.2.5 Natural, Historic, and Cultural Resources

Natural

A landslide event alters the landscape. In addition to changes in topography, vegetation and wildlife habitats may be damaged or destroyed. Soil and sediment accumulate downslope, potentially blocking waterways and wildlife pathways and impacting the quality of water bodies. Mudflows that erode into downstream waterways can threaten the life of freshwater species (USGS 2020). The impacts of eroded landscape can travel for miles downstream into adjacent waterways and create issues for surrounding watersheds. Environmental impacts also include loss of forest productivity.

Historic

Landslide impacts on historic resources within the County are highest in areas near hillsides that are characterized by unstable soil and erosion. Historical landmarks in these areas are highly susceptible to landslide occurrences.

Cultural

Landslide impacts on cultural resources within the County are highest in areas near hillsides that are characterized by unstable soil and erosion. Cultural landmarks in these areas are highly susceptible to landslide occurrences.

11.3 CHANGE OF VULNERABILITY SINCE 2018 HMP

This updated HMP used updated building stock and critical asset inventories to assess the County's risk to the landslide hazard. The building inventory was updated using RSMeans 2022 values, which are more current and reflect replacement cost versus the building stock improvement values reported in the 2018 HMP. Any increase in vulnerability is attributable to changes in population density, impacts from storm events, and new development.

11.4 FUTURE CHANGES THAT MAY AFFECT RISK

11.4.1 Potential or Planned Development

Any new development in landslide hazard areas would be at risk from the landslide hazard. Specific areas of development are indicated in the jurisdictional annexes in Volume II of this plan.

11.4.2 Projected Changes in Population

The population of Seneca County decreased by about 4 percent from 2010 to 2020 and is projected to continue decreasing through 2040 (Cornell University 2018). Any changes in the density of population can create risk for local residents needing to evacuate during a landslide event and can affect commuters who travel into and out of the County for work.

11.4.3 Climate Change

Any increase in rainfall intensity and duration will increase soil saturation and erosion, with resulting impacts on slope stability. This may lead to an increase of landslide events in Seneca County. Temperature increase could affect the snowpack and its ability to hold and store water. Warming temperatures also could increase occurrence and duration of droughts, which could increase probability of wildfire and likely reduce the vegetation that helps support steep slopes. All these factors could increase the probability of landslide occurrence.

Table 11-6. Critical Facilities Located in the Moderate-Slope Landslide Hazard Area

Jurisdiction	Number of Critical Facilities in the Moderate-Slope Landslide Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Number	% of Jurisdiction Total
Covert (T)	0	0	0	0	0	0	0	4	0	4	3.1%
Fayette (T)	0	0	0	0	0	0	1	1	0	2	0.8%
Interlaken (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Junius (T)	5	0	0	0	0	0	0	1	0	6	9.7%
Lodi (T)	0	0	0	0	0	0	0	1	0	1	8.3%
Lodi (V)	0	0	1	0	0	0	0	6	0	7	5.1%
Ovid (T)	0	0	1	0	0	0	0	0	0	1	4.8%
Ovid (V)	0	0	0	0	0	0	1	2	0	3	2.6%
Romulus (T)	0	0	0	0	0	0	1	2	0	3	2.9%
Seneca Falls (T)	0	0	0	0	0	0	1	0	0	1	1.6%
Tyre (T)	0	0	0	0	0	0	1	2	0	3	2.6%
Varick (T)	0	0	0	0	0	0	0	2	0	2	2.1%
Waterloo (T)	0	0	0	0	0	1	0	0	0	1	2.0%
Waterloo (V)	0	0	0	1	0	0	0	0	0	1	0.1%
Seneca County	**5**	**0**	**2**	**1**	**0**	**1**	**5**	**21**	**0**	**35**	**2.6%**

Source: Seneca County GIS 2023, NYS GIS Clearinghouse 2023, NYSDOH 2023, NYSDOT 2023, HIFLD 2023; NYS GIS Clearinghouse 2012; Northrop Grumman, Advanced GEOINT Solutions Operating Unit 2014

Table 11-7. Critical Facilities Located in the High-Slope Landslide Hazard Area

Jurisdiction	Number of Critical Facilities in the High-Slope Landslide Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Number	% of Jurisdiction Total
Covert (T)	0	0	0	0	0	0	2	2	0	4	3.1%
Fayette (T)	0	1	0	0	0	0	4	2	0	7	2.8%
Interlaken (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Junius (T)	0	0	0	0	0	0	0	2	0	2	3.2%
Lodi (T)	0	0	0	0	0	0	3	10	0	13	7.6%
Lodi (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Ovid (T)	0	0	0	0	0	0	5	1	0	6	4.3%
Ovid (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Romulus (T)	0	0	0	0	0	0	1	1	0	2	1.7%
Seneca Falls (T)	0	1	0	0	2	0	2	1	0	6	5.8%
Tyre (T)	0	0	0	0	0	0	2	1	0	3	4.8%
Varick (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Waterloo (T)	0	0	0	0	0	0	1	1	0	2	2.1%
Waterloo (V)	0	1	0	0	0	0	3	2	0	6	12.2%
Seneca County	**0**	**3**	**0**	**0**	**2**	**0**	**23**	**23**	**0**	**51**	**3.8%**

Source: Seneca County GIS 2023, NYS GIS Clearinghouse 2023, NYSDOH 2023, NYSDOT 2023, HIFLD 2023; NYS GIS Clearinghouse 2012; Northrop Grumman, Advanced GEOINT Solutions Operating Unit 2014

12. SEVERE WEATHER

12.1 HAZARD PROFILE

12.1.1 Hazard Description

As determined by the HMP Steering Committee, the main severe weather types of concern for Seneca County are thunderstorms, lightning, hail, high winds, tornadoes, and hurricanes and tropical storms. These are described in the sections below.

Thunderstorms

Thunderstorms form when warm, moist surface air rises, causing the water vapor to cool and condense into clouds. These clouds eventually grow upward, with moisture building up enough to fall as rain. Thunderstorms can lead to rain-induced flooding, landslides, strong winds, and lightning. Typical thunderstorms are 15 miles in diameter and last an average of 30 minutes. The National Weather Service (NWS) considers a thunderstorm severe only if it produces damaging wind gusts of 58 mph or higher, large hail 1 inch in diameter or larger, or tornadoes (NWS n.d.). In New York, thunderstorms are responsible for most of the rainfall in summer (National Weather Service 1994).

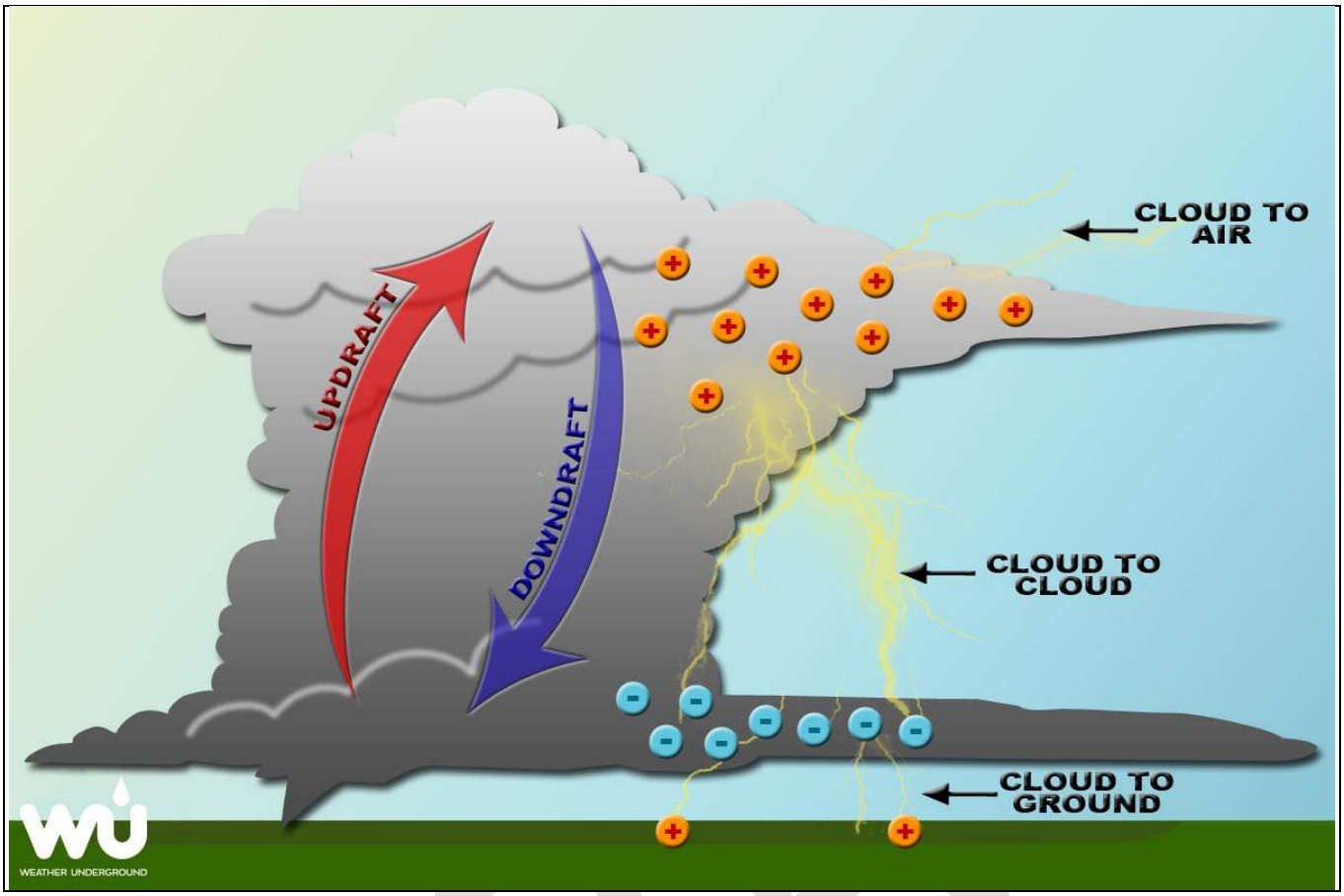
Thunderstorms affect relatively small, localized areas rather than large regions like winter storms and hurricanes. Typical thunderstorms are 15 miles in diameter and last an average of 30 minutes. They tend to take place during the spring and summer and during the warmest times of the day, which tend to be late afternoon and early evening (NOAA 2021).

Lightning

Lighting is a bright flash of electrical energy produced by a thunderstorm. When two water or ice particles in clouds collide, they bounce off each other. Many collisions by these particles build up regions of electric charges, causing bolts of lightning (NOAA 2021). The resulting clap of thunder is the result of a shockwave created by the lightning's rapid heating and cooling of the air. Lightning may take the following forms: (see Figure 12-1) (Royal Meteorological Society 2017).

- **Cloud-to-ground lightning** occurs when a negative charge nears the ground and connects to a positive charge (normally from taller objects in the area, such as a tree, house, or telephone pole), causing a powerful electric current.
- **Cloud-to-air lightning** is an electrical discharge that jumps from a cloud into clear air and terminates abruptly.
- There are two forms of **Cloud-to-cloud lightning**:
  - Intercloud lightning refers to long, horizontal moving flashes often seen on the underside of stratiform clouds.
  - Intracloud lightning refers to lightning embedded within a single storm cloud, which jumps between different charge regions in the cloud.

Figure 12-1. Types of Lightning



Source: Weather Underground n.d.

Lightning ranks as one of the top weather killers in the United States, killing approximately 50 people and injuring hundreds each year (NWS n.d.). Because it is typically associated with thunderstorms, it is most common during the same times as thunderstorms: during the spring and summer and during the warmest times of the day, which tend to be late afternoon and early evening

Hail

Hail forms inside a thunderstorm where there are strong updrafts of warm air and downdrafts of cold water. If a water droplet is picked up by the updrafts, it can be carried well above the freezing level. Water droplets freeze when temperatures reach 32°F or colder. As the frozen droplet begins to fall, it might thaw as it moves into warmer air toward the bottom of the thunderstorm, or the droplet might be picked up again by another updraft and carried back into the cold air to re-freeze. With each trip above and below the freezing level, the frozen droplet adds another layer of ice. The longer a hailstone spends in the clouds, the larger it becomes.

Hail falls when it becomes heavy enough to overcome the strength of the thunderstorm updraft and is pulled to the earth by gravity. Smaller hailstones may be blown away from the updraft by horizontal winds, so larger hail typically falls closer to the updraft than smaller hail (NOAA n.d.).

Most hail is less than 2 inches in diameter (NOAA 2021). Hail can damage aircraft, homes, and cars and can be deadly to livestock and people. Wind-driven hail can tear up siding on houses, break windows and blow into houses, break side windows on cars, and cause severe injury and/or death to people and animals.

High Winds

Wind is the horizontal movement of air caused by uneven heating of the earth's surface. It ranges from local breezes lasting a few minutes to global winds resulting from solar heating of the earth. High winds are often associated with other severe weather events such as thunderstorms, tornadoes, hurricanes, and tropical storms (NWS 2012). The following are common types of damaging winds (NOAA n.d.):

- **Derecho:** Long-lived windstorm associated with rapidly moving precipitation or thunderstorms. An event can be classified as a derecho if wind damage swath is more than 240 miles long and includes gusts of wind that reach 58 mph or greater
- **Microburst**: A small, concentrated downburst that produces an outward burst of relatively strong winds near the surface. Microbursts are small — less than 4 kilometers (km) across — and short-lived, lasting only 5 to 10 minutes, with maximum windspeeds sometimes exceeding 100 miles per hour (mph). There are two kinds of microbursts: wet and dry. A wet microburst is accompanied by heavy precipitation at the surface. Dry microbursts, common in places like the high plains and the intermountain west, occur with little or no precipitation reaching the ground.
- **Straight-line wind**: Used to define thunderstorm wind that is not linked with rotation, mainly to differentiate from tornadic winds.

Tornadoes

A tornado is a rotating, funnel-shaped cloud that extends from a thunderstorm to the ground with high-velocity whirling winds. Damage paths can be greater than 1 mile wide and 50 miles long. Tornadoes typically develop from either a severe thunderstorm or hurricane as cool air rapidly overrides a layer of warm air. Tornadoes typically move at speeds between 30 and 125 mph and can generate combined wind speeds (forward motion and speed of the whirling winds) exceeding 300 mph. The lifespan of a tornado rarely is longer than 30 minutes. Tornadoes can occur at any time of the year, with peak seasons at different times for different states (NWS 2010).

Approximately 1,200 tornadoes occur in the United States each year, with the central portion of the country experiencing the most (NOAA-NSSL n.d.). Tornadoes can occur at any time of the year, with peak seasons at different times for different states. The peak season for the Southern Plains (Texas, Oklahoma, Kansas, etc.) is from May into early June. The Gulf Coast experiences tornado seasons during the spring. For the Northern Plains and Upper Midwest region (North and South Dakota, Nebraska, Iowa, etc.), tornado season is June through July (NOAA-NSSL n.d.).

Most of the damage caused by this hazard is from windblown debris. This hazard can disrupt daily activities, causing injuries or damage to critical infrastructure and property.

Hurricanes and Tropical Storms

Hurricanes and tropical storms are both types of tropical cyclones. A tropical cyclone is an organized system of clouds and thunderstorms originating in tropical or subtropical waters. The characteristic that separates a tropical storm from another cyclonic system is that at any height in the atmosphere, the center of a tropical storm is warmer than its surroundings, a phenomenon called “warm core” storm systems (NWS n.d.).

These systems begin as disturbed areas of weather, often referred to as tropical waves. They strengthen when water evaporated from the ocean is released as the saturated air rises, resulting in condensation of water vapor contained in the moist air (NOAA 2020). The Saffir-Simpson Hurricane Wind Scale designates tropical cyclone levels, including hurricane category ratings of 1 to 5, based on the storm’s increasing sustained wind speed. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Tropical storms and Category 1 and 2 storms are still dangerous and require preventive measures (NOAA 2020). Table 12-1 presents this scale, which is used to estimate the potential property damage and flooding expected when a hurricane makes landfall.

Table 12-1. Saffir-Simpson Wind Scale

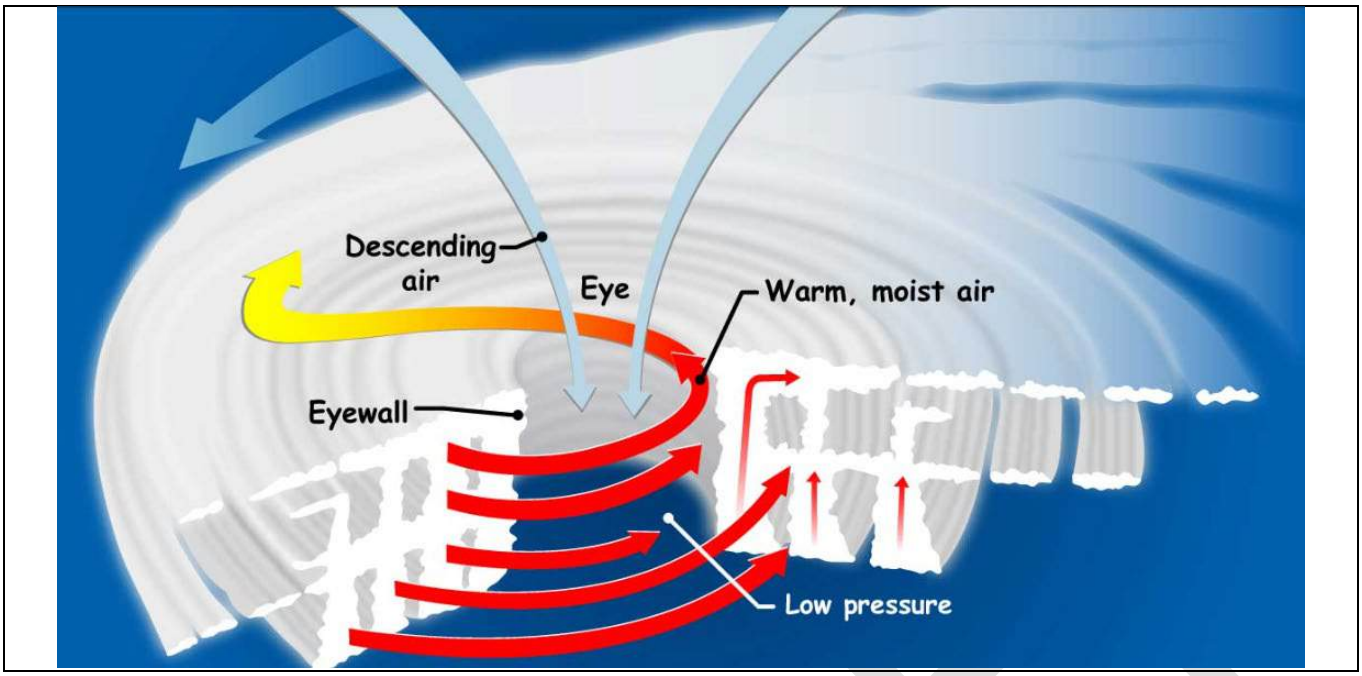
Category	Wind Speed
Tropical Depression	38 mph or less
Tropical Storm	39 to 73 mph
Hurricane Category 1	74 to 95 mph
Hurricane Category 2	96 to 110 mph
Hurricane Category 3 (major)	111 to 129 mph
Hurricane Category 4 (major)	130 to 156 mph
Hurricane Category 5 (major)	157 mph or higher

Source: NOAA 2020

Tropical cyclones can develop in the Atlantic between the Lesser Antilles and the African coast or in the warm tropical waters of the Caribbean Sea and Gulf of Mexico. These storms can move up the Atlantic coast of the United States, impacting the eastern seaboard, or move into the United States through the states along the Gulf Coast, bringing wind and rain as far north as New England before moving eastward offshore (NOAA 2020). Hurricanes and tropical storms can track inland, bringing heavy rainfall, strong winds, and flooding to non-coastal areas such as Seneca County. These storms are regional events that can impact very large areas hundreds to thousands of miles across over the life the storm.

As storm systems strengthen into hurricanes, the surface winds move continuously in a circular motion. Meteorologists refer to this pattern as “closed circulation.” These rotating winds lead to the development of the characteristic “eye” of the hurricane, the calm, clear center of the storm. The eye is surrounded by the eyewall, where winds are strongest. The formation of a tropical cyclone is shown in Figure 12-2.

Figure 12-2. Formation of a Tropical Cyclone



Source: NASA 2019

12.1.2 Location

Although a given thunderstorm or similar severe weather event may affect an isolated local area, Seneca County overall is equally exposed to the hazards of thunderstorms, lightning, hail, high winds, tornadoes, and hurricanes and tropical storms.

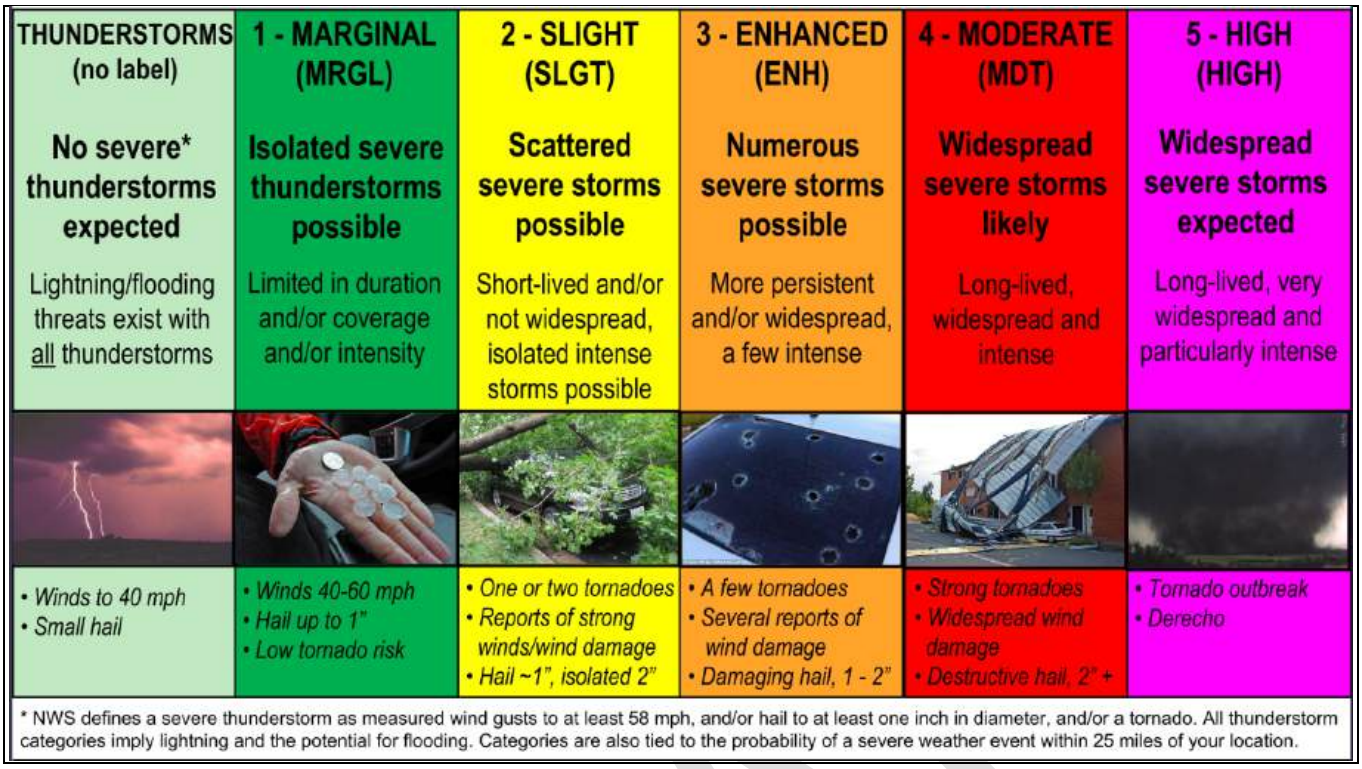
12.1.3 Extent

Thunderstorm

Thunderstorms are a common hazard for Seneca County. There have been previous records in the County of property damage, injury, and, in some cases, death caused by thunderstorms and lightning. As a result of thunderstorms, roads may become impassable from flooding, downed trees or power lines, or a landslide. (NOAA 2016). Downed power lines can lead to loss of utility services, such as water, phone, and electricity.

The NWS has five risk categories for thunderstorms: marginal, slight, enhanced, moderate, and high. Storm forecasts directly express the best estimate of a storm occurring within 25 miles of a point (National Weather Service 2022). Figure 12-3 details the thunderstorm risk categories.

Figure 12-3. Severe Thunderstorm Risk Categories



Source: National Oceanic and Atmospheric Administration n.d.

The local NWS office and the Storm Prediction Center issue the following alerts for severe storms (National Weather Service 2023):

- **Special Weather Statements** are issued for strong storms that are below severe levels but may have impacts. Usually reserved for the threat of wind gusts of 40 to 57 mph or hail of 0.5 inches to 0.99 inches in diameter.
- **Severe Thunderstorm Watches** are issued when severe thunderstorms are possible in and near watch areas.
- **Severe Thunderstorm Warning** indicates a storm 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 one inch in diameter or larger. A warning means to take shelter.

The NWS and Storm Prediction Center update the watches and warnings and notify the public when they are no longer in effect.

Lightning

Lightning flashes are detected and mapped in real-time by two networks in the United States: National Lightning Detection Network (NLDN) and the Earth Networks Total Lightning Network. These systems detect radio waves 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 size of hail is often estimated by comparing it to a known object, as shown in Table 12-2. Most hailstorms are made up of a mix of different sizes. Only the very largest hail stones pose serious risk to people (NOAA 2021).

Table 12-2. Hail Size

Description	Diameter (in inches)	Description	Diameter (in inches)
Pea	0.25	Golf ball	1.75
Marble or Mothball	0.50	Tennis ball	2.5
Penny or Dime	0.75	Baseball	2.75
Nickel	0.88	Tea cup	3.00
Quarter	1.00	Softball	4.00
Ping Pong Ball	1.25	Grapefruit	4.50

Source: National Oceanic and Atmospheric Administration 2023

High Wind

The American Society of Civil Engineers (ASCE) identifies wind speeds to use in building design (ASCE 2024):

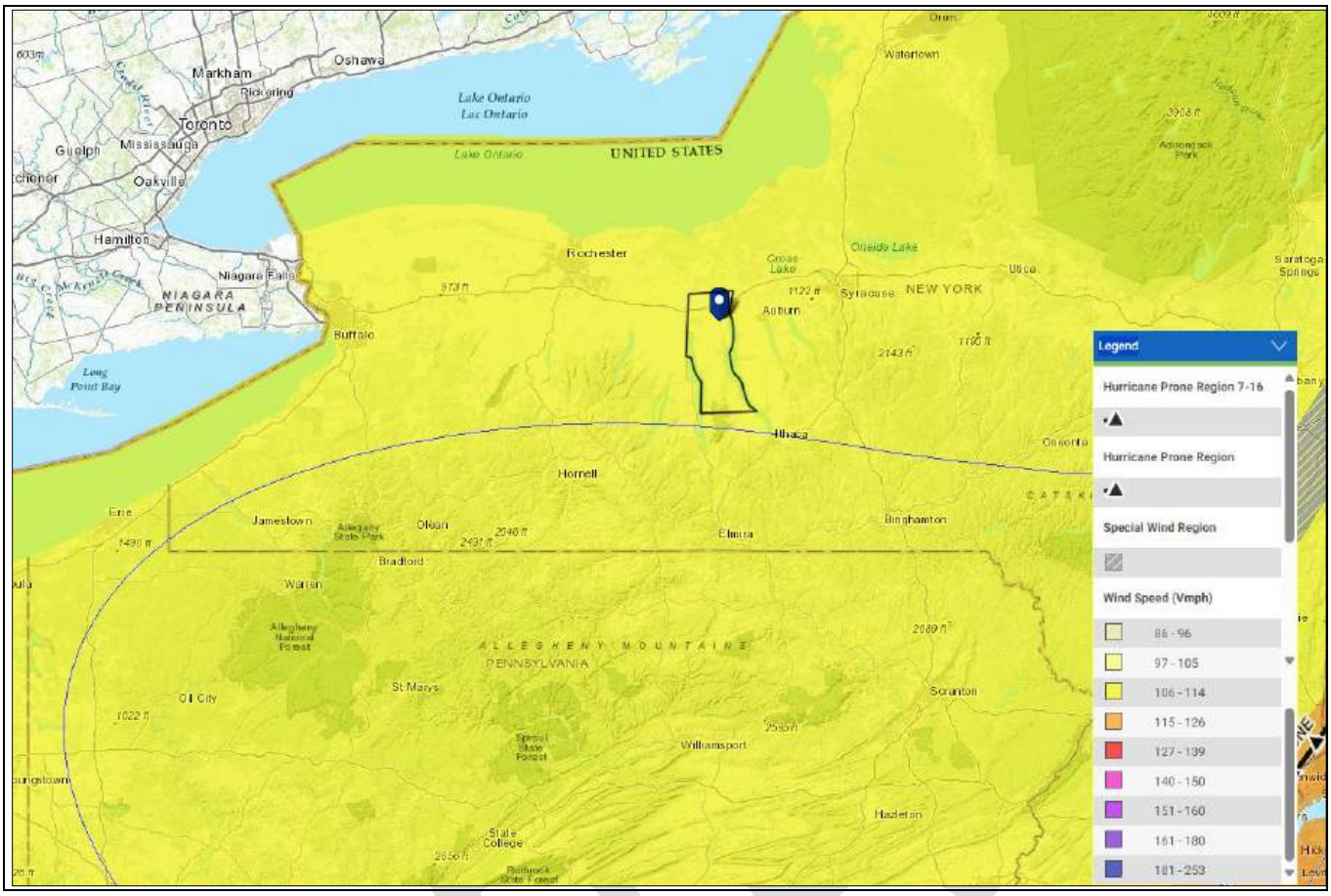
- For Risk Category II structures, which include most residential buildings, the ASCE standard calls for a design that can withstand the 3-second gust wind speed that has a 7 percent chance of occurring in a 50-year period. In Seneca County, that speed is 109 mph. Figure 12-4 shows the mapping of ASCE Risk Category II wind speeds in the region around Seneca County.
- For Risk Category IV structures, defined as buildings that are critical for emergencies and defense (such as shelters and other critical facilities), the ASCE design standard is the 3-second gust wind speed that has a 1.6 percent chance of occurring in a 50-year period. In Seneca County this is 122 mph.

When wind speeds may pose a hazard or may be life-threatening, the NWS issues alerts that are normally site-specific. The criteria vary from state to state. Wind warnings and advisories for New Jersey are defined as follows (National Weather Service 2012):

- **Wind Advisories** are issued when sustained wind speeds of 30 to 39 mph are forecast for one hour or longer or wind gusts of 46 to 57 mph are forecast for any duration.
- **High Wind Watches** are issued when there is the possibility that High Wind Warning Criteria may be met at longer ranges (24 to 48 hours out).
- **High Wind Warnings** are issued when sustained wind speeds of 40 mph or greater are forecast for 1 hour or longer or winds of 58 mph or greater are forecast for any duration or widespread damage is possible.

Table 12-3 lists descriptions of sustained wind speed used by the NWS during wind-producing events.

Figure 12-4 ASCE Design Winds for Risk Category II Structures



Source: ASCE 2024

Table 12-3. NWS Wind Descriptions

Descriptive Term	Sustained Wind Speed (mph)
Strong, dangerous, or damaging	≥40
Very windy	30 to 40
Windy	20 to 30
Breezy, brisk, or blustery	15 to 25
None	5 to 15 or 10 to 20
Light or light and variable wind	0 to 5

Source: National Weather Service 2010

Tornado

The magnitude or severity of a tornado is categorized using the Enhanced Fujita Tornado Intensity Scale (EF Scale). This scale determines tornado ratings by comparing wind speed and actual damage. Figure 12-5 illustrates the relationship between EF ratings, wind speed, and expected tornado damage.

Figure 12-5. Enhanced Fujita Tornado Intensity Scale Ratings, Wind Speeds, and Expected Damage

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

Source: National Weather Service 2015

Tornado watches and warnings are issued by the local NWS office. A tornado watch is released when tornadoes are possible in an area. A tornado warning means a tornado has been sighted or indicated by weather radar. The current average lead time for tornado warnings is 13 minutes. Occasionally, tornadoes develop so rapidly that little, if any, advance warning is possible (NOAA 2011).

Hurricanes and Tropical Storms

The NWS issues hurricane and tropical storm alerts that remain in effect until the storm no longer poses a significant threat to life and property (NOAA NHC 2010):

- A **Tropical Storm Watch** is issued when sustained winds of 39 to 73 mph are possible in the specified area within 48 hours in association with a tropical, sub-tropical, or post-tropical storm.
- A **Tropical Storm Warning** is issued when sustained winds of 39 to 73 mph are expected in the specified area within 36 hours in association with a tropical, subtropical, or post-tropical storm.
- A **Hurricane Watch** is issued when sustained winds of 74 mph or higher are possible in the specified area in association with a tropical, subtropical, or post-tropical cyclone. The hurricane watch is issued 48 hours prior to the anticipated onset of tropical storm-force winds.

- A **Hurricane/Typhoon Warning** is issued when sustained winds of 74 mph or higher are expected within the specified area in association with a tropical, subtropical, or post-tropical cyclone. The warning is issued 36 hours in advance of the anticipated onset of tropical storm-force winds. It can remain in effect when dangerously high water or combination of dangerously high water and waves continue, even though winds may be less than hurricane force.

To evaluate the potential for hazard events of a given magnitude, a mean return period (MRP) is often used. The MRP provides an estimate of the frequency of an event that may occur within any given year based on past recorded events. Figure 12-6 shows the estimated maximum three-second gust wind speeds that can be anticipated in the study area associated with the 500-year MRP hurricane-wind event. These peak wind speed projections were generated using FEMA's Hazus v6.1 wind model. The estimated hurricane track used for the 500-year event is also shown. The maximum 3-second gust wind speeds for Seneca County for the 500-year MRP wind event are 39 to 73 miles per hour (Tropical Storm).

12.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Seneca County has been included in three federal major disaster (DR) or emergency (EM) declarations for severe weather-related events, as summarized in Table 12-4 (FEMA 2024).

Table 12-4. FEMA Declarations for Severe Weather Events in Seneca County (1954 to 2024)

Event Date	Declaration Date	Declaration Number	Description
June 23, 1972	June 23, 1972	DR-338	Tropical Storm Agnes
May 13–June 17, 2004	August 3, 2004	DR-1534	Severe Storms and Flooding
August 13–15, 2018	October 1, 2018	DR-4397	Severe Storms and Flooding

Source: FEMA 2023

USDA Declarations

Since the previous HMP, Seneca County has been included in one USDA severe weather-related agricultural disaster declaration, as listed in Table 12-5 (USDA 2024).

Table 12-5. USDA Declarations for Severe Weather Events in Seneca County (2018 to 2024)

Event Date	Event Type	USDA Declaration Number
July 10 -16, 2024	Tornado, Hurricane, High Wind, Flash Flood, Excessive Rain, Hail	S5739

Source: USDA 2024

Previous Events

Known hazard events that impacted Seneca County between January 2017 and July 2024 are listed in Table 12-6.

Figure 12-6. Wind Speeds for the 500-Year MRP Event

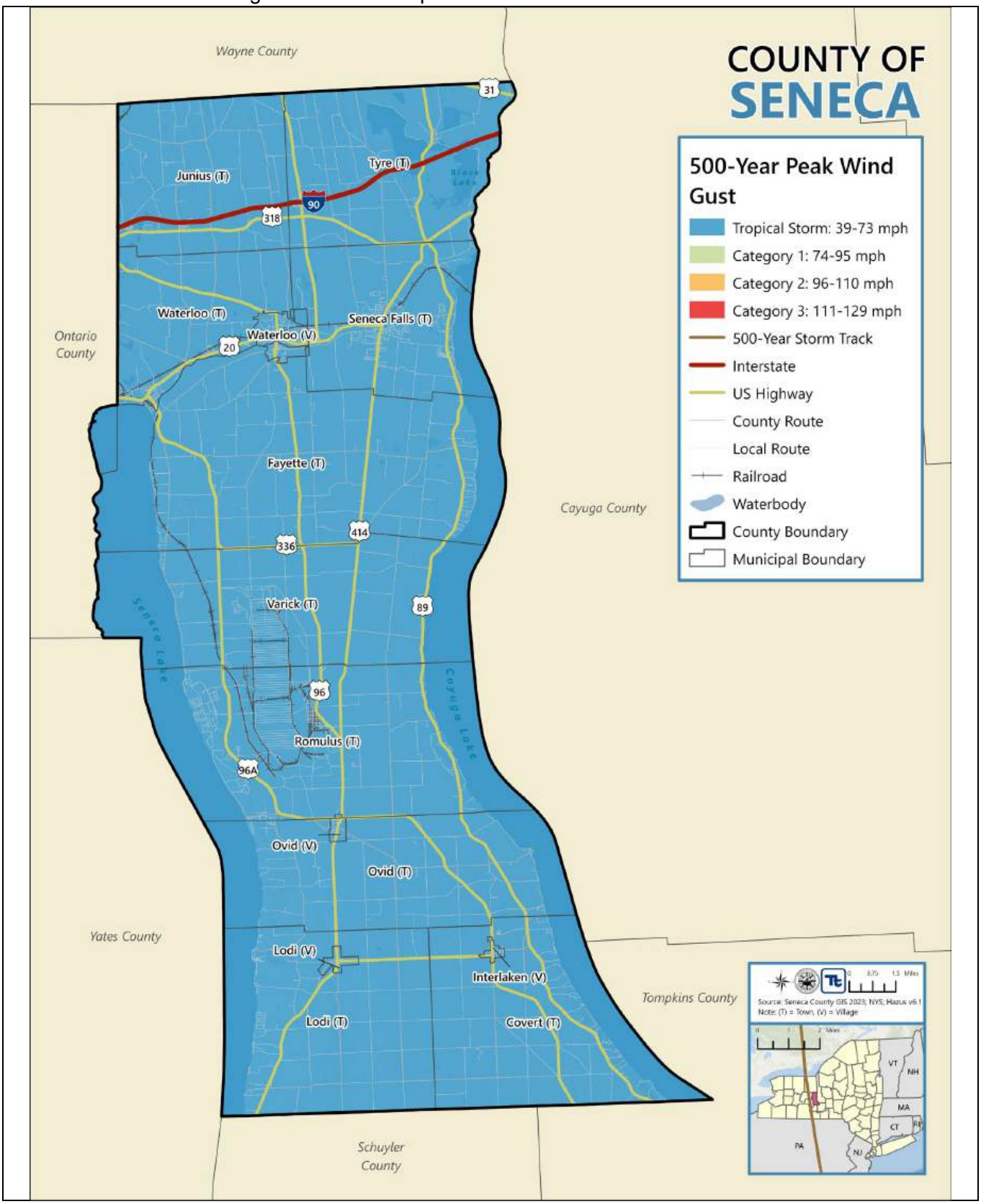


Table 12-6. Severe Weather Events in Seneca County (2017 to 2024)

Event Date	Event Type	Disaster Declaration/Proclamation		Location Impacted	Description
		Number	County Included?		
August 4, 2017	Thunderstorm Wind	N/A	N/A	Town of Seneca Falls	In Seneca Falls a thunderstorm produced severe winds and knocked over trees and wires in the vicinity of 2190 Lake Road; $5,000 in property damage was reported.
April 4, 2018	High Wind	N/A	N/A	Seneca County	Strong winds behind an intense storm system spread across the Finger Lakes region. Numerous locations had wind gusts approaching 60 mph with trees and wires down in many locations. In Seneca County, $40,000 in property damage was reported.
July 2, 2018	Thunderstorm Wind	N/A	N/A	Town of Waterloo	In Waterloo, strong thunderstorm winds knocked down trees and wires on Inslee Street; $10,000 in property damage was reported in Waterloo.
February 25, 2019	High Wind	N/A	N/A	Town of Seneca Falls	A period of very strong winds affected portions of Central New York and Northeast Pennsylvania. In the Town of Seneca Falls, a thunderstorm produced severe winds and knocked over trees and wires in the vicinity of 2190 Lake Road; $5,000 in property damage was reported.
May 15, 2020	Thunderstorm Wind	N/A	N/A	Town of Waterloo, Town of Romulus	In Waterloo, strong thunderstorm winds brought down a tree on County Route 96; $5,000 in property damage was reported. In Romulus, strong thunderstorm winds brought down wires on County Road 129; $5,000 in property damage was reported.
July 29, 2020	Thunderstorm Wind	N/A	N/A	Town of Ovid, Town of Waterloo	In Ovid, strong thunderstorm winds brought down wires between County Route 139 and Parish Road; $5,000 in property damage was reported. In Waterloo, strong thunderstorm winds brought down a tree on West Town Line Road and brought down trees and wires along Miller Road; $15,000 in property damage was reported.
August 27, 2020	Thunderstorm Wind	N/A	N/A	Town of Seneca Falls	In Seneca Falls, strong thunderstorm winds brought down trees and wires on Boston Avenue and Lake Road; $20,000 in property damage was reported in Seneca Falls.

Event Date	Event Type	Disaster Declaration/Proclamation		Location Impacted	Description
		Number	County Included?		
June 30, 2021	Thunderstorm Wind	N/A	N/A	Town of Waterloo, Town of Seneca Falls	Severe thunderstorms with damaging winds knocked down trees and wires across Central New York. A few of these storms produced hail 1 inch or larger. In Waterloo strong thunderstorm winds knocked down a tree onto a road; $1,000 in property damage was reported. In Seneca Falls, strong thunderstorm winds knocked down a tree through a house; $20,000 in property damage was reported. In Bridgeport, strong thunderstorm winds knocked down multiple trees blocking a road; $5,000 in property damage was reported.
August 29, 2021	Thunderstorm Wind	N/A	N/A	Tow of Tyre, Town of Waterloo	In Seneca County, there were reports of trees and utility wires knocked down by a thunderstorm. In Border City, strong thunderstorm winds knocked down a tree which blocked Serven Road; $1,000 in property damage was reported. In Tyre, strong thunderstorm winds knocked down wires with poles hanging out over the road; $3,400 in property damage was reported. In Waterloo, strong thunderstorm winds knocked down a tree onto Marshall Road and knocked down a pole across Yellow Tavern Road; $2,200 in property damage was reported.
December 11, 2021	High Wind	N/A	N/A	Seneca County	In Seneca County, high winds with gusts as high as 62 mph knocked down large branches onto powerlines; $1,500 in property damage was reported.
June 16, 2022	Thunderstorm Wind	N/A	N/A	Town of Seneca Falls	In Seneca Falls, strong thunderstorm winds knocked down wires near Peterman Road and Ovid Street; $1,000 in property damage was reported.
July 22, 2022	Thunderstorm Wind	N/A	N/A	Town of Interlaken	In Kelly's Corners, strong thunderstorm winds knocked down two poles near the intersection of County Road 142 and Halls Corners Road; $2,000 in property damage was reported. In Interlaken Beach, strong thunderstorm winds knocked down a tree onto all lanes of NY-89; $1,000 in property damage was reported. In Interlaken, strong thunderstorm winds knocked down a tree and lines on Holten Beach Road; $5,000 in property damage was reported.

Event Date	Event Type	Disaster Declaration/Proclamation		Location Impacted	Description
		Number	County Included?		
July 28, 2022	Thunderstorm Wind	N/A	N/A	Town of Ovid	In Ovid strong thunderstorm winds knocked down a large tree onto Route 414, blocking all lanes; $1,000 in property damage was reported.
September 22, 2022	Thunderstorm Wind	N/A	N/A	Border City	In Border City strong thunderstorm winds knocked down power lines, resulting in a power outage on Seneca Blvd; $1,000 in property damage was reported.
June 26, 2023	Thunderstorm Wind, Hail	N/A	N/A	Border City, Mac Dougal	Winds knocked down a tree onto a mobile home, and a transformer caught fire when a tree leaned against it. Trees and wires fell onto a car, trapping one individual; elsewhere in Seneca County, trees and wires were knocked down near Route 54A.
July 13, 2023	Thunderstorm Wind	N/A	N/A	Town of Seneca Falls	Multiple severe thunderstorms developed that contained damaging wind gusts and large hail. Most of the storm reports were for downed trees and wires. Strong thunderstorm winds knocked down a tree onto a house on Goodwin Street.
September 7, 2023	Thunderstorm Wind	N/A	N/A	Town of Lodi, Town of Ovid, Town of Seneca Falls	Severe storms produced damaging winds with the majority of damage reports for downed trees and utility lines.
June 18, 2024	Thunderstorm Wind	N/A	N/A	Town of Ovid	Scattered thunderstorms with damaging winds knocked down several utility lines and trees into roadways and one against a house.
June 22, 2024	Thunderstorm Wind, Hail	N/A	N/A	Border City	Severe thunderstorms with damaging winds produced large hail. Strong thunderstorm winds knocked down trees and wires and snapped a power pole.
July 10, 2024	Thunderstorm Wind	N/A	N/A	Town of Junius, Towns of Tyre, Town of Romulus	Damaging thunderstorms winds caused widespread tree and wire damage across Seneca County. One large tree fell onto a home. A microburst occurred in the Town of Romulus.
July 15, 2024	Thunderstorm Wind	N/A	N/A	Bridgeport, Town of Tyre	Severe thunderstorm produced damaging winds and a tornado, which did not impact Seneca County. Damage was limited to downed wires and trees across roadways.

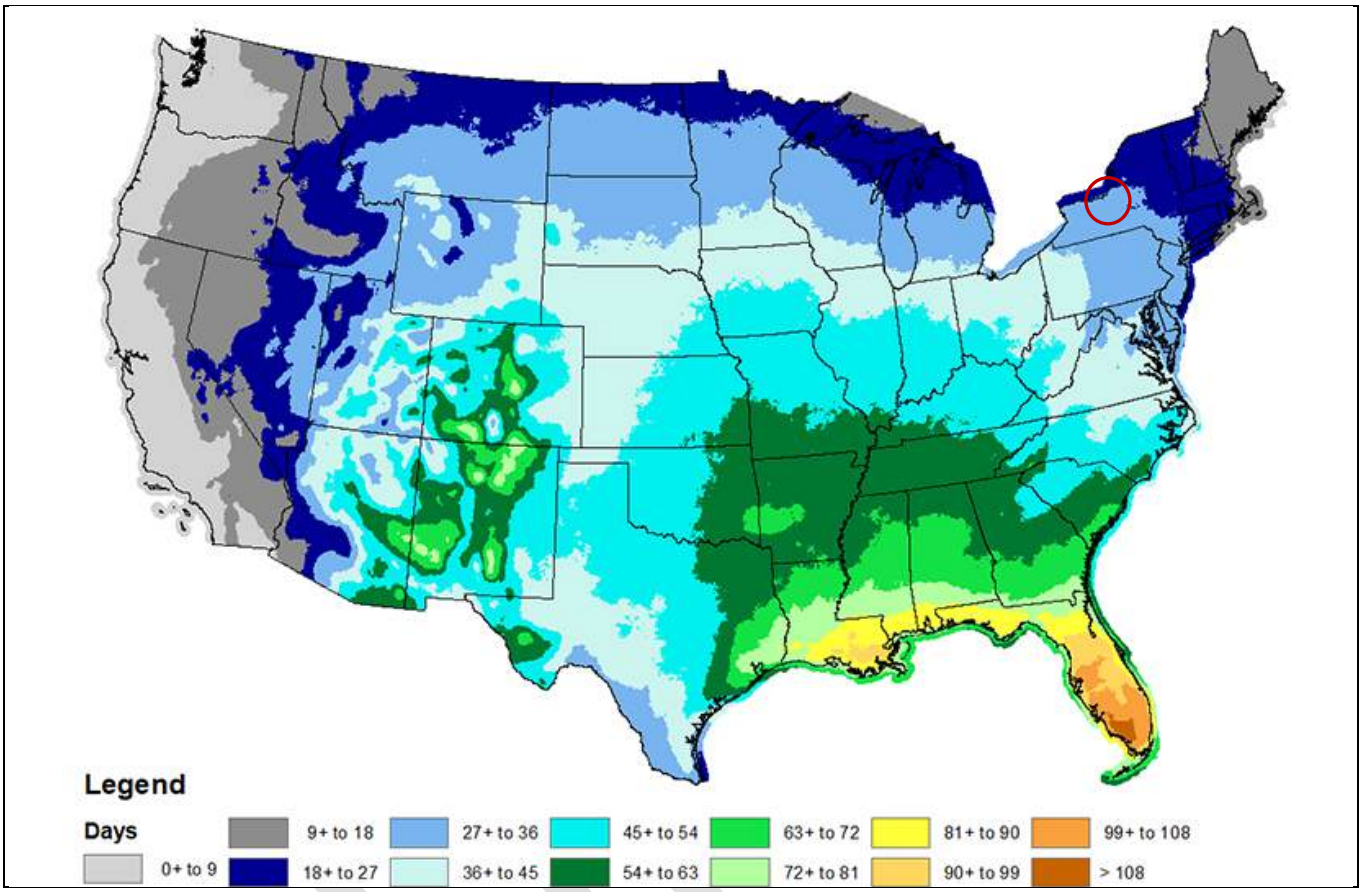
Source: NOAA-NCEI 2024; FEMA 2024

12.1.5 Probability of Future Occurrences

Probability Based on Past Events

Figure 12-7 shows thunderstorm days per year across the United States. The map shows that Seneca County is likely to have between 27 and 36 thunderstorms each year (NOAA 2023).

Figure 12-7. Average Number of Thunderstorms in the United States



Source: National Oceanic and Atmospheric Administration 2023
Note: The red oval indicates the approximate location of Seneca County.

The information on previous severe weather occurrences in the County was used to calculate the probability of future occurrence of such events, as summarized in Table 12-7. Based on historical records and input from the Steering Committee, the likely frequency of future occurrence of severe weather in the County is frequent.

Table 12-7. Probability of Future Severe Weather Events in Seneca County

Hazard Type	Occurrences Between 1996 and 2024	Percent Chance of Occurring in Any Given Year
Hail	36	100.00%
High Wind	15	53.57%
Hurricane	0	0.00%
Lightning	1	3.57%
Strong Wind	2	7.14%
Thunderstorm Wind	87	100.00%
Tornado	1	3.57%
Tropical Storm	0	0.00%
Total	**133**	**100.00%**

Source: NOAA-NCEI 2023; FEMA 2023
Note: The NCEI database used as a source for this table has limited data before 1996. Therefore, the evaluation of future hazard probability is based only on data from 1996 and later.

Potential Effect of Climate Change on Hazard Probability

Projections of climate change for New York State and for the Central/Finger Lakes region that includes Seneca County are summarized in Chapter 3.6.4. Heavy rainstorms are projected to happen more often and can become more intense as the climate continues to warm, 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 weather-related delays and hazards.

Hurricanes and tropical storms have become more intense since the mid-1990s, and their winds and associated flooding are expected to increase. The number of hurricanes and tropical storms may not increase, but storms that do form are projected to be stronger and shift farther north (Stevens & Lamie 2024). The length of hurricane season is also likely to expand due to rising water temperatures.

Research suggests that there is a greater risk of more off-season tornadoes in a warmer future climate, which suggests that more tornadic activity may occur when people are not expecting it (NOAA 2023).

12.1.6 Cascading Impacts on Other Hazards

Severe weather events can escalate the impacts of flooding and landslides. Severe winds can be destructive to the functionality of utilities by breaching power lines and disconnecting the utility systems. Severe weather may carry extreme rainfall that could exacerbate flooding.

12.2 VULNERABILITY AND IMPACT ASSESSMENT

For the severe weather hazard, all of Seneca County has been identified as the hazard area. Therefore, all assets in the County (population, structures, critical facilities, and lifelines) are vulnerable to a severe weather event. A Hazus analysis was performed to analyze wind losses in the County for the 500-year MRP hurricane wind event. Details on the Hazus hurricane model and the methodology for this assessment are provided in Chapter 4.2.2.

12.2.1 Life, Health, and Safety

Overall Population

The entire population, 33,814 persons total, is considered vulnerable to a severe weather event and wind impacts. Injury or loss of life can be caused by downed trees, damaged buildings, and debris carried by high winds. People located outdoors (e.g., engaged in recreational activities or farming) are considered most vulnerable to hailstorms, thunderstorms, lightning, and tornadoes. This is because there is little to no warning, and shelter may not be available.

The Hazus analysis for the 500-year MRP hurricane wind event found that there would be no displaced households or persons seeking short-term shelter in Seneca County because of that event.

Socially Vulnerable Population

Socially vulnerable populations are most susceptible due to their physical and financial ability to react and respond during extreme severe weather. This population includes the elderly, young, and individuals with disabilities or access or functional needs who may be unable to evacuate in the event of an emergency. The elderly are considered most vulnerable because they require extra time or outside assistance during evacuations and are more likely to need medical attention that might not be readily available due to isolation during a storm event. 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 weather may also include those beyond the disaster area that rely on affected roads for transportation.

Economically disadvantaged people are at high risk from severe weather because of the potential inability to afford up-to-code homes and buildings that are deemed safe from storms. They also may also lack access to vehicles for any necessary evacuations.

Table 3-7 shows social vulnerability statistics for Seneca County and participating municipalities from the 2022 ACS 5-year estimates. Table 3-8 shows low-income populations based on United for ALICE data for 2022. The municipalities with the highest and lowest numbers and percentages in each social vulnerability category are listed in Table 12-8.

12.2.2 General Building Stock

Wind damage to buildings is dependent upon wind speed, storm duration, and path of the storm track. Building construction also plays a major role in the extent of damage. Due to differences in construction, residential structures are generally more susceptible to wind damage than commercial and industrial structures. Wood and masonry buildings, in general, regardless of their occupancy class, tend to experience more damage than concrete or steel buildings. High-rise buildings are also very vulnerable structures.

The Hazus wind model estimated potential building losses for the 500-year MRP wind event in the damage categories defined in Table 12-9. Table 12-10 summarizes results. No structures are anticipated to be destroyed or to incur severe or moderate damage; however, up to 10 structures may incur minor damage.

Table 12-8. Municipalities With Highest and Lowest Socially Vulnerable Populations

Category	Municipality Highest in Category		Municipality Lowest in Category	
	Number	Percent	Number	Percent
Population Over 65	Seneca Falls (T)	Interlake (V)	Lodi (V)	Junius (T)
	1,873	**24.9%**	**56**	**11.4%**
Population Under 5	Seneca Falls (T)	Lodi (V)	Ovid (V)	Ovid (V)
	435	**10.6%**	**11**	**2.1%**
Non-English-Speaking Population	Seneca Falls (T)	Ovid (V)	Covert (T), Interlaken (V), Lodi (T and V), Tyre (T)	
	115	**3.4%**	**0**	**0.0%**
Population With Disability	Seneca Falls (T)	Waterloo (V)	Lodi (V)	Romulus (T) and Fayette (T)
	1,792	**20.3%**	**49**	**9.2%**
Population Below Poverty Level	Seneca Falls (T)	Varick (T)	Lodi (V)	Romulus (T)
	1,399	**18.4%**	**28**	**6.8%**
Households Below ALICE Threshold (2022)	Seneca Falls (T)	Lodi (V)	Lodi (V)	Romulus (T)
	2,091	**64.9%**	**85**	**33.7%**

Note: All data from 2022 5-year ACS (see Table 3-7) except ALICE data from 2022 United for Alice (see Table 3-8).

Table 12-9. Description of Damage Categories

Qualitative Damage Description	Roof Cover Failure	Window Door Failure	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 additional water entering the building. Marks or dents on walls requiring painting or patching for repair.	>2% and ≤15%	One window, door, or garage door failure	No	<5 impacts	No	No
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 of 20% & 3	1 to 3 panels	Typically 5 to 10 impacts	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% & 3 and ≤50%	>3 and ≤25%	Typically 10 to 20 impacts	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 >20 impacts	Yes	Yes

Source: FEMA 2022

Table 12-10. Expected Damage from 500-Year MRP Event

Occupancy Class	Total Number of Buildings in Occupancy	Severity of Expected Damage	500-Year MRP Hurricane	
			Building Count	Percent Buildings in Occupancy Class
Residential Buildings (Single and Multi-Family Dwellings)	13,746	None	13,740	100.0%
		Minor	6	<0.1%
		Moderate	0	0.0%
		Severe	0	0.0%
		Destruction	0	0.0%
Commercial Buildings	809	None	807	99.8%
		Minor	2	0.2%
		Moderate	0	0.0%
		Severe	0	0.0%
		Destruction	0	0.0%
Industrial Buildings	272	None	271	99.6%
		Minor	1	0.4%
		Moderate	0	0.0%
		Severe	0	0.0%
		Destruction	0	0.0%
Government, Religion, Agricultural, and Education Buildings	631	None	630	99.8%
		Minor	1	0.2%
		Moderate	0	0.0%
		Severe	0	0.0%
		Destruction	0	0.0%

Table 12-11 summarizes the estimated replacement cost value of damage for the 500-year MRP hurricane-wind event. The total estimated damage to buildings for all occupancy types across Seneca County is estimated to be $933,000, primarily to residential buildings. The Town of Covert is estimated to experience the greatest damage, totaling approximately $206,000.

12.2.3 Community Lifelines and Other Critical Facilities

Community lifelines are at risk of being impacted by high winds associated with structural damage or falling tree limbs/flying debris, which can result in the loss of power. Power loss can greatly impact households, business operations, public utilities, and emergency personnel. Vulnerable populations in Seneca County are at risk if power loss results in interruption of heating and cooling services, stagnated hospital operations, or potable water supplies. Emergency personnel such as police, fire, and emergency medical services will not be able to effectively respond in a power loss event to maintain public safety. Impacts on transportation lifelines affect both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting and goods transport) transportation needs.

Table 12-11. Estimated Building Damage from the 500-Year MRP Event

Jurisdiction	Estimated Damage Due to 500-Year MRP Hurricane Wind Event				
	Residential	Commercial	Industrial	Other[a]	All Occupancies
Covert (T)	$186,062	$6,569	$4,261	$9,207	$206,098
Fayette (T)	$143,321	$9,986	$3,479	$8,377	$165,162
Interlaken (V)	$1,324	$0	$0	$143	$1,467
Junius (T)	$16,899	$0	$0	$42	$16,942
Lodi (T)	$107,311	$0	$0	$49	$107,360
Lodi (V)	$1,443	$0	$0	$1	$1,444
Ovid (T)	$104,594	$0	$0	$50	$104,644
Ovid (V)	$1,072	$0	$0	$0	$1,073
Romulus (T)	$52,389	$0	$0	$149	$52,538
Seneca Falls (T)	$145,763	$4,996	$0	$7	$150,767
Tyre (T)	$20,706	$0	$0	$54	$20,760
Varick (T)	$47,233	$0	$0	$134	$47,367
Waterloo (T)	$50,879	$0	$0	$42	$50,920
Waterloo (V)	$6,376	$0	$0	$208	$6,583
Seneca County	$885,372	$21,551	$7,739	$18,462	$933,124

a. Other = government, religion, agricultural, and education

Table 12-12 summarizes the damage state probabilities for critical facilities as a result of the 500-year MRP wind event. As a result of a 500-year MRP wind event, Hazus estimates that the energy lifeline has the greatest chance of sustaining minor damage (0.43 percent), followed by the water system lifeline (0.42 percent). No moderate, severe, and complete damage to lifelines is predicted. There are no days predicted for loss of function of any lifeline.

Table 12-12. Estimated Impacts to Critical Facilities for the 100-Year MRP Event

	Loss of Days	Average Percent Probability of Sustaining Damage 500-Year MRP Hurricane Wind Event			
		Minor	Moderate	Severe	Complete
Communications	0	0.34%	0.00%	0.00%	0.00%
Energy	0	0.43%	0.00%	0.00%	0.00%
Food, Hydration, Shelter	0	0.32%	0.00%	0.00%	0.00%
Hazardous Materials	0	0.38%	0.00%	0.00%	0.00%
Health and Medical	0	0.15%	0.00%	0.00%	0.00%
Safety and Security	0	0.26%	0.00%	0.00%	0.00%
Transportation	0	0.33%	0.00%	0.00%	0.00%
Water Systems	0	0.42%	0.00%	0.00%	0.00%

Source: Seneca County GIS 2023, NYS GIS Clearinghouse 2023, NYSDOH 2023, NYSDOT 2023, HIFLD 2023

12.2.4 Economy

Severe weather events can have short- and long-lasting impacts on the economy. When a business is closed during storm recovery, 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 or replacement of buildings.

Hazus estimated the amount of debris that might be produced as result of the 500-year MRP wind event, as summarized in Table 12-13. Debris production from trees is the greatest, with an estimated 649 tons of debris. These estimates represent only debris generated by wind damage; additional damage during a severe weather event could be generated by flooding.

Table 12-13. Debris Production for the 500-Year MRP Event Wind

Jurisdiction	Brick and Wood (tons)	Concrete and Steel (tons)	Trees (tons)	Tree Volume (cubic yards)
Covert (T)	60	0	763	2,136
Fayette (T)	527	0	6,504	13,782
Interlaken (V)	81	0	1,248	1,872
Junius (T)	513	0	8,952	21,083
Lodi (T)	483	0	8,550	15,611
Lodi (V)	516	0	1,475	7,931
Ovid (T)	182	0	3,435	4,810
Ovid (V)	230	0	4,167	6,251
Romulus (T)	435	0	336	2,958
Seneca Falls (T)	286	0	7,528	12,305
Tyre (T)	862	0	14,012	23,157
Varick (T)	1,077	0	4,388	18,264
Waterloo (T)	365	0	5,169	6,203
Waterloo (V)	138	0	14,909	11,927
Seneca County	554	0	649	4,677

12.2.5 Natural, Historic, and Cultural Resources

Natural

The long-term impacts of severe weather can be destructive to the natural environment. USGS and NOAA have been studying and monitoring the impacts of extreme weather phenomena on stream flow, river levels, reservoir elevations, floods, landslides, erosion, etc. Severe weather that creates longer periods of rainfall can erode natural banks along waterways and degrade soil stability for terrestrial species. Tornadoes can tear apart habitats, causing fragmentation across ecosystems (EPA 2023). Researchers also believe that a greater number of diseases will spread across ecosystems because of impacts of severe weather on water supplies (USGCRP 2016). As the physical environment becomes more altered, species will begin to contract or migrate in response, which may cause additional stressors to the entire ecosystem within Seneca County.

Historic

Historic structures built before modern building codes existed are vulnerable to the effects of severe weather, especially high winds, tornadoes, and flooding, due to the fragility of their structure. Foundations and roof sheeting are especially susceptible to the stresses of wind and water (Gibbs 2001).

Cultural

Winds associated with severe weather can cause damage or destruction to cultural resources. Many of the losses that are caused by the loss of a historic building are of cultural significance, including museum collections, archival documents, and family or cultural heirlooms (US DOI n.d.) Cultural resources may be located outdoors or inside vulnerable historical buildings and homes. Outdoor cultural events are likely to be postponed or cancelled as the result of severe weather conditions.

12.3 CHANGE OF VULNERABILITY SINCE 2018 HMP

Seneca County's vulnerability to severe weather has not changed; the entire County remains vulnerable to severe weather events and their impacts.

12.4 FUTURE CHANGES THAT MAY AFFECT RISK

12.4.1 Potential or Planned Development

All of Seneca County is exposed to the severe weather hazard. Any areas of new development could be impacted by the severe weather hazard. However, due to increased standards and codes, new development may be less vulnerable to the severe weather hazard than the aging building stock in the County. Specific areas of recent and new development are indicated in tables and maps included in the jurisdictional annexes in Volume II of this plan.

12.4.2 Projected Changes in Population

The population of Seneca County decreased by about 4 percent from 2010 to 2020 and is projected to continue decreasing through 2040 (Cornell University 2018). Any changes in the density of population can create issues for local residents during evacuation from a severe weather event. Historically, flooding and debris with associated severe weather events have severely impacted transportation corridors as well as infrastructure.

12.4.3 Climate Change

The State of New York is projected to experience an increase in the frequency and severity of extreme storms and rainfall. Major clusters of summertime thunderstorms will grow larger, more intense, and more frequent later this century in a changing climate, unleashing far more rain and posing a greater threat of flooding across wide areas (NASA 2013). An increase in storms will produce more wind events. Additionally, an increase in temperature will provide more energy to produce storms that generate

tornadoes (NASA 2013). With an increased likelihood of strong winds and tornado events, all the County's assets will experience additional risk for losses as a result of severe weather events.

13. SEVERE WINTER WEATHER

13.1 HAZARD PROFILE

13.1.1 Hazard Description

A winter storm is a weather event with one of the following types of precipitation (see Figure 13-1).

- **Heavy Snow—**Snowflakes are clusters of ice crystals that form from a cloud. They originate in clouds when temperatures are below the freezing point (32 °F) and 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 snowflakes, which then fall to the earth.
- **Sleet**—Sleet is made up of rain drops or partially melted snowflakes that freeze into ice pellets as they fall through colder lower air layers. The pellets are usually smaller than a third of an inch in diameter (NSSL 2021). A sleet storm involves accumulations of these pellets, causing slippery surfaces and posing a hazard to pedestrians and motorists (NSIDC 2013).
- **Ice Storms/Freezing Rain—**An ice storm is when damaging accumulations of ice result from freezing rain. 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 0.25 inches or more (National Weather Service 2009).

The following are the three basic components of a winter storm (NOAA 2021):

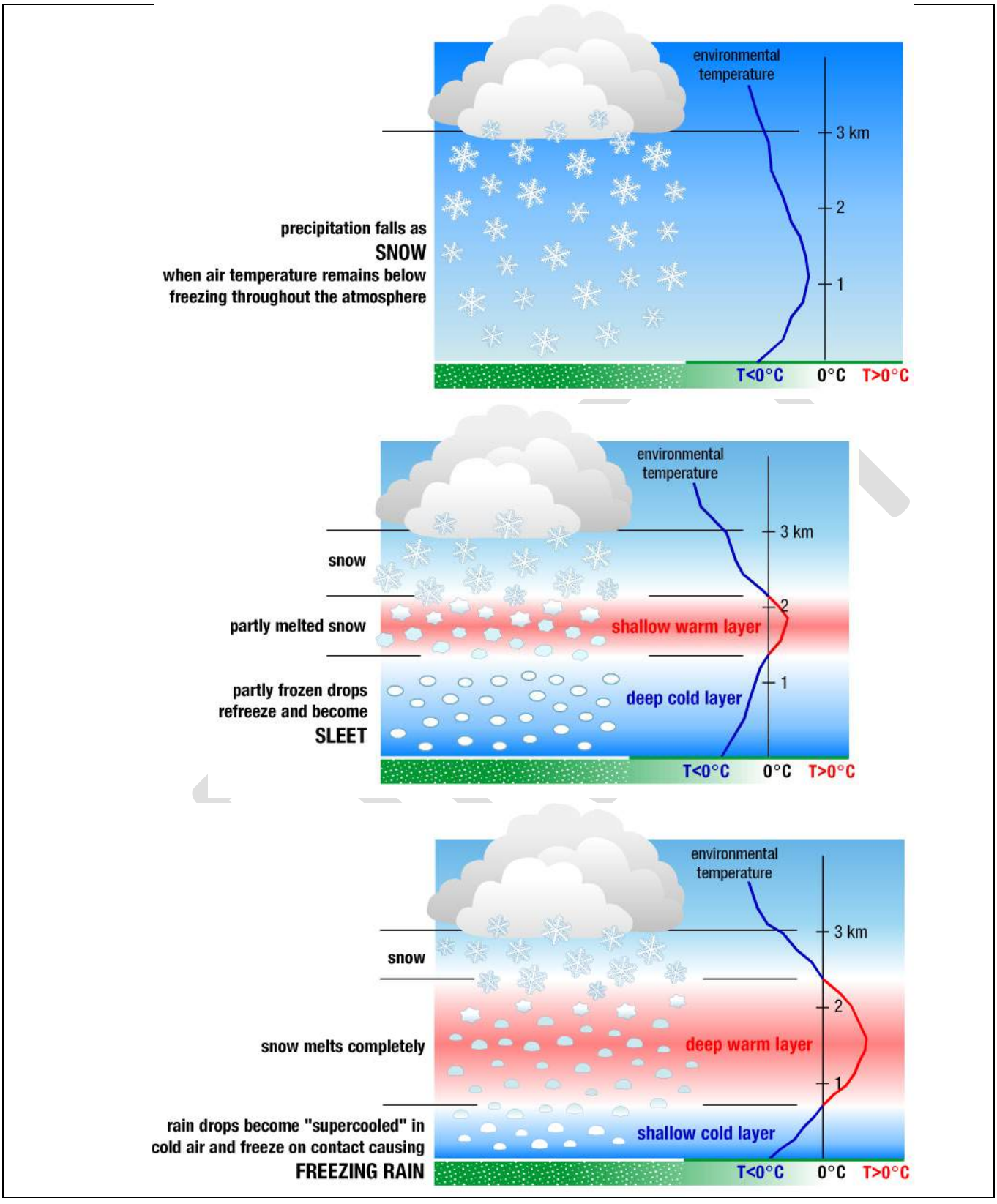
- Below freezing temperatures in the clouds and near the ground to make snow and ice.
- A source of moisture, such as air blowing across a large lake or the ocean.
- A lifting force to raise moist air to form clouds, such as warm air colliding with cold air and being forced to rise over the cold dome or air flowing up a mountainside.

A winter storm can affect a wide region or only a small community. It can cause cold temperatures, flooding, storm surge, closed and blocked roadways, downed utility lines, and power outages.

Blizzards

A blizzard is a winter snowstorm with sustained or frequent wind gusts of at least 35 miles per hour (mph) and falling or blowing snow that reduces visibility to a quarter mile or less over a three-hour period (NOAA n.d.). Blizzards are most likely when temperatures are below 20 °F. A severe blizzard is defined as a blizzard with temperatures near or below 10 °F, winds exceeding 45 mph, and visibility reduced to near zero.

Figure 13-1. Creation of Snow, Sleet, and Freezing Rain



Source: NOAA 2023

Storm systems powerful enough to cause blizzards usually form when the jet stream dips far to the south, allowing cold air from the north to clash with warm, moister air from the south. Blizzard conditions often develop on the northwest side of an intense storm system. The difference between the lower pressure in the storm and the higher pressure to the west creates a tight pressure gradient, resulting in strong winds and extreme blowing snow conditions (The Weather Channel 2019).

NWS Winter Weather Notifications

NWS winter weather advisories inform people about winter weather conditions expected to cause significant inconveniences that may be hazardous:

- A **winter storm watch** means that severe winter conditions (heavy snow, ice, etc.) may affect a certain area, but its occurrence, location and timing are uncertain. A watch is issued to provide 12- to 48-hour notice of the possibility of severe winter weather.
- A watch is upgraded to a **winter storm warning** when hazardous winter weather, in the form of heavy snow, heavy freezing rain or heavy sleet, is imminent or occurring. Warnings are usually issued 12 to 24 hours before the event is expected to begin.
- The NWS may also issue a **blizzard warning** when snow and strong winds combine and produce a blinding snow, deep drifts, and wind chill (NWS 2021).

13.1.2 Location

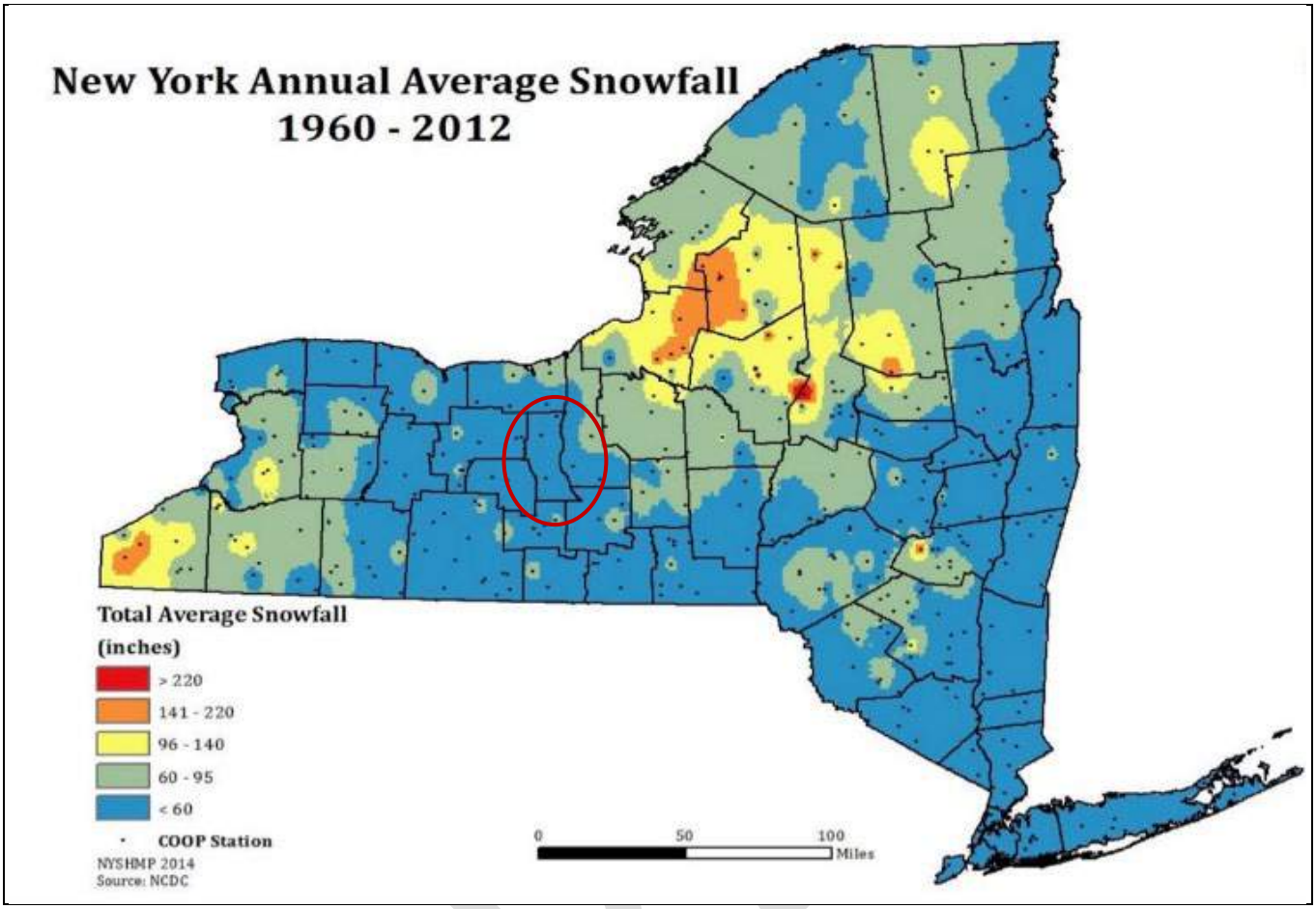
The State of New York's climate is marked by abundant snowfall. Winter weather can reach the state as early as October and is usually in full force by late November, with average winter temperatures between 20 and 40 °F. The inland regions of the state receive more snow than most other communities in the nation. The easternmost and west-central portions of the state are more likely than the rest of the state to experience winter storms. The average annual snowfall is greater than 70 inches over 60 percent of the State of New York's area. Seneca County experiences less than 60 inches of snow a year (NYS DHSES 2019). Figure 13-2 illustrates the annual average snowfall totals over a 50-year period for New York State.

13.1.3 Extent

The National Centers for Environmental Information (NCEI) produces 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 NCEI has analyzed and assigned RSI values to over 500 storms since 1900 (NOAA n.d.). Table 13-1 presents the five RSI ranking categories.

The magnitude of severe winter weather also can be qualified into five main categories by event type, as listed in Table 13-2 (FEMA 2024).

Figure 13-2. New York Annual Average Snowfall, 1960 to 2012



Source: NYS DHSES 2014
Note: The red circle indicates the location of Seneca County

Table 13-1. 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

Table 13-2. Winter Storm Category Thresholds

Winter Storm Event	Threshold
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

13.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Seneca County has been included in two federal major disaster (DR) or emergency (EM) declarations for severe winter weather-related events, as listed in Table 10-4 (FEMA 2024).

Table 13-3. FEMA Declarations for Severe Winter Weather Events in Seneca County (1954 to 2024)

Event Date	Declaration Date	Declaration Number	Description
March 13-17, 1993	March 17, 1993	EM-3107	Severe Blizzard
April 3-5, 2003	May 12, 2003	DR-1497	Ice Storm

Source: FEMA 2024

USDA Declarations

Since the previous HMP, Seneca County has been included in two USDA severe winter weather-related agricultural disaster declarations, as listed in Table 13-4 (USDA 2024).

Table 13-4. USDA Declarations for Severe Winter Weather Events in Seneca County (2018 to 2024)

Event Date	Event Type	USDA Declaration Number
May 14–25, 2023	Frost, Freeze	S5485
April 22–27, 2024	Frost, Freeze	S5698

Source: USDA 2024

Previous Events

Known winter weather events that impacted Seneca County between January 2017 and July 2024 are listed in Table 13-5.

Table 13-5. Severe Winter Weather Events in Seneca County (2017 to 2024)

Event Date	Event Type	Disaster Declaration/Proclamation		Location Impacted	Description
		Number	County Included?		
March 14–15, 2017	Heavy Snow	N/A	N/A	Countywide	A major winter storm spread a heavy record-breaking snowstorm to a large part of central New York and northeast Pennsylvania. Snowfall ranged from 11 to 21 inches in Seneca County.
January 12–13, 2018	Heavy Snow	N/A	N/A	Countywide	Snowfall totals ranged from 8 to 10 inches in Seneca County.
March 1–2, 2018	Heavy Snow	N/A	N/A	Countywide	A major winter storm dropped snowfall of about 7 inches In Seneca County.
November 15–16, 2018	Heavy Snow	N/A	N/A	Countywide	A major winter storm affected all of northeast Pennsylvania and central New York State. Snowfall totals ranged from 9 to 14 inches in Seneca County.
January 19–20, 2019	Heavy Snow	N/A	N/A	Countywide	Snow accumulated 8 to 11 inches in Seneca County.
December 1–2, 2019	Heavy Snow	N/A	N/A	Countywide	In Seneca County snow accumulated 7 to 10 inches.
February 6–7, 2020	Heavy Snow	N/A	N/A	Countywide	With a quick period of heavy snowfall across Central New York, snow accumulated 6 to 10 inches in Seneca County.
February 1–3, 2021	Winter Storm	N/A	N/A	Countywide	A long-duration winter storm system brought moderate to heavy snow to portions of Central New York. In Seneca County, snow accumulated 11 to 24 inches.
January 16–17, 2022	Heavy Snow	N/A	N/A	Countywide	In Seneca County snow accumulated 8 to 10 inches.
February 3–4, 2022	Heavy Snow	N/A	N/A	Countywide	Several inches of snow were observed across the Finger Lakes and Mohawk Valley with the highest totals near 18. Snow accumulated 8 to 14 inches in Seneca County.
January 6–7, 2024	Heavy Snow	N/A	N/A	Countywide	A large winter storm brought a period of moderate to heavy snowfall to the area. Snow accumulated between 5 and 9 inches.

Source: NOAA-NCEI 2024; FEMA 2024

13.1.5 Probability of Future Occurrences

Probability Based on Past Events

The above information on previous severe winter weather occurrences in the County was used to calculate the probability of future occurrence of such events, as summarized in Table 13-6. Based on historical records and input from the Steering Committee, the likely frequency of future occurrence of severe winter weather in the County is frequent.

Table 13-6. Probability of Future Severe Winter Weather Events in Seneca County

Hazard Type	Occurrences Between 1996 and 2024	Percent Chance of Occurring in Any Given Year
Heavy Snow	38	100.00%
Ice Storm	8	28.57%
Winter Storm	18	64.29%
Total	64	100.00%

Source: NOAA-NCEI 2024
Note: The NCEI database used as a source for this table has limited data before 1996. Therefore, the evaluation of future hazard probability is based only on data from 1996 and later.

Potential Effect of Climate Change on Hazard Probability

Projections of climate change for New York State and for the Central/Finger Lakes region that includes Seneca County are summarized in Chapter 3.6.4. New York has experienced a decrease in the number of cold winter days (below 32°F) and is projected to see an additional decrease by more than 50 percent by the 2080s. While projected temperature increases may reduce the likelihood of snow, future changes in frozen precipitation are also dependent upon changes in winter storm intensity and track. On balance, most of New York State is likely to see a shorter snow season, reduced snow cover and snow depth, and fewer snow events. However, the largest snow events could grow in magnitude since a warmer atmosphere can hold more moisture (Stevens & Lamie 2024).

Many parts of the Seneca County region experience lake-effect snow coming off the Great Lakes. As winters continue to warm, ice is projected to become rarer, which may lead to more lake-effect snow in the short term due to additional moisture available in the atmosphere to create precipitation. Over the long term, however, more of this is likely to fall as rain (Stevens & Lamie 2024).

13.1.6 Cascading Impacts on Other Hazards

Severe winter storms are often accompanied by extreme cold temperatures, which may require warming shelters to be opened. Snow and ice conditions on the road make transportation accidents more likely, which may lead to utility and power lines being knocked over. Heavy snow and ice can lead to utility failure and downed trees and wires. Electrical utility failure also has the potential to start fires that can damage infrastructure and woodlands. The damage from electrical utility failure can also include fatalities and injuries, depending on the location and severity of the failure. Snow and ice melt may contribute to flooding. Responding to winter weather hazards with snow and ice removal could minimize the potential risk of flooding during a warming period.

13.2 VULNERABILITY AND IMPACT ASSESSMENT

13.2.1 Life, Health, and Safety

Overall Population

The entire population of Seneca County (33,814) is exposed to severe winter weather events (US Census 2020). Winter weather kills hundreds of people in the United States every year primarily from automobile accidents, overexertion, and exposure. Winter storms are often accompanied by strong winds, with blinding wind-driven snow, drifting snow, and dangerous wind chills (NSSL 2021).

Socially Vulnerable Population

People who experience homelessness, those over the age of 65, and those under the age of 5 are most susceptible to this hazard. The homeless population, which can be 372 persons on any given night in Seneca, Ontario, Wayne, and Yates counties (National Alliance to End Homelessness 2022), lacks adequate shelter and is exposed to the elements for extended periods of time. The elderly are 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. Young children are at risk from hypothermia or other cold related illnesses due to their inability to care for themselves. In addition, severe winter weather events can reduce the ability of these populations to access emergency services.

Table 3-7 shows social vulnerability statistics for Seneca County and participating municipalities from the 2022 ACS 5-year estimates. Table 3-8 shows low-income populations based on United for ALICE data for 2022. The municipalities with the highest and lowest numbers and percentages in each social vulnerability category are listed in Table 13-7.

Table 13-7. Municipalities With Highest and Lowest Socially Vulnerable Populations

Category	Municipality Highest in Category		Municipality Lowest in Category	
	Number	Percent	Number	Percent
Population Over 65	Seneca Falls (T)	Interlake (V)	Lodi (V)	Junius (T)
	1,873	**24.9%**	**56**	**11.4%**
Population Under 5	Seneca Falls (T)	Lodi (V)	Ovid (V)	Ovid (V)
	435	**10.6%**	**11**	**2.1%**
Non-English-Speaking Population	Seneca Falls (T)	Ovid (V)	Covert (T), Interlaken (V), Lodi (T and V), Tyre (T)	
	115	**3.4%**	**0**	**0.0%**
Population With Disability	Seneca Falls (T)	Waterloo (V)	Lodi (V)	Romulus (T) and Fayette (T)
	1,792	**20.3%**	**49**	**9.2%**
Population Below Poverty Level	Seneca Falls (T)	Varick (T)	Lodi (V)	Romulus (T)
	1,399	**18.4%**	**28**	**6.8%**
Households Below ALICE Threshold (2022)	Seneca Falls (T)	Lodi (V)	Lodi (V)	Romulus (T)
	2,091	**64.9%**	**85**	**33.7%**

Note: All data from 2022 5-year ACS (see Table 3-7) except ALICE data from 2022 United for Alice (see Table 3-8).

13.2.2 General Building Stock

The entire general building stock inventory is vulnerable to the severe winter storm hazard. An extreme blizzard or snowstorm event can deposit significant amounts of snow that are heavy enough to knock down power and telephone lines as well as damage roofs and aging buildings. Potential structural impacts include partial damage to roofs and building frames, rather than an entire building.

13.2.3 Community Lifelines and Other Critical Facilities

Full functionality of lifeline facilities such as police, fire, and medical facilities is essential for response during and after a severe winter weather event. These facilities are largely constructed of concrete and masonry; therefore, they should suffer only minimal damage from severe winter weather 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.

13.2.4 Economy

Severe winter weather 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.

13.2.5 Natural, Historic, and Cultural Resources

Natural

Severe winter weather can have a major impact on the environment. For example, an excess amount of snowfall and earlier warming periods may affect natural processes such as stream flow. The residual impacts of a community's methods to maintain its infrastructure through winter weather maintenance may also have an impact on the environment. (NSIDC n.d.).

Rain-on-snow events can exacerbate runoff rates with warming winter weather. Resulting excess volumes of water can erode banks, tear apart habitat along stream banks, and disrupt terrestrial plants and animals. Road-salt runoff can cause groundwater salinization, modify the soil structure, and result in loss or reduction in lake turnover. Additionally, road salt can cause changes in the composition of aquatic invertebrate assemblages and pose threats to birds, roadside vegetation, and mammals. This may

increase mobilization of trace metals in fish, which are toxic to humans in high doses, which can lead to a decrease in food resources (NYSDEC 2023).

Historic and Cultural

Historic and cultural structures should take careful precautions to winterize buildings ahead of severe winter weather. This can include maintenance to both the interior and exterior of the building, plumbing, piping, and careful temperature and humidity management. These buildings often have aging systems that require regular maintenance and special preparation ahead of very cold temperatures to protect both the structure itself and its contents (CCHA 2019).

13.3 CHANGE OF VULNERABILITY SINCE 2018 HMP

Seneca County's vulnerability to severe winter weather has not changed; the entire County remains vulnerable to severe winter weather events and their impacts.

13.4 FUTURE CHANGES THAT MAY AFFECT RISK

13.4.1 Potential or Planned Development

Areas targeted for future development have been identified across the County. Any new development could be impacted by severe winter weather events. Current New York State land use and building codes incorporate standards that address and mitigate snow accumulation. Seneca County administers and enforces the New York State Uniform Fire Prevention and Building Code. Some municipalities in New York have implemented the following activities related to development to eliminate loss of life and property damage during winter storm events (NYS DHSES 2023):

- Ensure proper road signs are visible and installed properly.
- Bury electrical and telephone utility lines to minimize downed lines.
- Install cell towers in areas where limited telecommunication is available to increase emergency response and cell phone coverage.

13.4.2 Projected Changes in Population

The population of Seneca County decreased by about 4 percent from 2010 to 2020 and is projected to continue decreasing through 2040 (Cornell University 2018). Any changes in the density of population may impact the ability of persons in the County to mobilize or receive essential services during severe winter weather events.

13.4.3 Climate Change

Most studies project that the State of New York will see an increase in average annual temperatures and precipitation. The temperature increase could decrease the frequency of winter weather events. 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.

14. HAZARD RANKING

Hazard rankings are one of the bases for identifying the jurisdictional hazard mitigation strategies included in Volume II. These rankings vary among the jurisdictions. For example, a hazard may be ranked low in one municipality but due to differences in vulnerability and impact, be ranked as high for the County or another municipality. Jurisdictional ranking results are presented in each jurisdictional annex in in Volume II.

14.1 HAZARD RANKING METHODOLOGY

Each jurisdiction participating in this HMP has differing levels of vulnerability to and potential impacts from each of the hazards assessed in this plan. Each jurisdiction needs to recognize the hazards that pose the greatest risk to its community and direct its attention and resources accordingly to manage risk and reduce losses. To achieve this, the hazards of concern were ranked using methodologies promoted by FEMA's hazard mitigation planning guidance and input from all participating jurisdictions. Relative ranking scores were generated by FEMA's Hazus risk assessment tool.

14.1.1 Categories Used in Ranking

The ranking methodology is based on four risk assessment categories, with the following scoring parameters defined for each category:

- **Level**—The level is a qualitative description of how each hazard rates in each category (such as low to high, or unlikely to frequent)
- **Benchmark value**—The benchmark values are clearly determinable quantities or descriptions that define which level should apply to each hazard
- **Numeric value**—The numeric value is the hazard's score in each category, based on the assigned level
- **Weighting**—The weighting is a multiplier applied to each hazard's numeric value in each category, to represent the relative importance of the category (the higher the weighting, the more important the category)

The following sections describe the categories and their associated scoring parameters.

Probability of Occurrence

The probability of occurrence is the likelihood of a hazard event occurring in any given year. A review of historical events assists with this determination. Table 14-1 summarizes the scoring parameters for probability of occurrence.

Table 14-1. Values and Weights for Probability of Occurrence

Level	Benchmark Value	Numeric Value	Weighting
Unlikely	A hazard event is not likely to occur or is unlikely to occur with less than a 1 percent annual chance probability.	0	30%
Rare	Between 1 and 10 percent annual probability of a hazard event occurring.	1	
Occasional	Between 10 and 100 percent annual probability of a hazard event occurring.	2	
Frequent	100 percent annual probability; a hazard event may occur multiple times per year.	3	

Consequence

Consequence represents the expected vulnerability and impact associated with the hazard. This is rated for three subcategories: vulnerability of people; vulnerability of property; and economic impacts on the community. A numeric value based on defined benchmarks is assigned for each subcategory, and a factor is applied to those values representing the relative importance of each subcategory. The total numeric value for consequence is the sum of the factored numeric values for each subcategory. Table 14-2 summarizes the scoring parameters for consequence.

Table 14-2. Values and Weights for Consequence

Level	Benchmark Value	Numeric Value	Factor	Weighting
Population (Numeric Value x 3)				**30%**
None	No population vulnerable to the hazard	0	3	
Low	14 percent or less of population is exposed to a hazard with potential for measurable life-safety impact due to its extent and location.	1		
Medium	15 to 29 percent of population is exposed to a hazard with potential for measurable life-safety impact due to its extent and location.	2		
High	30 percent 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)				
None	No property vulnerable to the hazard	0	2	
Low	Property vulnerability is 14 percent or less of the total number of structures for your community.	1		
Medium	Property vulnerability is 15 to 29 percent of the total number of structures for the community.	2		
High	Property vulnerability is 30 percent or more of the total number of structures for the community.	3		

Level	Benchmark Value	Numeric Value	Factor	Weighting
Economy (Numeric Value x 1)				
None	No estimated loss due to the hazard	0	1	
Low	Loss estimate is 9 percent or less of the total replacement cost for the community.	1		
Medium	Loss estimate is 10 to 19 percent of the total replacement cost for the community.	2		
High	Loss estimate is 20 percent or more of the total replacement cost for the community.	3		

Adaptive Capacity

Adaptive capacity describes a jurisdiction's administrative, technical, planning/regulatory and financial ability to protect from or withstand a hazard event. Mitigation measures that can increase a jurisdiction's capacity to withstand and rebound from events include codes or ordinances with higher standards to withstand hazards due to design or location; deployable resources; or plans and procedures for responding to an event.

A rating of "weak" for adaptive capacity means a jurisdiction does not have the capability to effectively respond, which increases vulnerability. A "strong" adaptive capacity means the jurisdiction does have the capability to effectively respond, which decreases vulnerability. These ratings were assigned using the results of the core capability assessment, with input from each jurisdiction. Table 14-3 summarizes the scoring parameters for adaptive capacity.

Table 14-3. Values and Weights for Adaptive Capacity

Level	Benchmark Value	Numeric Value	Weighting
Weak	Weak, outdated, or inconsistent plans, policies, codes, or 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

Current climate change projections were evaluated as part of the hazard ranking to account for potential increases in severity or frequency of the hazard. This is important because the hazard ranking helps guide and prioritize the mitigation strategy as a long-term future vision for mitigating the hazards of

concern. The potential impacts that climate change may have on each hazard of concern are discussed in the risk assessment chapters for each hazard. Table 14-4 summarizes the scoring parameters for climate change. The benchmark values are similar to confidence levels outlined in the National Climate Assessment 2023.

Table 14-4. Values and Weights for Climate Change

Level	Benchmark Value	Numeric Value	Weighting
Low	No local data are 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 (moderate evidence).	2	
High	Studies and modeling projections indicate exacerbated conditions and increased future risk due to climate change; very high confidence level (strong evidence, well documented, and acceptable methods).	3	

14.1.2 Total Ranking Score

The total ranking score based on the categories described above is calculated using the following equation:

Risk Ranking Score Equation

Ranking Score= [(Consequence on Population x 3) + (Consequence on Property x 2) + (Consequence on Economy x 1) x 0.3] + [Adaptive Capacity x 0.3] + [Climate Change x 0.1] + [Probability of Occurrence x 0.3]

Using this equation, the highest possible ranking score is 6.9. The higher the number, the greater the relative risk. Based on the score for each hazard, a hazard ranking is assigned to each hazard of concern as follows:

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

All planning partners applied the same methodology to develop the hazard rankings to ensure consistency in the overall ranking of risk. However, each jurisdiction had the ability to alter rankings based on local knowledge and experience in handling each hazard.

14.2 HAZARD RANKING RESULTS

Using the methodology described above, the hazard ranking for the identified hazards of concern was determined for each planning partner. The hazard ranking for Seneca County is detailed in the following tables that present the stepwise process for the ranking:

- Table 14-5 shows the unweighted numeric values assigned for the probability of occurrence for each hazard.
- Table 14-6 shows the numeric values assigned for each subcategory of consequence for each hazard. Results are shown for applying the subcategory factors, but not the category-wide weighting.
- Table 14-7 shows the unweighted numeric values assigned for adaptive capacity and climate change for each hazard.
- Table 14-8 shows the total weighted hazard ranking scores for each hazard of concern.

The countywide hazard ranking includes the entire planning area and may not reflect the highest risk for all planning partners. The overall ranking for each jurisdiction is included in Table 14-9 and in the annexes in Volume II

Table 14-5. Probability of Occurrence for Hazards of Concern for Seneca County

Hazard of Concern	Probability	Numeric Value
Dam Failure	Occasional	2
Drought	Occasional	2
Earthquake	Rare	1
Extreme Temperature	Occasional	2
Flood	Frequent	3
Landslide	Rare	1
Severe Weather	Frequent	3
Severe Winter Weather	Frequent	3

Table 14-6. Consequence Rating for Hazards of Concern for Seneca County

Hazard of Concern	Population			Property			Economy			Total Impact Rating (Population + Property + Economy)
	Consequence	Numeric Value	Multiplied by Factor (3)	Consequence	Numeric Value	Multiplied by Factor (2)	Consequence	Numeric Value	Multiplied by Factor (1)	
Dam Failure	Medium	2	6	Medium	2	4	Medium	2	2	12
Drought	Medium	2	6	Low	1	2	Low	1	1	9
Earthquake	Medium	2	6	Medium	2	4	Medium	2	2	12
Extreme Temperature	High	3	9	Low	1	2	Low	1	1	12
Flood	Medium	2	6	Medium	2	4	Low	1	1	11
Landslide	Low	1	3	Low	1	2	Low	1	1	6
Severe Weather	High	3	9	High	3	6	High	3	3	18
Severe Winter Weather	High	3	9	High	3	6	High	3	3	18

Table 14-7. Adaptive Capacity and Climate Change Ratings for Hazards of Concern for Seneca County

Hazard of Concern	Adaptive Capacity		Climate Change	
	Level	Numeric Value	Level	Numeric Value
Dam Failure	Medium	0	Medium	2
Drought	Medium	0	High	3
Earthquake	Medium	0	Low	1
Extreme Temperature	Medium	0	High	3
Flood	Medium	0	High	3
Landslide	Medium	0	Medium	2
Severe Weather	Medium	0	High	3
Severe Winter Weather	Medium	0	High	3

Table 14-8. Total Hazard Ranking Scores for the Hazards of Concern for Seneca County

Hazard of Concern	Probability x 30%	Total Consequence x 30%	Adaptive Capacity x 30%	Changing Future Conditions x 10%	Total Hazard Ranking Score
Dam Failure	0.6	3.6	0	0.2	4.4
Drought	0.6	2.7	0	0.3	3.6
Earthquake	0.3	3.6	0	0.1	4.0
Extreme Temperature	0.6	3.6	0	0.3	4.5
Flood	0.9	3.3	0	0.3	4.5
Landslide	0.3	1.8	0	0.2	2.3
Severe Weather	0.9	5.4	0	0.3	6.6
Severe Winter Weather	0.9	5.4	0	0.3	6.6

Note: Low (yellow) = Values less than 3.9; Medium (orange) = Values between 3.9 and 4.9; High (red) = Values greater than 4.9

Table 14-9. Overall Ranking of Hazards by Jurisdiction

Jurisdiction	Dam Failure	Drought	Earthquake	Extreme Temperature	Flood	Landslide	Severe Weather	Severe Winter Weather
Town of Covert	Medium	Low	Low	Medium	Low	Low	High	High
Town of Fayette	Medium	Low	Medium	Medium	Medium	Low	High	High
Village of Interlaken	Low	Low	Low	Medium	Medium	Low	High	High
Town of Junius	Low	Low	Medium	Medium	Low	Low	High	Medium
Town of Lodi	Medium	Low	Low	Medium	Medium	Low	High	Medium
Village of Lodi	Low	Low	Low	Medium	Medium	Low	High	Medium
Town of Ovid	Low	Low	Low	Medium	Medium	Low	High	High
Village of Ovid	Low	Low	Low	Medium	Low	Low	High	Medium
Town of Romulus	Medium	Low	Low	Medium	Medium	Low	High	High
Town of Seneca Falls	Medium	Low	Medium	Medium	Medium	Low	High	High
Town of Tyre	Low	Low	Medium	Medium	Medium	Low	High	Medium
Town of Varick	Medium	Low	Low	Medium	Medium	Low	High	Medium
Town of Waterloo	Low	Low	Medium	Medium	Medium	Low	High	High
Village of Waterloo	Medium	Low	Medium	Medium	Medium	Low	High	High
County of Seneca	Medium	Low	Medium	Medium	Medium	Low	High	High

PART 3: CAPABILITY ASSESSMENT

15. CAPABILITY ASSESSMENT

A capability assessment is an inventory of a community's missions, programs, and policies and an analysis of its capacity to carry them out (FEMA 2003). This assessment is an integral part of the planning process. It enables identification, review, and analysis of current local and state programs, policies, regulations, funding, and practices that could either facilitate or hinder mitigation. Through assessing its capabilities, a jurisdiction learns how or whether it can 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
- Actions that are infeasible because they are outside the scope of current capabilities
- Types of mitigation actions that may be technically, legally, administratively, politically, or fiscally challenging or infeasible
- Opportunities to enhance local capabilities to support long-term mitigation and risk reduction

This chapter presents a summary and description of the existing plans, programs, and regulatory mechanisms at all levels of government (federal, state, county, local) that reduce hazard risks and support hazard mitigation within the planning area. These capabilities are presented in three categories:

- Planning and regulatory capabilities
- Administrative and technical capabilities
- Fiscal capabilities

15.1 CAPABILITY ASSESSMENT PROCESS

Jurisdiction-specific capabilities are assessed in each jurisdictional annex in Volume II. All participating jurisdictions were tasked with developing or updating their capability assessment for this update, evaluating the effectiveness of their capabilities in supporting hazard mitigation, and identifying opportunities to enhance local capabilities. Each jurisdiction identified how it has integrated hazard mitigation into its existing planning, regulatory, and operational/administrative framework and how it intends to promote ongoing integration.

The contracted consultant met with Seneca County and each jurisdiction virtually to review the capability assessment from the 2018 HMP and update accordingly. The consultant also reviewed plans, codes, and ordinances to enhance the information provided by the jurisdictions.

15.2 PLANNING AND REGULATORY CAPABILITIES

Planning and regulatory capabilities are based on ordinances, policies, local laws, state statutes, plans, and programs that relate to managing growth and development. Planning and regulatory capabilities refer not only to current plans and regulations but also to the jurisdiction's ability to change and improve those

plans and regulations as needed. This section summarizes planning and regulatory capabilities for Seneca County. Further information is provided in the jurisdictional annexes in Volume II.

15.2.1 Federal

Biggert Waters National Flood Insurance Reform Act of 2012

Under the Biggert-Waters National Flood Insurance Reform Act of 2012, long-term changes to the National Flood Insurance Program have been adopted that have increased rates overall to reflect the flood risk more accurately to buildings in flood hazard areas. This has significantly influenced construction and reconstruction within flood hazard areas.

Property owners are encouraged to consider long-term insurance costs when undertaking reconstruction or elevation of damaged buildings. An investment to reconstruct the lowest floor of a building an additional foot or two higher today may translate into significant future flood insurance savings.

Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004

The Flood Insurance Reform Act of 2004 amended the 1994 National Flood Insurance Reform Act of 1968 to reduce losses to properties for which repetitive flood insurance claim payments have been made. This Act established a program for mitigation of severe repetitive loss properties and gave FEMA the authority to fund mitigation activities for individual repetitive loss claims properties. The Act provides additional coverage for compliance with land-use and control measures. It helps residents with affordable flood insurance and gives additional tools to states and communities to mitigate severe repetitive loss properties.

Code of Federal Regulations, Local Hazard Mitigation Plans (44 CFR PART 201.6)

FEMA has prepared policies and procedures for FEMA's review and approval of local HMPs. A local HMP is the representation of a jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. Local plans also serve as the basis for the state to provide technical assistance and to prioritize project funding.

Disaster Mitigation Act of 2000 (P.L. 106-390)

The Disaster Mitigation Act (DMA) is the current federal legislation addressing hazard mitigation planning. The DMA provides an opportunity for states, tribes, and local governments to take a new and revitalized approach to mitigation planning. The DMA 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 mitigation plan requirements (Section 322). This new section emphasizes the need for state, tribal, and local entities to closely coordinate mitigation planning and implementation efforts. It emphasizes planning for disasters before they occur. It specifically addresses planning at the local level, requiring plans to be in place before Hazard Mitigation Assistance grant funds are available to communities. HMPs designed to meet the requirements of DMA will remain eligible for future FEMA Hazard Mitigation Assistance funds. This plan is designed to meet the requirements of the DMA, improving eligibility for future hazard mitigation funds. Once approved, the applicant is eligible to

apply for federal funds for mitigation of hazards. The rules provide detailed guidance on what applicants should include in a plan.

Disaster Recovery Reform Act

This bill amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act as follows:

- It modifies the Pre-disaster Hazard Mitigation Grant Program to permit the use of technical and financial assistance to establish and carry out enforcement activities to implement codes, specifications, and standards that incorporate the latest hazard-resistant designs.
- It directs the President to establish a National Public Infrastructure Pre-disaster Mitigation Fund.
- It authorizes the President's contribution to the cost of hazard mitigation measures to be used to increase resilience in any area affected by a major disaster.
- It directs FEMA to issue a final rulemaking that defines the terms "resilient" and "resiliency."

Emergency Support Function #14, Long-Term Recovery Planning

Long-term community recovery is a mechanism for coordinating federal support to state, tribal, regional, and local governments, nongovernmental organizations, and the private sector to enable recovery from the long-term consequences of extraordinary disasters. Emergency Support Function (ESF) #14 accomplishes this by identifying and facilitating availability and use of sources of recovery funding and providing technical assistance (such as impact analyses) for community recovery and recovery planning (FEMA 2008).

ESF #14 may be activated for incidents that require a coordinated Federal response to address significant long-term impacts (e.g., impacts on housing, government operations, agriculture, businesses, employment, community infrastructure, the environment, human health, and social services) to foster sustainable recovery (FEMA 2008).

Actions coordinated under ESF #14 include pre-incident planning and coordination immediately prior to the incident, post-event planning, and operations (FEMA 2008).

Homeowner's Flood Insurance Affordability Act

This 2014 law repealed and modified certain provisions of the Biggert-Waters Flood Insurance Reform Act and made additional changes to some flood insurance aspects not covered by that Act. It lowered rate increases on some policies, prevented some future rate increases, implemented a surcharge on all policyholders, and repealed certain rate increases that had already gone into effect and provided for refunds to those policyholders. The act also authorized additional resources for the National Academy of Sciences to complete an affordability study.

National Flood Insurance Program

The National Flood Insurance Program (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 damage. 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.

The state and municipalities within it may adopt higher regulatory standards when implementing the provisions of the NFIP. Specifically identified are the following:

- **Building Elevation**: Based flood elevation is the elevation of surface water due to flooding that has a 1 percent chance of being equaled or exceeded in any given year. Where base flood elevation is available, NFIP communities must require, as a minimum, that all new construction and substantial improvements of residential structures in FEMA-mapped flood zones have the lowest floor (including basement) elevated to or above the base flood level.
- **Cumulative Substantial Improvements/Damage:** The NFIP allows improvements valued at up to 50 percent of a 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 (FEMA n.d.).

NFIP Community Rating System

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 2003).

As of November 2023, no municipalities in Seneca County participate in the CRS program. No municipalities in the County have expressed interest in joining in the near future.

Presidential Policy Directive 8

Presidential Policy Directive 8 (PPD-8) requires that a Threat Hazard Identification and Risk Assessment (THIRA) be developed for a state to remain eligible for Homeland Security Grant Program and Emergency Management Program Grant funding. The NYS DHSES is the lead agency in preparing the State's THIRA.

Risk Mapping, Assessment, and Planning

FEMA works with federal, state, tribal, and local partners across the nation to identify flood risk and promote informed planning and development practices to help reduce that risk through the Risk Mapping, Assessment, and Planning (Risk MAP) program. Risk MAP provides high-quality flood maps and information, tools to better assess the risk from flooding, and planning and outreach support to

communities to help them take action to reduce (or mitigate) flood risk. Each Risk MAP flood risk project is tailored to the needs of each community and may involve different products and services.

According to the Risk MAP Progress interactive map available online at the time of this plan update, there are numerous active Risk MAP projects taking place throughout New York (FEMA n.d.). FEMA coordinates and works directly with municipal floodplain managers during the Risk MAP project process. The State NFIP Coordinator is kept apprised of project activities and consults as needed.

Risk Rating 2.0: Equity in Action

FEMA's Risk Rating 2.0: Equity in Action considers specific characteristics of a building to provide individualized and equitable flood insurance rates. The rating methodology considers the frequency of flooding, multiple flood types, proximity to flood sources, and building characteristics such as first-floor heights and costs to rebuild. Homeowners that elect to drop NFIP insurance policies will no longer have access to FMA funding for future mitigation efforts.

Robert T. Stafford Disaster Relief and Emergency Assistance Act

The Robert T. Stafford Disaster Relief and Emergency Assistance Act provides for assistance from the federal government to state and local governments in carrying out their responsibilities to alleviate the results of disasters. Its provisions include the following:

- Revising and broadening the scope of existing disaster relief programs
- Encouraging the development of comprehensive disaster preparedness and assistance plans, programs, capabilities, and organizations by state and local governments
- Achieving greater coordination and responsiveness of disaster preparedness and relief programs
- Encouraging individuals, and state and local governments to protect themselves by obtaining insurance coverage to supplement or replace governmental assistance
- Encouraging hazard mitigation measures to reduce losses from disasters, including development of land-use and construction regulations
- Providing federal assistance programs for both public and private losses sustained in disasters.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) can issue the following types of general permits under Section 404(e) of the Clean Water Act to authorize activities that have only minimal individual and cumulative adverse environmental effects:

- A nationwide permit is a general permit that authorizes activities across the country unless a district or division commander revokes the nationwide permit in a state or other geographic region. There are 54 nationwide permits, and they authorize a wide variety of activities, including transportation projects, bank stabilization activities, residential development, commercial and industrial developments, aids to navigation, and maintenance activities (USACE 2017).
- Standard permits are individual permits that involve a full public interest review of an individual permit application and include the issuance of a public notice for any project that does not meet the terms and conditions of a nationwide permit or a letter of permission.

- Regional general permits are for small, specialized projects. In New York State, there are six regional general permit categories (USACE Buffalo District 2019).

15.2.2 State

New York State Floodplain Management

Development Requirements

New York State law requires new construction or substantial improvements in mapped flood zones to have the lowest floor 2 feet above the base flood elevation. Elevation may be accomplished by means of properly compacted fill, a solid slab foundation, or a crawl space foundation, which contains permanent openings to let flood waters in and out. Non-residential structures may be flood-proofed in lieu of elevation. Where a local floodplain administrator has information to estimate a base flood elevation, such as historical flood records or a hydraulic study, that elevation must be used. If the development consists of more than 5 acres or more than 50 lots, the permit applicant must develop a base flood elevation and build accordingly (NYSDEC 2020).

Communities may go beyond this requirement, providing for additional freeboard. In most New York communities, new structures must have the lowest floor 3 feet or more above the highest adjacent grade.

Responsible Agencies

Two departments 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. The NYSDEC is the lead coordinator of New York's NFIP efforts and the agency working with New York communities with severe repetitive loss properties. 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 NYSDEC 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.

New York Power Authority

The New York Power Authority (NYPA) 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, rural electric cooperatives, and government entities. NYPA provides the lowest-cost electricity in New York State and is the only statewide electricity supplier.

Stormwater Management Planning

The goal of stormwater management is to ensure that the quantity and quality of stormwater runoff from a site that is undergoing construction or development should not be substantially altered from its pre-

development conditions (NYSDEC 2023). According to the federal law commonly known as Stormwater Phase II, permits are required for stormwater discharges from Municipal Separate Storm Sewer Systems (MS4s) in urbanized areas and those additionally designated by the NYSDEC. Owners or operators of such MS4s must be authorized in accordance with the State Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems. The permit requires development of a Stormwater Management Program (NYSDEC 2023).

Community Risk and Resiliency Act

New York State's Community Risk and Resiliency Act (CRRA) ensures that certain state monies, facility-siting regulations, and permits include consideration of the effects of climate risk and extreme weather events. CRRA includes five major provisions (NYSDEC 2020):

- Official Sea-Level Rise Projections—CRRA requires the NYSDEC 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 NYSDEC consider 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 NYSDEC, 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 NYSDEC, to develop model local laws that include consideration of future risk due to sea-level rise, storm surge and/or flooding. These model local laws must be based on available data predicting the likelihood of extreme weather events, including hazard risk analysis.

NYSDEC's State Flood Risk Management Guidance (SFRMG) 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 inland flooding expected to result from increasingly frequent extreme precipitation events (NYSDEC 2020).

15.2.3 County

Agricultural and Farmland Enhancement Plan

The Seneca County Agricultural and Farmland Enhancement Plan (February 2022) establishes a vision for agriculture as the predominant economic driver and land use contributing to the County's rural character and quality of life. The plan was developed with goals and strategies to create a future in which farm-friendly regulations are adopted, farmland is protected utilizing local, state, and national programs, and agriculture and agritourism continue to be cornerstones of the community culture.

Community Health Improvement Plan 2022-2024

The Community Health Improvement Plan is a long-term, systematic effort to address public health problems based on the results of community health assessment activities and the community health improvement process. The priorities of the 2022-2024 Seneca County Community Health Improvement Plan are prevention of mental and substance abuse disorders and healthy eating and food security.

Comprehensive Emergency Management Plan

The Seneca County Department of Public Safety coordinates all emergency management activities in the County, including planning, response, and management. The department works with many other agencies and organizations so that the County can better protect life and property during disasters and emergencies. This Department maintains the Seneca County Comprehensive Emergency Management Plan, which is a comprehensive approach to emergency management. The Comprehensive Emergency Management Plan is an all-hazards plan that outlines how the County will manage emergencies and disaster situations (Seneca County n.d.).

The Seneca County annex to this HMP includes an action to work with municipalities to improve evacuation, sheltering, temporary housing, and permanent housing planning.

Comprehensive Plan

The Seneca County Comprehensive Plan was last updated in the late 1970s. The Seneca County Department of Planning and Community Development has been in the process of updating this Plan in a "notebook" format. As each individual plan was adopted, it was ready to become a "chapter" within the overall Seneca County Comprehensive Plan (Seneca County 2022).

Comprehensive Regional Community Health Assessment

The Prevention Agenda is New York State's blueprint to help improve the health and well-being of its residents and promote health equity through state and local action. Every three years, New York State requests that local health departments and their local hospital systems work together to create a joint community health assessment and improvement plan using the Prevention Agenda guidelines.

The Comprehensive Regional Community Health Assessment provides comprehensive information about the community's current health status, needs, and issues. This information helps develop community health improvement plans by justifying how and where resources should be allocated to best meet community needs. This assessment contains a chapter specific to each County in the Finger Lakes Region, which focuses on specific needs, including additional demographic indicators, main health challenges, and underlying behavioral, political, and built environmental factors contributing to the County's overall health status.

Finger Lakes Regional Land Bank Operational Plan

The Finger Lakes Regional Land Bank Operational Plan was developed in October 2023 to guide the Finger Lakes Regional Land Bank's activities. The Land Bank wanted to identify new housing development models and pursue grant funding to implement some or all of those models, as well as proactively engage developers in the redevelopment of already identified sites. The plan was identifies a

set of models and strategies to balance mission-oriented outcomes with financial sustainability and outlines findings, insights, and models that will best serve the Land Bank and Seneca County.

Housing Needs Assessment

The June 2023 Seneca County Housing Needs Assessment provides comprehensive data on socio-economic, demographic, and housing market conditions. It supports the County and community stakeholders in developing and implementing policies, programs, and strategies to address current and future housing needs and preferences.

Housing Plan

The Seneca County Housing Plan is a part of the County's Comprehensive Plan, completed in January 2011 through analysis of three sources:

- Available public records such as the U.S. Census 2000 and the Seneca County Office of Real Property Tax Services
- 2009 interviews and surveys with the human service and economic development agencies that serve Seneca County
- The 2010 Seneca County Comprehensive Plan Survey that generated 267 responses from the residents of the County.

The Housing Plan identifies the existing housing stock in Seneca County and its affordability, conditions, and those who may need assistance with housing assistance.

Pandemic Plan

The Pandemic Plan, completed in February 2021, is an annex to the Comprehensive Emergency Management Plan. It is a preparedness, response, and recovery plan specific to a pandemic event. Important elements of a pandemic response include community care as well as care of government employees. This plan includes response activities inside the government and within the County's communities in coordination with the Seneca County Health Department and its health-specific plans for response to a pandemic. The plan includes the identification of essential positions, facilitation of remote work for non-essential positions, provision of personal protective equipment, and protocols for supporting contact tracing.

Watershed Protection Law

The Seneca County Watershed Protection Law aims establishes a program of routine inspections (on a cycle) for properties that border the major water bodies in the County. The major goals of the law are:

- To protect the water bodies, watersheds, and drinking water sources in the County from residential wastewater containing harmful bacteria, viruses, and excess nutrients.
- To help prevent people from unknowingly purchasing properties with a septic system that is failing or that is likely to fail.
- To bring Seneca County in line with other municipalities in the region and across New York State that have enacted septic system inspection laws or regulations in recent years.

- To standardize a set of minimum requirements for septic inspections within the County so that buyers and sellers alike know what to expect.

15.2.4 Local

Local Waterfront Revitalization Program

New York State's 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). Such programs provide more detailed implementation of the state's CMP through use of such existing powers as zoning and site plan review (NYS Department of State 2023).

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. State law provides 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 (NYS Department of State 2023).

A LWRP 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 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. Funding to advance preparation, refinement, or implementation of LWRPs is available under Title 11 of the New York State Environmental Protection Fund Local Waterfront Revitalization Program, among other sources (NYS Department of State 2023).

Any village, town, or city located along the state's coast or designated inland waterway can prepare a new or amend an existing LWRP. Municipalities are encouraged to address local revitalization issues in a broader context, aligned with regional economic development strategies and regional resource protection and management programs (NYS Department of State 2023).

As of December 2023, no municipalities in Seneca County have an LWRP (NYS Department of State 2023).

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. Specific County and local planning and regulatory capabilities are identified in their jurisdictional annexes in Volume II. These include but are not limited to comprehensive plans, flood damage prevention ordinances, local codes and regulations, stormwater regulations, and municipal level plans. A list of plans reviewed is provided in each annex.

Section 239 of New York State General Municipal Law requires the referral of certain local planning actions to the Seneca County Planning Board for the examination of possible intermunicipal impacts. The Seneca County Planning Board operates under New York State General Municipal Law §239 to advise local boards on the potential intermunicipal or countywide impact of local land use decisions. The Seneca County Planning Board must review and make recommendations on the application if any portion of the property in question is (Seneca County 2024):

- Within 500′ of a state or county road
- Within 500′ of a state or county facility
- Within 500′ of a municipal boundary
- Within 500′ of a New York State agricultural district

15.3 ADMINISTRATIVE AND TECHNICAL CAPABILITIES

This section summarizes administrative and technical capabilities in Seneca County. Further information is provided in the jurisdictional annexes in Volume II.

15.3.1 Federal

Federal Emergency Management Agency

FEMA is responsible for providing assistance before, during, and after disasters. FEMA is the federal reviewer of HMPs and sets federal standards for local and state HMPs.

FEMA evaluates NFIP minimum compliance through compliance audits known as Community Assistance Visits (CAVs) or Community Assistance Contacts (CACs). CAVs and CACs are performed to ascertain community compliance with the NFIP, at entry into the CRS, and to maintain participation in the CRS. FEMA may conduct these with Region 2 staff, with NYSDEC staff under the Compliance Assistance Program–State Support Services Element (CAP-SSSE) grant, or with private contractors. While there is some flexibility in how a CAV or a CAC is conducted, CAVs are generally more rigorous than CACs. FEMA evaluates the following key areas in a compliance audit:

- The community's flood damage prevention ordinance
- Mapping products and other ordinances used to regulate floodplain development
- Floodplain development permitting procedures
- Floodplain permit applications and other forms/records, including substantial damage and improvement determinations
- Floodplain development review and performance standards
- Floodplain development permits issued to applicants

Federal Energy Regulatory Commission Dam Safety Program

The Federal Energy Regulatory Commission (FERC) has the largest dam safety program in the United States, cooperating with many federal and state agencies to ensure and promote dam safety and, more

recently, homeland security on dams associated with hydropower. Every 5 years, an independent consulting engineer, approved by the FERC, must inspect and evaluate projects with dams higher than 10 meters (32.8 feet) or with a total storage capacity of more than 2,000 acre-feet.

HURREVAC

HURREVAC is the decision support tool of the National Hurricane Program, administered by FEMA, USACE, and the National Hurricane Center (HURREVAC n.d.). HURREVAC permits government agencies to work as a unified team to coordinate notification, communication, activations, public warning, and evacuation and sheltering efforts. By operating together and providing the same advisories and actions, the government agencies serve the public better.

National Weather Service

The National Weather Service (NWS) monitors weather and delivers weather forecasting for New York. The state is serviced by five weather forecast offices: Albany, Binghamton, Buffalo, Burlington, and New York. The Buffalo Weather Forecast Office covers the counties of Allegany, Cattaraugus, Cayuga, Chautauqua, Erie, Genesee, Jefferson, Lewis, Livingston, Monroe, Niagara, Orleans, Oswego, Seneca, St. Lawrence, Wayne, Wyoming, and Yates.

NYS DHSES uses conference calling with the NWS and county OEMs to share specific information and needs when severe weather is forecast. The NWS also offers education and training programs on weather-related hazards (NWS 2023).

Northeast Regional Climate Center

The Northeast Regional Climate Center (NRCC) is one of six regional climate centers in the United States managed by the National Centers for Environmental Information (NCEI). NRCC develops products for use by municipal officials, researchers, planners, highway departments, and other decision-makers who need to take future storm events into account. NRCC partnered with the New York State Energy Research and Development Authority (NYSERDA) to create extreme precipitation projections for New York State for use in climate change adaptation planning (NRCC 2014).

NRCC maintains the Extreme Precipitation in New York & New England website, an interactive tool for extreme precipitation analysis. The site includes estimates of extreme rainfall for various durations (5 minutes to 10 days) and recurrence intervals (1 year to 500 years). Confidence intervals for these values are included, as are the partial duration rainfall series used in their computation. Regional extreme rainfall maps and graphic products are available. Precipitation distribution curves can be generated for each grid (NRCC n.d.). This tool can be used by municipalities to assist them in the design and feasibility assessment of future projects and allow them to see the future intensity and frequency of rain events (NRCC 2022).

StormReady Program

The NWS StormReady program provides emergency managers with clear-cut guidelines on how to improve their hazardous weather operations. To be recognized by the program, a community must do the following:

- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises

Seneca County is a StormReady community, and the Waterloo Premium Outlets is noted as a supporter of the StormReady program (NWS n.d.).

U.S. Army Corps of Engineers

USACE builds and maintains infrastructure projects that include dredging, storm damage reduction, and ecosystem restoration in and near waterways (USACE n.d.). Seneca County is represented by the USACE Buffalo District. USACE has numerous initiatives to support hazard mitigation measures, including the Silver Jackets, planning assistance, and inspections and repair of flood control structures. USACE also maintains the National Inventory of Dams and the National Levee Database.

Silver Jackets

Silver Jackets, developed by USACE, is the state-level implementation program for the National Flood Risk Management Program. The program's goals are to leverage information and resources from federal, state, and local agencies to improve flood risk management; improve public risk communication through a united effort; and create a mechanism to collaboratively solve issues and implement initiatives beneficial to local communities. The USACE Buffalo District organizes this program in Seneca County.

Climate Preparedness and Resilience Community of Practice

The Climate Preparedness and Resilience Community of Practice develops and implements approaches and policies to reduce potential vulnerabilities to the nation's water infrastructure resulting from climate change and variability.

Planning Assistance to States Program

The 1974 Water Resources Development Act provides authority for USACE to assist states, local governments, Native American tribes, and other non-federal entities in the preparation of plans for the development and conservation of water and related land resources. Types of water resource planning investigations that can be done include water quality studies, wetland evaluation studies, floodplain management studies, coastal zone management/protection studies, and harbor/port studies. The individual non-federal sponsors determine the needed planning assistance.

Floodplain Management Services Program

The 1960 Flood Control Act provides the authority for USACE to provide assistance and guidance on floodplain management planning. The program develops or interprets site-specific data on obstructions to flood flows, flood formation, and the timing, extent, duration, and frequency of flooding. Program

services are available without charge to state, regional, and local governments, Native American tribes, and other non-federal public agencies.

Inspection of Completed Works Program

Civil works structures whose failure could jeopardize the operational integrity of a facility, endanger the lives and safety of the public, or cause substantial property damage, are periodically inspected, and evaluated to ensure their structural stability, safety, and operational adequacy. For structures constructed by USACE and turned over to others for operation and maintenance, the operating entity is responsible for periodic inspection and evaluation. USACE may conduct the inspection on behalf of the project sponsor provided appropriate reimbursement is made. However, USACE may participate in the inspection with the operating entity at the government's expense.

Rehabilitation and Inspection Program

The USACE Rehabilitation and Inspection Program provides for inspection of flood control projects, the rehabilitation of damaged flood control projects, and the rehabilitation of federally authorized and constructed hurricane or shore protection projects.

Dam Safety Program

USACE is responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. USACE has inventoried dams and has surveyed each state and federal agency's capabilities, practices, and regulations regarding design, construction, operation, and maintenance of the dams. USACE has also developed guidelines for inspection and evaluation of dam safety.

U.S. Geological Survey

The U.S. Geological Survey (USGS) maintains a network of gauges that continuously measure lake, reservoir table, stream, and tidal levels. The data is transmitted to the USGS and made available over the internet. As project needs and funding levels change, gauges may be added or deactivated, and deactivated gauges may be reactivated (USGS 2023). USGS provides data to the state for drought determinations. USGS also recovers high water marks post-coastal flooding (USGS 2018).

15.3.2 State

New York State Division of Homeland Security and Emergency Services

NYS DHSES coordinates the activities of all state agencies to protect New York's communities, the State's economic well-being, and the environment from natural and human-caused disasters and emergencies. NYS DHSES assists local governments, voluntary organizations, and private industry through 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 HMP. NYS DHSES prepared the

current state HMP, approved by FEMA in 2023, which was used as guidance in completing the Seneca County HMP Update. NYS DHSES is the lead agency that reviews, submits, and administers federal funding to programs that mitigate hazards. These programs help find projects that are cost beneficial to help reduce damages from hazards. Through ESF 14, Long-Term Recovery Planning, NYS DHSES works to have a plan for long-term planning and recovery prior to a disaster or emergency. This coordination allows for another statewide plan to incorporate mitigation principles and planning.

New York State Department of Environmental Conservation

The NYSDEC's Mission is "To conserve, improve and protect New York's natural resources and environment and to prevent, abate and control water, land and air pollution, in order to enhance the health, safety, and welfare of the people of the state and their overall economic and social well-being." Its goal is to achieve this mission through the simultaneous pursuit of environmental quality, public health, economic prosperity, and social well-being, including environmental justice and the empowerment of individuals to participate in environmental decisions that affect their lives. NYSDEC staff have two main areas of responsibility: natural resource management and environmental quality protection. Staff oversee state fish and wildlife resources as well as state forests (NYSDEC 2023).

Division of Water—Bureau of Dam Safety, Coastal & Flood Protection

NYSDEC's Bureau of Flood Protection and Dam Safety focuses on floodplain management through structural and nonstructural means and provides support for information technology needs in NYSDEC's Division of Water.The bureau consists of the following sections (NYSDEC 2023):

- Coastal Erosion and Floodplain Management Section—Provides a wide range of technical assistance. It works with communities throughout the state in finding ways to reduce or protect against physical and property damage caused by flooding. The section consists of two branches:
  - The Coastal Erosion branch works to reduce coastal erosion and storm damage to protect lives, natural resources, and properties through structural and non-structural means.
  - The Floodplain Management branch 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. 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.
- Dam Safety Section—Responsible for reviewing repairs and modifications to dams and ensuring that dam owners operate and maintain dams in a safe condition through inspections, technical reviews, enforcement, and emergency planning.
- Flood Control Projects Section—Responsible for reducing flood risk to life and property through construction, operation and maintenance of flood control facilities.

Region 8

NYSDEC Region 8 covers the western New York counties of Avon, Bath, Chemung, Elmira, Genesee, Livingston, Monroe, Ontario, Orleans, Schuyler, Seneca, Steuben, Wayne, and Yates. The Region's main office is in Avon, with sub-offices in Bath and Elmira.

Department of State's Division of Building Standards and Codes

The New York State Department of State's Division of Building Standards and Codes provides services related to the development, administration, and enforcement of the Uniform Fire Prevention and Building Code (Uniform Code) and Energy Conservation Construction Code (Energy Code). The statutory responsibility for developing and maintaining the Uniform Code and the Energy Code is vested in the State Fire Prevention and Building Code Council (Code Council). If the Code Council decides to amend either code, it commences a process for rulemaking set forth in the State Administrative Procedure Act. The Code Development Unit administers statutory functions and evaluates proposed changes to the codes.

Executive Law §379 authorizes the legislative body of a local government to enact or adopt local laws and ordinances that impose standards for construction that are more restrictive than the corresponding standards imposed by the Uniform Code. Energy Law §11-109 allows counties, cities, towns, villages, school districts, or district corporations to promulgate local energy conservation construction codes that are more stringent than the state Energy Code. The Code Council is empowered to approve these more restrictive standards and codes when they comply with Executive Law §379 and Energy Law §11-109. The Code Development Unit assists with reviewing the technical aspects of these local laws and ordinances and reporting its findings to the Code Council.

The Division of Building Standards and Codes' Code Enforcement Disaster Assistance Response Program provides communities with post-disaster assistance. The program's initial disaster response focuses on rapid evaluation safety assessments of damaged structures in affected communities for use as part of the process to request federal disaster assistance through FEMA. The program's long-term disaster response provides a unified method for communities to access the range of resources available within and beyond the Department of State.

New York State Department of Transportation

It is the mission of the New York State Department of Transportation (NYSDOT) to provide a safe, reliable, equitable, and resilient transportation system that connects communities, enhances quality of life, and supports the economic well-being of New York State. Seneca County is served by the Region 3 (Central New York) NYSDOT office, which is based in Syracuse.

NYSDOT offers grant, education, and training opportunities; manages environmental initiatives and programs; issues permits for traffic signals, driveways, advertisements, and other permitting needs; provides statistical roadway information; and provides information on community resources such as scenic highways and fishing access sites.

New York State Office of Planning, Development, and Community Infrastructure

The New York State Office of Planning, Development, and Community Infrastructure works with communities to increase their resilience to climate change. The Office employs key resilience principles that help communities understand their vulnerabilities, advance resilience measures that reduce risk, including using natural infrastructure and natural processes, and avoid investments that are not highly adapted to a changing climate.

Climate Smart Communities

Climate Smart Communities (CSC) is a New York State program that helps local governments take action to reduce greenhouse gas emissions and adapt to a changing climate. The program offers grants, rebates for electric vehicles, and free technical assistance. The CSC program enables high-performing registered communities to achieve recognition for their leadership. Designed around 10 pledge elements, the certification program recognizes communities achieving any of 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 5 years.

Participation in the program is voluntary. In Seneca County, the Town of Lodi is certified CSC with a Bronze ranking. The Town of Seneca Falls is registered with the CSC but has not been ranked.

Resilient NY

New York State's Resilient NY program develops state-of-the-art stream studies to reduce flooding and build resilience in high-risk watersheds throughout New York State. These studies conclude with published resilience reports that give communities specific, fundable recommendations to mitigate the worst effects of future flooding while supporting healthy riparian habitats. It is the intention of Resilient NY to guide flood mitigation and to make technical assistance more accessible in the face of climate change (NYSDEC n.d.).

15.3.3 County

Finger Lakes Regional Land Bank Corporation

The Finger Lakes Regional Land Bank Corporation acquires, improves, and redistributes vacant, blighted, and tax abandoned properties to eliminate the harms and liabilities caused by such properties and return them to productive use, while being consistent with local municipalities' redevelopment and comprehensive plans. The land bank was created by Seneca County and operates from its Department of Planning and Community Development. (FLR Land Bank 2024).

The primary focus of the land bank's operations is the acquisition of distressed real property that is tax delinquent suffering from abandonment in Seneca County. The land bank leverages grant funding to stabilize or demolish these distressed properties and moves to facilitate projects with partners that generally result in new or substantially rehabbed housing opportunities. Partners include Seneca Housing Inc., Habitat for Humanity of Seneca County, Finger Lakes Area Counseling and Recovery Agency, Seneca County Code Enforcement, and all Seneca County towns and villages. The land bank collaboratively incorporates strategic planning, housing, brownfield, and economic development initiatives into its work.

Seneca County Board of Supervisors

The Board of Supervisors serves as the governing body of the County. The Board has numerous standing committees as described below (Seneca County 2023).

Agriculture and Environmental Affairs

This committee is responsible for agriculture districts, the Cornell Cooperative Extension Service, soil and water conservation districts, lake weed control, clean energy, the county solid waste management plan, and keeping the Board of Supervisors abreast of those activities and their potential environmental impacts.

Ways and Means

This committee is responsible for the County Finance Department and budget, County Treasurer Department, real property tax services, fixed asset procurement, purchasing, and the Information Technology and Communications Department.

Economic Development and Tourism

This committee is responsible for the Planning and Community Development Department, Planning Board, Industrial Development Agency, Tourism Promotion Agency, Finger Lakes Regional Airport, all federal and state grants, and housing development. This committee reviews and interviews Industrial Development Agency (IDA) board members for replacement or to fill vacancy. It also works directly with the broadband committee.

Human Resources and Government Operations

This committee is responsible for the Human Resources Department, insurance, risk management, worker compensation and third-party administrator, labor management, civil service employee contracts, salaries, benefits, ethics, and affirmative action program. It oversees the County Clerk, the Motor Vehicles Office, the Board of Elections, records management, rules and order of business, legislative proposals and reviews, the Clerk to the Board of Supervisors, the County Manager, purchasing, the County Law Department, the County Historian, and the Code Enforcement Department.

Health and Human Services

This committee is responsible for the Public Health Department, Department of Human Services, social services programs, Workforce Development and Youth Bureau, Office for the Aging, Division of Mental Health Services, addictions treatment and prevention, Domestic Violence Program, Community Services Board, weatherization programs, Veterans Service Agency, and community colleges.

Intergovernmental Affairs

This committee is responsible for engaging with local, county, state, federal and tribal governments, including interaction with other counties through the New York State Inter-County Association.

Public Works

This committee is responsible for the Division of Public Works, County Highway Department, recycling and municipal solid wastes, Department of Weights and Measures, Facilities Department, county capital improvement plan, and Parks and Recreation. This committee is also responsible for developing and

implementing a facilities master plan and for the county's vehicle fleet and asset management, working directly with the special fleet committee.

Public Safety and Criminal Justice

This committee is responsible for Sheriff's Office Enforcement and Corrections, Probation Department, District Attorney, Public Defender, Courts, Justices and Constables, Criminal Justice Advisory Board, Coroners, Emergency Management Office, E-911 Communications Center, Fire Mutual Aid Coordination, Traffic Safety Board and STOP-DWI Program.

Water and Sewer Treatment Management and Operations

This committee is responsible for all matters related to Seneca County Sewer Districts 1, 2, 3, and 4 and Seneca County Water District 1. It moves forward the study of forming a water and sewer authority.

Seneca County Department of Environmental Health

The Department of Environmental Health works to ensure a safe and healthy environment for people to live, work, and play in Seneca County. The Department is responsible for enforcing most areas of the New York State Sanitary Code, such as protecting public drinking water supplies, inspecting restaurants, inspecting children's camps, and ensuring the safety of public pools and beaches (Seneca County 2024).

The Department also enforces regulations regarding smoking and the sale of tobacco to minors, operates a rabies control program involving a follow-up on all animal bites, and works to reduce lead hazards in the homes of lead-poisoned children. In addition, the Department provides technical advice on a wide array of topics, including mold, radon, roadside springs, private wells, and mosquito-borne illnesses (Seneca County 2024).

Seneca County Department of Public Safety

The Department of Public Safety provides education, prevention, technical support, inter-agency coordination, and direct services to enhance the quality of life in Seneca County. The Department includes the E-911 Center, Emergency Management, Sheriff's Office, County Coroner, District Attorney, Public Defender, Probation, and the Criminal Justice Advisory Board (Seneca County 2023).

Emergency Management Office

The Emergency Management Office (EMO) led the update of this HMP and was an active participant in the Steering Committee. The EMO provides vision, direction, and subject matter expertise to heighten the County's state of emergency readiness. It facilitates emergency partnerships, enhances emergency response coordination, provides emergency planning, conducts emergency training and exercises, facilitates public education and community outreach programs, manages homeland security grants, and acts as the coordination point for federal disaster relief and recovery programs (Seneca County 2023).

Hyper-Reach

Seneca County's Hyper-Reach allows the E-911 Center to quickly send a recorded message to telephones in specific areas and alert residents to any emergency situations that require immediate

action. The system is designed to deliver more than 5,000 calls per hour and has been successfully used on several occasions for incidents such as hazardous chemical releases, missing persons, and barricaded persons. The Hyper-Reach message delivers critical information to residents and provides guidance on what precautions need to be taken by residents during and after the incident. The EMO and the E-911 Center encourage Seneca County residents to register to receive emergency alerts from the E-911 Center (Seneca County 2024).

Seneca County Department of Health

The Seneca County Department of Health provides preventive health programs and services to residents in collaboration with community partners. The Department's goals are to encourage healthy lifestyles, prevent disease, and promote safe, healthy environments in Seneca County (Seneca County Department of Health 2023).

Seneca County Highway Department

The Seneca County Highway Department is responsible for the construction and maintenance of county roads and bridges (Seneca County n.d.).

Seneca County Planning Board

The Seneca County Planning Board reviews and makes recommendations on applications if any portion of the property in question is (Seneca County 2024):

- Within 500 feet of a state or County road
- Within 500 feet of a state or County facility
- Within 500 feet of a municipal boundary
- Within 500 feet of a New York State agricultural district.

Seneca County Planning and Community Development Department

The Seneca County Planning and Community Development Department coordinates a broad range of programs, including those for land use planning and resource integration. The Department promotes the sound and orderly economic and physical growth of Seneca County and its municipalities. It is responsible for comprehensive countywide planning, economic development coordination, tourism promotion, community development program implementation, review of local land use referrals, and environmental reviews. Additionally, the Department is responsible for administering the overall development of the Finger Lakes Regional Airport, providing planning and grant writing assistance to local governments, and managing the Agricultural District Program (Seneca County 2023).

The Department provides staff assistance to the Seneca County Industrial Development Agency (IDA) and is involved in several IDA economic development initiatives. Examples include administration of the NYS Empire Zone Program in Seneca County, redevelopment of the former Seneca Army Depot, and assisting business and industry with the site location and development process (Seneca County 2023).

Seneca County Recycling Department

The Recycling Department administers the recycling contract with Cardinal Disposal for the operation of the state-mandated recycling program in Seneca County. The responsibilities of the Recycling Department are to provide education to the taxpayers of Seneca County to maximize participation in the program and to encourage reuse of recyclable materials. The Department maintains records of materials collected and is charged with receiving complaints and rectifying problems with the contractor in a timely fashion to ensure regular and routine recycling pickup. The Department purchases blue bins and recycling guides and distributes them to recycling program participants (Seneca County 2024).

Seneca County Soil and Water Conservation District

The Seneca County Soil and Water Conservation District is a political subdivision of the State of New York whose primary purpose is to improve and protect existing and potential land, water, and related resources; to discourage land use practices that are detrimental to the environment; and to develop and carry out preventive and creative programs aimed at conserving and enhancing the natural resource base of the County and the State (Seneca County SWCD n.d.).

15.4 FISCAL CAPABILITIES

This section summarizes fiscal capabilities in Seneca County. Further information is provided in the jurisdictional annexes in Volume II. The 2023 New York State HMP features a section on mitigation-related funding administered by state agencies that eligible jurisdictions can use to fund mitigation actions (NYS DHSES 2023): https://mitigateny.availabs.org/strategies/funding

15.4.1 Federal Hazard Mitigation Funding Opportunities

FEMA

Hazard Mitigation Assistance Programs

FEMA Hazard Mitigation Assistance (HMA) programs provide funding for eligible activities that reduce or eliminate long-term risk to people and property from future disasters. HMA includes the following programs (FEMA 2023):

- Hazard Mitigation Grant Program (HMGP)
- HMGP Post-Fire Grant
- Flood Mitigation Assistance (FMA) Program
- Pre-Disaster Mitigation (PDM) Program
- Building Resilient Infrastructure & Communities (BRIC) Program

HMGP funding generally accounts for 15 percent 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 percent set aside from federal post-disaster grant funding. Most of the grants require a local share in the range of 10 to 25 percent of the total grant amount. Table 15-1 provides an overview of program funding cost share requirements.

Table 15-1. FEMA HMA Grant Cost Share Requirements

	Cost Share (Percent of Federal/Non-Federal Share)[a]
HMGP	75/25
HMGP Post-Fire	75/25
FMA	
Community flood mitigation, project scoping, individual mitigation of insured properties, and planning grants	75/25
Repetitive loss property[b]	90/10
Severe repetitive loss property[b]	100/0
PDM	
Standard	75/25
Small and impoverished community	Up to 90/10
BRIC	
Standard	75/25
Small and impoverished community	Up to 90/10

Source: FEMA 2023; FEMA 2023

a. Sub-applicants should consult their state hazard mitigation officer for percentage of HMGP subrecipient management cost funding their state has determined to be passed through subrecipients.

b. To be eligible for an increased federal cost share, a FEMA-approved state or tribal mitigation plan that addresses repetitive loss properties must be in effect at the time of award, and the property being submitted must be a repetitive loss property.

States, local, tribal, and territorial governments may apply for this funding to help them build climate resilience. HMA grant funding is available to communities with a current HMP (this plan). Individual homeowners and business owners may not apply directly to FEMA. Eligible local governments may apply on their behalf (FEMA 2023).

Individual HMP grant programs are described below.

Hazard Mitigation Grant Program

HMGP assists in implementing long-term hazard mitigation planning and projects following a federal major disaster declaration. Grants can be used to fund cost-effective projects that will protect public or private property in an area covered by a federal disaster declaration or that will reduce the likely damage from future disasters. 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.

Applications are submitted to the state, placed in rank order for available funding, and submitted to FEMA for approval. Eligible projects not selected for funding are placed in an inactive status and may be considered as additional HMGP funding becomes available.

HMGP Post-Fire

The HMGP offers post-fire assistance to help communities implement hazard mitigation measures after wildfire disasters. States, federally recognized tribes, and territories affected by fires resulting in a Fire Management Assistance Grant (FMAG) declaration are eligible to apply. The application period opens with the state or territory's first FMAG declaration of the fiscal year and closes six months after the end of that fiscal year. Application extensions may be requested.

Flood Mitigation Assistance Program

FMA provides funds on an annual basis for planning and projects to reduce or eliminate risk of flood damage to buildings that are insured under the NFIP. Of the 25 percent of total eligible costs that must be provided by a non-federal source, 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, which serves as the grantee and administrator for the program.

Pre-Disaster Mitigation Program

PDM provides funds on an annual basis to plan for and implement sustainable, cost-effective measures to reduce the risk to individuals and property from future natural hazards, while also reducing reliance on federal funding for future disasters. This funding is offered in addition to funds provided through other FEMA grant programs for projects that will support growing mitigation needs nationwide.

Building Resilient Infrastructure and Communities Program

BRIC supports jurisdictions in hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The BRIC program’s 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 2023).

Extraordinary Circumstances

For HMGP, BRIC, and FMA, the the FEMA Region may apply extraordinary circumstances to allow grant awards to jurisdictions without currently approved mitigation plans when justification is provided and with concurrence from FEMA Headquarters. 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.

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 mitigation plan and that the jurisdiction meets at least one of the following criteria:

- The jurisdiction meets the small, impoverished community criteria.

- The jurisdiction 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 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.

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 HMGP project funding is awarded under extraordinary circumstances, the recipient must acknowledge in writing to FEMA that a plan will be completed within 12 months of the subaward and provide a work plan for doing so. This requirement will be incorporated into the award.

Rehabilitation of High Hazard Potential Dams Program

The Rehabilitation of High Hazard Potential Dams (HHPD) grant program provides technical, planning, design, and construction assistance for rehabilitation activities that reduce dam risk and increase community preparedness. The HHPD Grant Program aids with technical, planning, design, and construction activities toward repair, removal, or rehabilitation of eligible high hazard potential dams.

Assistance to Firefighters Grant Program

Assistance to Firefighters Grants provide direct financial assistance to eligible fire departments, 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.

Emergency Management Performance Grants Program

The Emergency Management Performance Grant provides state, local, tribal, and territorial emergency management agencies with the resources required for implementation of the National Preparedness System. The program's provides funds to build and sustain core capabilities across the prevention, protection, mitigation, response, and recovery mission areas.

Homeland Security Grant Program

The Homeland Security Grant Program supports the building, sustainment, and delivery of 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.

The Homeland Security Grant Program is composed of three interconnected grant programs: the State Homeland Security Program, Urban Areas Security Initiative, and Operation Stonegarden. These programs fund a range of preparedness activities, including planning, organization, equipment purchase, training, exercises, and management and administration.

Disaster and Recovery Assistance Programs

Following a disaster, various types of assistance may 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 sections below describe two types of assistance that may be provided in the event of a federally declared major disaster.

Individual Assistance

Individual Assistance provides help for homeowners, renters, businesses, and some nonprofit entities after disasters occur. This program is largely funded by the U.S. Small Business Administration.

Homeowners who suffered uninsured or underinsured losses may be eligible for a Home Disaster Loan to repair or replace damaged real estate or personal property (such as clothing, furniture, cars, and appliances). Renters are eligible for loans to cover personal property losses. Individuals may 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.

Physical disaster loans of up to $2 million are available to qualified businesses or most private nonprofit organizations. For businesses, loans may be made to repair or replace disaster damage to property owned by the business, including real estate, machinery and equipment, inventory, and supplies. Businesses of any size are eligible. Nonprofit organizations such as charities, churches, private universities, etc. are also eligible. An Economic Injury Disaster Loan provides necessary working capital until normal operations resume after a physical disaster; these loans are restricted to small businesses.

Public Assistance

Public Assistance provides cost reimbursement to local governments (state, county, local, municipal authorities, and school districts) and certain nonprofit 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; local and state matching contributions are required.

National Park Service Land and Water Conservation Fund

The Land and Water Conservation Fund was established to safeguard natural areas, water resources, and cultural heritage, and to provide recreation opportunities. The fund invests earnings from offshore oil and gas leasing to help strengthen communities, preserve history, and protect national lands and waters. The program provides grants to state and local governments as well as acquiring lands, waters, and interests to achieve objectives of federal land management agencies. The Land and Water Conservation Fund was permanently funded in August 2020.

U.S. Department of Agriculture

Community Facilities Direct Loan and Grant Program

This program provides affordable funding to develop essential community facilities, defined as facilities that provide an essential service to the local community for the orderly development of the community in a primarily rural area (excluding private, commercial, or business undertakings). Funds can be used to purchase, construct, or improve essential community facilities, purchase equipment, and pay related project expenses. Rural areas including cities, villages, townships, towns, and federally recognized tribal lands, with no more than 20,000 residents according to the latest U.S. Census, are eligible.

Emergency Loan Program

The Emergency Loan Program is triggered when a natural disaster is designated by the Secretary of Agriculture, or a natural disaster or emergency is declared by the President under the Stafford Act. These loans help producers who suffer farm-related losses directly caused by the disaster in a county declared or designated as a primary disaster or quarantine area. Farmers in counties contiguous to the declared, designated, or quarantined area also may qualify for emergency loans.

For production losses, a 30 percent reduction in a primary crop in a designated or contiguous county is required. Losses to quality, such as receiving a 30 percent reduced price for flood-damaged crops, may be eligible for assistance, too.

Emergency Watershed Protection Program

The Emergency Watershed Protection (EWP) Program offers technical and financial assistance to help local communities relieve imminent threats to life and property caused by floods, fires, windstorms, and other natural disasters that impair a watershed. EWP does not require a disaster declaration by federal or state government officials for program assistance to begin. The Natural Resources Conservation Service (NRCS) state conservationist can declare a local watershed emergency and initiate EWP program assistance in cooperation with an eligible sponsor. The sponsor must sign a cooperative agreement with NRCS. The EWP program offers financial and technical assistance for various activities, including the following:

- Remove debris from stream channels, road culverts, and bridges
- Reshape and protect eroded streambanks
- Correct damaged or destroyed drainage facilities
- Establish vegetative cover on critically eroding lands
- Repair levees and structures
- Repair certain conservation practices
- Buyouts

EWP–Recovery

The EWP–Recovery program is 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 is a legal subdivision of the state, such as a city, county, township, or conservation district, or a Native American tribal government. 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.

The EWP–Recovery program is designed for the 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, and upland sites stripped of protective vegetation by fire or drought.

EWP–Floodplain Easement

Through the EWP–Floodplain Easement program, easements are restored to the natural environment to the extent practicable. Work can include both structural and nonstructural practices to restore flood storage and flow, control erosion, and improve the practical management of the easement. Eligibility includes either public or private lands that 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 that would contribute to the restoration of flood storage and flow, provide for control of erosion, or improve the practical management of the floodplain easement
- Lands that would be inundated or adversely impacted as a result of a dam breach

Structures, including buildings, within the floodplain easement must be demolished and removed or relocated outside the 100-year floodplain or dam breach inundation area.

Regional Conservation Partnership Program

The Regional Conservation Partnership Program promotes coordination of NRCS conservation activities with partners that offer value-added contributions to expand the collective ability to address on-farm, watershed, and regional natural resource concerns. Through this program, NRCS seeks to co-invest with partners to implement projects that demonstrate innovative solutions to conservation challenges and provide measurable improvements and outcomes tied to the resource concerns they seek to address.

U.S. Department of Health and Human Services Social Services Block Grant Program

The Social Services Block Grant is a flexible funding source that allows states and territories to tailor social service programming to their population's needs. Through these grants, states provide essential social services that help to reduce dependency and promote self-sufficiency; protect children and adults from neglect, abuse, and exploitation; and help individuals who are unable to take care of themselves to stay in their homes or find the best institutional arrangements.

U.S. Department of Housing and Urban Development

Community Development Block Grants

Community Development Block Grants (CDBG) are federal funds 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, planning, and administration. Public improvements may include flood and drainage improvements. In limited instances, and during times of urgent need (e.g., post-disaster) as defined by the CDBG National Objectives, funding may 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.

Community Development Block Grant Disaster Recovery (CDBG-DR) grant funds are appropriated by Congress and allocated by HUD to rebuild disaster-impacted areas and provide crucial seed money to start the long-term recovery process. These grants help cities, counties, tribes, and states recover from federally declared disasters, especially in low-income areas. CDBG-DR assistance may fund a broad range of recovery activities, so it can help communities and neighborhoods that otherwise might not recover due to limited resources.

Disaster Housing Assistance Program

The Disaster Housing Assistance Program provides emergency assistance for housing, including minor repairs of homes to establish livable conditions, mortgage, and rental assistance.

HOME Investment Partnerships Program

The HOME Investment Partnerships Program provides grants for states and communities to use—often in partnership with local nonprofit groups—to fund activities such as building, buying, or rehabilitating affordable housing for rent or homeownership or providing rental assistance to low-income people. HOME is the largest federal block grant to state and local governments designed exclusively to create affordable housing for low-income households. HOME funds are awarded annually as grants to participating jurisdictions. The program's flexibility allows states and local governments to use HOME funds for grants, direct loans, loan guarantees or other forms of credit enhancements, or rental assistance or security deposits. Participating jurisdictions must match 25 cents of every dollar in program funds.

Section 108 Loan Guarantee Program

The Section 108 Loan Guarantee Program provides communities with low-cost, long-term financing for economic and community development projects. Section 108 financing provides an avenue for communities to undertake larger, more costly projects, where they may have limited resources to invest upfront. The program can fund economic development, housing, public facilities, infrastructure, and other physical development projects, including improvements to increase resilience against natural disasters. Section 108 assistance can be deployed in two ways:

- Directly by the community or its governmental or non-profit partner to carry out an eligible project

- Indirectly, with a community or its partner re-lending (or, in limited circumstances, granting) the funds to a developer or business to undertake an eligible project

U.S. Department of Transportation

Federal Highway Administration Emergency Relief

Federal Highway Administration (FHWA) Emergency Relief is a grant program that can be used for the repair or reconstruction of federal-aid highways and roads on federal lands that have suffered serious damage as a result of a disaster. New York State serves as the liaison between local municipalities and FHWA, making the municipalities sub-applicants of the state. The program is appropriated $100 million annually.

Federal Transit Administration Emergency Relief

Federal Transit Authority (FTA) 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 FTA and directly allocated to mass transit and port authorities, this transportation-specific fund was created as an alternative to FEMA's Public Assistance.

Federal Highway Administration Recreational Trails

The Recreational Trails Program is an assistance program of the FHWA that provides funds to states to develop and maintain recreational trails and trail-related facilities for both nonmotorized and motorized recreational trail uses. The program requires that states use 30 percent of funds for non-motorized recreation, 30 percent for motorized recreation, and 40 percent for diverse recreational trail use. In New York State, the Recreational Trails Program is administered by the Office of Parks, Recreation, and Historic Preservation.

Rebuilding American Infrastructure with Sustainability and Equity Grant Program

The Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grant program provides an opportunity for the U.S. Department of Transportation to invest in road, rail, transit, and port projects that promise to achieve national objectives. The eligibility requirements of RAISE allow project sponsors at the state and local levels to obtain funding for multi-modal, multi-jurisdictional projects that are more difficult to support through traditional Department of Transportation programs.

RAISE can provide funding directly to any public entity, including municipalities, counties, port authorities, tribal governments, or others, in contrast to traditional federal programs that provide funding to very specific groups of applicants (mostly state departments of transportation and transit agencies). This flexibility allows RAISE and partners at the state and local levels to work directly with a host of entities that own, operate, and maintain much of that nation's transportation infrastructure but otherwise cannot turn to the federal government for support.

Recreational Trails Grant Program

The Recreational Trails Program (RTP) provides funds to develop and maintain recreational trails and trail-related facilities for nonmotorized and motorized recreational trail uses. The RTP is an assistance

program of the FHWA. The program requires that states use 30 percent of funds for non-motorized recreation, 30 percent for motorized recreation, and 40 percent for diverse recreational trail use.

In New York State, the RTP is administered by the Office of Parks, Recreation, and Historic Preservation.

U.S. Economic Development Administration

The U.S. Economic Development Administration (USEDA) 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.

Public Works Program

Through its Public Works Program, USEDA invests in key public infrastructure, including water and sewer system 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.

Economic Adjustment Program

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.

U.S. Environmental Protection Agency

Smart Growth Implementation Assistance Program

The Smart Growth Implementation Assistance program focuses on complex 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 four categories: community resilience to disasters, job creation, the role of manufactured homes in sustainable neighborhood design, or medical and social service facilities siting.

Clean Water Act Section 604(b) Water Quality Planning Grants

Water Quality Planning Grants provide funding to implement regional comprehensive water quality management planning activities as described in Section 604(b) of the federal Clean Water Act. 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.

U.S. Fish and Wildlife Service Partners for Fish and Wildlife

The Partners for Fish and Wildlife Program provides free technical and financial assistance to landowners, managers, tribes, corporations, schools, and nonprofits interested in improving wildlife

habitat on their land. These projects range in size from a wetland of a few acres to a grassland restoration covering several hundred thousand acres.

Many Partners for Fish and Wildlife projects take place on working landscapes such as forests, farms, and ranches. Efforts are focused on areas of conservation concern, such as upland forests, wetlands, native prairies, marshes, rivers, and streams. Projects are designed to benefit federal trust species, including migratory birds and endangered, threatened, or at-risk species.

15.4.2 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 (NYS ESD 2023).

Local Waterfront Revitalization Program

Funding to advance preparation, refinement, or implementation of Local Waterfront Revitalization Programs (see Chapter 15.2.4) is available under Title 11 of the New York State Environmental Protection Fund Local Waterfront Revitalization Program, among other sources.

New York State Department of Archives Local Government Records Management Improvement Fund

The Local Government Records Management Improvement Fund provides grants to assist local governments in establishing records management programs or developing new program components. Funds come from fees collected by county clerks and the New York City Office of the City Register. These fees are collected during the recording of certain documents and when county clerks assign index numbers for certain court cases. The amount of grant funding available each year depends on the number of documents recorded and index numbers assigned that year. Project categories include the following:

- Disaster management
- Document conversion and access
- Files management
- Historical records
- Inactive records

Application types include the following:

- Individual (up to $75,000)
- Shared services (up to $150,000)
- New York City Department of Records

New York State Department of Environmental Conservation

Climate Smart Communities Grant Program

Competitive grants ranging from $25,000 to $100,000 provide support for local governments to become certified Climate Smart Communities (see Chapter 15.3.2). All counties, cities, towns, and villages of New York State are eligible to receive funding. The CSC grant program provides 50/50 matching grants for eligible projects. It offers free technical support on energy and climate and guidance tailored to New York State communities. Funding is available for the following:

- Implementation projects that advance 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
- Certification projects that advance actions aligned with CSC certification requirements, including the following:
  - Right-sizing government fleets
  - Developing natural resource inventories
  - Conducting vulnerability assessments
  - Developing climate adaptation strategies
  - Updating HMPs to address changing conditions and reduce climate vulnerability

Environmental Protection Fund

New York State's Environmental Protection Fund (EPF) is a source of funding for capital projects that protect the environment and enhance communities. Capital projects are usually large projects that purchase land or construct facilities. Most projects that receive grants of EPF money combine it with other funding sources that require matching funds.

The EPF also supports the stewardship of public lands, including state parks and millions of acres of public lands throughout the state. Through partnerships with volunteer organizations, state agencies use stewardship funding to manage trails and lands, protect natural resources, preserve wildlife habitats, make critical capital improvements at parks and campgrounds, educate students about conservation, and provide access to persons with disabilities.

Volunteer Fire Assistance Grants

The Volunteer Fire Assistance Grants program makes 50/50 matching funds available to rural fire companies for the purchase of wildland firefighting equipment such as portable backpack pumps, protective clothing, hand tools, hard hats, hoses, portable radios, and dry hydrants.

Wastewater Infrastructure Engineering Planning Grant

The Wastewater Infrastructure Engineering Planning Grant assists municipalities with the engineering and planning costs of water quality projects. Eligibility for municipalities is based on median household income as follows:

- Median household income of $65,000 or less in the Regional Economic Development Council (REDC) regions of Capital District, Southern Tier, North Country, Mohawk Valley, Central New York, Finger Lakes, or Western New York
- Median household income 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 engineering and planning services to produce an engineering report. 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 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 implementation plan

Successful applicants can use the engineering report funded by the grant to seek financing through the Clean Water State Revolving Fund program, Water Quality Improvement Project program, or other funding entities to further pursue the identified solution.

Water Quality Improvement Project Program

The Water Quality Improvement Project 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. Eligible activities include the following (NYSDEC n.d.):

- Wastewater treatment improvement
- Non-agricultural nonpoint source abatement and control
- Land acquisition for source water protection
- Salt storage
- Aquatic habitat restoration
- Municipal separate storm sewer systems

Grant recipients may receive the following amounts:

- 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
- Up to 40 percent for general wastewater infrastructure improvement projects

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 the following:

- 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
- The current bridge and culvert structural conditions.

New York State Division of Homeland Security and Emergency Services Revolving Loan

The New York State Emergency Services Revolving Loan Account makes loans to cities, villages, fire districts, counties, towns, and not-for-profit fire/ambulance corporations at an annual fixed interest rate of 2.5 percent. The loan supports the repair of firefighting apparatus, ambulances, or rescue vehicles and the renovation, rehabilitation, or repair of facilities that house firefighting equipment, ambulances, rescue vehicles, and related equipment.

Principal and interest payments made by recipients are deposited in the revolving loan account and loaned once again to new applicants. Therefore, funding levels in the account vary throughout the year depending upon the amount of repayment money, interest accrued, and number of new loans made.

New York State Environmental Facilities Corporation Clean Water State Revolving Fund

The New York State Environmental Facilities Corporation's (EFC) Clean Water State Revolving Fund (CWSRF) provides interest-free or low-interest rate financing for wastewater and sewer infrastructure projects to municipalities throughout New York State. Projects eligible for financing include construction or restoration of sewers and wastewater treatment facilities, stormwater management, landfill closures, and habitat restoration and protection projects.

The Corporation provides both short- and long-term financing—interest-free or low-interest—to accommodate municipalities of all population sizes with varying financial needs. When communities repay their financings, it allows the Corporation to finance new projects.

15.4.3 County and Local

Seneca County and individual jurisdictions have the legal authority to fund mitigation projects though existing local budgets, local appropriations (including referendums and bonding), and federal and state loan and grant programs. Many jurisdictions noted throughout the planning process that they are faced with increasing fiscal constraints, including decreasing revenues and budget constraints. In an effort to overcome these fiscal challenges, jurisdictions have continued to leverage the sharing of resources and combining available funding with grants and other sources and note that plans and interjurisdictional cooperation are beneficial in obtaining grants.

Agricultural Non-Point Source Abatement and Control Grant Program

This New York State grant program assists farmers in preventing water pollution from agricultural activities by providing technical assistance and financial incentives. County Soil and Water Conservation Districts apply for the competitive grants on behalf of farmers and coordinate funded conservation projects. Grants can cost share up to 75 percent of project costs or more if farmers contribute in the following two areas (Seneca County SWCD 2024):

- Funds awarded to conduct environmental planning
- Funds awarded to construct or apply management practices

The New York State Soil and Water Conservation Committee and the Department of Agriculture and Markets coordinate the statewide program and allocate funds provided by the New York State Environmental Protection Fund on a semi-annual basis (Seneca County SWCD 2024).

Healthy Neighborhoods Program

The Seneca County Healthy Neighborhoods Program (HNP) offered by the Seneca County Health Department is a New York State grant-funded program that provides eligible Seneca County residents with home assessments to identify any environmental hazards or safety concerns (Seneca County 2024). Based on an in-home assessment, HNP staff implement strategies and provide free materials to address environmental hazards and concerns in the home. The Healthy Neighborhoods Program aims to reduce home health and safety hazards such as the following (Seneca County 2024):

- Fire safety
- Carbon monoxide
- Slip and fall concerns
- Asthma triggers
- Mold and mildew
- Pests
- Lead poisoning
- Smoking/hazards from secondhand smoke

Weatherization Assistance Program

Weatherization services reduce the amount of energy required to heat homes and provide hot water. The majority of homes in New York State were built when energy was relatively inexpensive. These homes are significantly more costly to heat than a newer energy-efficient home (Seneca County 2024).

Local service providers supply high-quality work performed by skilled personnel; some providers use their own crews, and some hire local private contractors. All services are provided without obligation to the occupant of the home. However, owners of rental buildings are required to invest funds toward the cost of the weatherization services (Seneca County 2024).

Eligibility is based on household income relative to federal low-income guidelines. If a household contains a member who receives Supplemental Security Income (SSI), Public Assistance, Food Stamps, or Home Energy Assistance Program benefits, the household is considered automatically eligible for weatherization services. Services might include but are not limited to the following (Seneca County 2024):

- Weatherstripping and caulking around doors and windows
- Cleaning, testing, repairs, or replacement of heating systems
- Replacement or repair of storm windows
- Replacement or repair of broken windows and/or outside doors
- The addition of insulation to walls or ceilings
- Minor repairs, as needed, to ensure maximum efficiency from the weatherization services performed.

PART 4: MITIGATION STRATEGY

16. MITIGATION STRATEGY

This chapter presents mitigation strategies for Seneca County to reduce potential vulnerability and losses identified as concerns in the risk assessment portion of this plan. The Steering Committee reviewed the risk assessment and capability assessment to identify and develop these mitigation strategies.

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.

16.1 PAST MITIGATION ACCOMPLISHMENTS

The 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 Seneca County HMP. The current planning process represents the regulatory 5-year plan update process, which includes the participation of 14 jurisdictions in the County, along with key County and regional stakeholders.
- Eleven municipalities participating in this HMP update participate in the National Flood Insurance Program (NFIP), which requires the adoption of FEMA floodplain mapping and certain minimum standards for building within the floodplain.
- Reports, plans, and studies relating to or including information on natural hazards or natural hazard policies affecting Seneca County have been reviewed and incorporated into this plan update as appropriate, as discussed in Chapter 2 (Planning Process) and the references.

16.2 REVIEW AND UPDATE OF MITIGATION GOALS AND OBJECTIVES

Hazard mitigation goals and objectives for reducing long-term vulnerabilities to identified hazards were reviewed and revised as appropriate or this HMP update. For the purposes of this plan, goals and objectives are defined as follows:

"The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards."

44 CFR 201.6(c)(3)(i)

- **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).
- **Objectives** are short-term aims that form a strategy or course of action to meet a goal. Unlike goals, objectives are stand-alone measurements of the effectiveness of a mitigation action. The objectives also are used to help establish priorities. Broadly defined mitigation objectives were eliminated from the updated strategy unless accompanied by discrete actions.

The Steering Committee reviewed the 2018 goals and objectives and made revisions for the 2025 update based on the following considerations:

- Hazard events and losses since the 2018 plan
- The updated hazard profiles and risk assessment
- The goals and objectives established in the New York State 2023 HMP
- The Planning Partnership's interest in integrating this plan with other planning mechanisms
- Direct input from the Steering Committee, stakeholders, and the public on how the County and jurisdictions need to move forward to best manage their hazard risk
- Discussions and research on existing authorities, policies, programs, resources
- Support for mitigation through the protection of natural systems

As a result of this review process the goals and objectives for the 2025 update were updated to those presented in Table 16-1 and Table 16-2.

Table 16-1. 2025 Seneca County HMP Goals

Goal 1	Protect life, property, and the environment from current and future impacts.
Goal 2	Coordinate hazard mitigation programs and other planning efforts that affect the County.
Goal 3	Increase public preparedness and awareness of natural hazards.
Goal 4	Enhance mitigation capabilities to reduce hazard vulnerabilities.
Goal 5	Support continuity of operations before, during, and after hazard events.
Goal 6	Reduce the risk of natural hazards for socially vulnerable populations and underserved communities.
Goal 7	Address long-term vulnerabilities from high hazard dams.

Table 16-2. 2025 Seneca County HMP Objectives

Objective 1	Reduce the impact of disasters on currently developed property, especially residential, commercial, and critical public facilities that are near the lake shores and canal corridor.
Objective 2	Improve the stability of creek banks and improve the water flow of creek beds to lessen flooding events.
Objective 3	Lessen the impact of flooding on roads.
Objective 4	Use the community's land use plans, ordinances, subdivision regulations, and site plan review processes to enhance loss reduction.
Objective 5	Ensure that future development is not vulnerable to the impact of natural, technological, or man-made disasters.
Objective 6	Coordinate and integrate the hazard mitigation activities with existing local emergency service agencies' emergency operations plans.
Objective 7	Analyze the need for and procure any specialized equipment or training to enhance the emergency services response to specific hazards.
Objective 8	Review current evacuation routes to determine if they are adequate.
Objective 9	Ensure that County residents and businesses are aware of potential hazards and are knowledgeable about their roles in limiting the effects of hazards on their personal property, health, and safety.

Objective 10	Use appropriate public information and education strategies to increase public awareness of various hazard mitigation options.
Objective 11	Continue to educate the public about emergency preparedness, response, and recovery activities.
Objective 12	Encourage all residents and businesses to purchase NOAA Weather radios for timely alert warnings.
Objective 13	Reduce the possibility of damage and losses due to natural hazards affecting the County and its municipalities.
Objective 14	Increase communications before, during, and after natural hazard events.
Objective 15	Retrofit, acquire, or relocate vulnerable property in high hazard areas, including those known to be subject to repetitive damage.
Objective 16	Utilize the best available information on hazard exposure and vulnerability to support appropriate land use decisions within Seneca County.
Objective 17	Increase local government official awareness regarding funding opportunities for mitigation and participating/contributing to plan updates.
Objective 18	Identify and provide additional resources to vulnerable and marginalized populations that have reduced capacity to respond to hazards compared with the general population.
Objective 19	Ensure dam infrastructure is maintained.
Objective 20	Support the identification of and access to funding for the repair or replacement of dams.
Objective 21	Ensure emergency action plans are developed and updated.
Objective 22	Acquire and maintain detailed data regarding critical facilities and lifelines so that they can be prioritized and risk-assessed for possible mitigation actions.
Objective 23	Support increased participation in the National Flood Insurance Program and Community Rating System.
Objective 24	Promote sustainable and equitable land development practices that direct future development away from vulnerable areas.
Objective 25	Encourage and support multi-jurisdictional mitigation projects that leverage funding and support from multiple levels of government and community organizations.
Objective 26	Strengthen inter-jurisdiction and inter-agency communication, coordination, and partnerships to foster hazard mitigation actions and/or projects.
Objective 27	Encourage the establishment of policies to help ensure the prioritization and implementation of mitigation actions designed to benefit essential facilities, services, and infrastructure.
Objective 28	Encourage residents to register their cell phone numbers with the County's Hyper-Reach alert system.

16.3 MITIGATION STRATEGY DEVELOPMENT AND UPDATE

16.3.1 Update of Local Jurisdiction Mitigation Strategies

Review of Previous Actions

FEMA defines ***Mitigation Actions*** as specific actions that help to achieve the mitigation goals and objectives.

To evaluate progress on local mitigation actions, each planning partner was provided with a Mitigation Action Plan Review Worksheet, pre-populated with the actions identified for their jurisdiction in the prior (2018) plan. The planning partners were asked to indicate the status of each action ("No Progress," "In Progress," "Continuous," "Completed,"

"Discontinued"). They were requested to provide comments to quantify the extent of progress and provide reasons for the level of progress or why actions were discontinued. This information is included in the jurisdictional annexes.

Mitigation actions identified as "Complete" or "Discontinued" have been removed from the planning partners' updated mitigation strategies. Actions identified as "No Progress" or "In Progress" have been carried forward in their local updated mitigation strategies. Planning partners 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 actions (Ongoing Capabilities) from the previous plan that represent programs that are now fully integrated into the normal operational and administrative framework of the community are identified in the capabilities assessment of each annex and removed from the updated mitigation strategy (marked as "Discontinued").

Identifying New Actions

At the kickoff and during subsequent local-level planning meetings, all participating jurisdictions were further surveyed to identify potential new actions. Communities also were made aware of potential new mitigation actions as such actions became evident during the plan update process (e.g., through the capability assessment, risk assessment, or the public and stakeholder outreach process).

Developing the Overall Strategy

Beginning in November 2023, members of the Steering Committee and contract consultants worked directly with each jurisdiction (by phone, email, or virtual meetings) to update their annex with mitigation strategies that focus on well-defined, implementable projects that meet the definition or characteristics of mitigation. Mitigation actions were selected with careful consideration of benefits (risk reduction, losses avoided), costs, and possible funding sources (including mitigation grant programs).

Three annex support meetings were held for planning partners to assist in the development of additional actions, foster collaboration between neighboring jurisdictions for mitigation actions, discuss actions that involve cooperation between the County and jurisdictions, and identify steps needed to complete the jurisdictional annexes.

Addressing Known Vulnerabilities

To help support the selection of an appropriate risk-based mitigation strategy, each annex includes a summary of hazard vulnerabilities. These were identified during the plan update process by planning partner representatives, through review of available plans and reports, or through the hazard profiling and risk assessment process.

A mitigation strategy workshop was conducted on September 19, 2024, for all participating jurisdictions to support the development of focused problem statements based on the impacts of natural hazards in the County and their communities. These problem statements provide a detailed description of a problem area, including its impacts on the jurisdiction, past damage, loss of service, etc. An effort was made to include the street address of the problem location, adjacent streets, water bodies, and well-known structures as well as a brief description of existing conditions (topography, terrain, hydrology) of the site.

These problem statements form a bridge between the hazard risk assessment, which quantifies impacts on each community, and the development of actionable mitigation strategies.

Incorporating a Range of Action Types

Concerted efforts were made to ensure that planning partners develop updated mitigation strategies that cover the range of mitigation action types described in recent FEMA planning guidance (FEMA 2023d):

- **Local Plans and Regulations**—These actions include government authorities, policies or codes that influence the way land and buildings are 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 community lifelines and other critical facilities. This type of action also involves projects to construct structures to reduce the impact of hazards.
- **Natural Systems Protection**—These are actions that minimize damage and losses to natural systems and preserve or restore their functions.
- **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, Community Rating System, StormReady (NOAA), and Firewise (NFPA) Communities.

Efforts were also made to develop mitigation strategies that cover the range of mitigation action types described in recent CRS guidance (FEMA 2018):

- **Preventative Measures (PR)**—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.
- **Property Protection (PP)**—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.
- **Public Information (PI)**—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.
- **Natural Resource Protection (NR)**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Structural Flood Control Projects (SP)**—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.
- **Emergency Services (ES)**—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.

Protecting Critical Facilities

Planning partner mitigation actions that address vulnerable critical facilities have been proposed in consideration of protection against 500-year events or worst-case scenarios. However, in the case of projects 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 jurisdiction discretion must be recognized. Further, it must be recognized that the County and jurisdictions have limited authority with regard to mitigation at any level of protection over privately owned critical facilities.

Accounting for Climate Change

As discussed in the hazard profiles in this HMP, the long-term effects of climate change are anticipated to exacerbate the impacts of weather-related hazards (e.g., dam failure, drought, extreme temperatures, flood, severe weather, severe winter weather). Communities are working to evaluate and recognize these long-term implications and to incorporate their mitigation strategies into planning and capital improvement updates.

16.3.2 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 2018 HMP using a process similar to that used to review local jurisdiction mitigation strategy progress. The County, through various department representatives, was provided with a Mitigation Action Plan Review Worksheet identifying all County-level actions and initiatives from the 2018 plan. The County reviewed each action and provided progress. For each action, relevant County representatives were asked to indicate the status of each action (No Progress, In Progress, Ongoing, Complete, or Discontinued), and provide review comments on each.

Projects/initiatives identified as "Complete", as well as those actions identified as" Discontinued," have been removed from this plan update. Actions that the County identified as "No Progress," "In Progress," or "Ongoing" have been carried forward in the County's updated mitigation strategy. Actions considered ongoing capabilities were marked as "Discontinued" and included in the plan as ongoing capabilities.

Throughout the course of the plan update process, additional regional and County-level mitigation actions were identified by the following processes:

- 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 regional agencies, including:
  - Seneca County Emergency Management Office
  - Seneca County Health Department
  - Seneca County Division of Human Services
  - Seneca County Highway Department
  - Seneca County Mental Health Services

  - Seneca County Soil and Water District
  - Cornell Cooperative Extension of Seneca County
  - Town of Seneca Falls
  - New York State Division of Homeland Security and Emergency Services
- Input received through the public and stakeholder outreach process

As discussed within the hazard profiles in this HMP, the long-term effects of climate change are anticipated to exacerbate the impacts of weather-related hazards including dam failure, drought, extreme temperatures, flood, severe weather, and severe winter weather. The County has included mitigation actions, including continuing and long-term planning and emergency management support, to address these long-term implications and potential impacts.

Various County departments and agencies included mitigation actions to address vulnerable critical facilities. These actions were proposed in consideration of protection against 500-year MRP events, or worst-case scenarios. It is recognized, however, that in the case of projects being funded through federal mitigation programs, the level of protection can be influenced by cost-effectiveness, as determined through a formal benefit-cost analysis. In the case of self-funded projects, local government authority can affect the ability to implement. The County has limited authority over private owners of critical facility regarding mitigation at any level of protection.

16.3.3 Mitigation Best Practices

Catalogs of hazard mitigation best practices were developed that present a broad range of alternatives to be considered for use in the mitigation strategies, in compliance with 44 CFR Section 201.6(c)(3)(ii). The catalogs are included in Appendix I. One catalog was developed for each hazard of concern evaluated in this plan. The catalogs present alternatives that are categorized based on the following:

- Who would have responsibility for implementation:
  - Individuals—personal scale
  - Businesses—corporate scale
  - Government—government scale
- What the alternatives would do:
  - Manipulate the hazard
  - Reduce vulnerability to the hazard
  - Reduce impacts from the hazard
  - Build local capacity to respond to or be prepared for the hazard

The alternatives include actions that will mitigate current risk from hazards and actions that will help reduce risk from changes in the impacts of these hazards resulting from climate change. Hazard mitigation actions recommended in this plan were selected from among the alternatives presented in the catalogs.

The catalogs provide a baseline of mitigation alternatives that are backed by a planning process, are consistent with the established goals and objectives, and are within the capabilities of the planning partners to implement. Some of these actions may not be feasible based on the selection criteria identified for this plan. The purpose of the catalogs was to provide a list of what could be considered to reduce risk from natural hazards within the planning area. Actions in the catalog that are not included for the partnership's mitigation strategy were not selected for one or more of the following reasons:

- The action is not feasible.
- The action is already being implemented.
- There is an apparently more cost-effective alternative.
- The action does not have public or political support.

16.3.4 Mitigation Strategy Evaluation and Prioritization

Federal guidelines establish how mitigation strategies are to be prioritized, implemented, and administered by local jurisdictions (44 CFR Section 201.c.3.iii). For this plan update, each mitigation strategy was prioritized using criteria suitable for evaluating hazard mitigation strategies. This method provided a systematic approach that considered the opportunities and constraints of implementing each mitigation action. The Steering Committee chose the following evaluation criteria for this process:

- Life Safety—How effective will the action be at protecting lives and preventing injuries? Will the proposed action adversely affect one segment of the population?
- Property Protection—How significant will the action be at eliminating or reducing damage to structures and infrastructure? For example: development in the floodplain or high-risk areas?
- Cost-Effectiveness—Are the costs to implement the action commensurate with the benefits achieved?
- Political—Is there overall public support for the action? Is there the political will to support it? Is the action at odds with development pressures?
- Legal—Does the jurisdiction have the authority to implement the action?
- Fiscal—Can the action be funded under existing program budgets (i.e., is this action currently budgeted for)? Or would it require a new budget authorization or funding from another source such as grants?
- Environmental—What are the potential environmental impacts of the action? Will it comply with environmental regulations? Are there co-benefits of this action?
- Social Vulnerability—Does the action benefit socially vulnerable populations and underserved communities? Additional considerations can include appropriate numerical measures of social vulnerability.
- Administrative—Does the jurisdiction have the personnel and administrative capabilities to implement the action and maintain it or will outside help be necessary? Does the scale and scope of the action align with the jurisdiction's capabilities?
- Hazards of Concern—Does the action address one or more of the jurisdiction's high-ranked hazards?

- Climate Change—Does the action incorporate climate change projections? Is the action designed to withstand/address long-term conditions?
- Timeline—Can the action be completed in less than 5 years?
- Community Lifelines—Does this action benefit community lifelines?
- 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 prioritize their identified mitigation actions. For each mitigation action, the jurisdictions assigned a numeric score for each of the 14 evaluation criteria:

- 1 = Highly effective or feasible
- 0 = Neutral
- -1 = Ineffective or not feasible

Jurisdictions were asked to provide a brief summary of the rationale behind the numeric rankings assigned. The numerical results were totaled and then used by each jurisdiction to help prioritize the action or strategy as low, medium, or high. Actions that had a numerical value between 0 and 6 were categorized as low priority; actions with numerical values between 7 and 10 were categorized as medium priority; and actions with numerical values between 11 and 14 were categorized as high priority. 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.

Some jurisdictions may be carrying forward mitigation actions from prior mitigation strategies that were prioritized using a different approach. Mitigation actions in the prior (2018) Seneca County HMP were qualitatively evaluated against the mitigation goals and objectives and other evaluation criteria. They were then prioritized into three categories: high, medium, and low. At their discretion, jurisdictions carrying forward prior actions were encouraged to re-evaluate their priority, particularly if conditions that would affect the prioritization criteria had changed.

For the plan update, there has been an effort to develop more clearly defined and action-oriented mitigation strategies. These local strategies include actions that are seen by the community as the most effective approaches to advance their local mitigation goals and objectives within their capabilities. In addition, each planning partner was asked to develop problem statements. With active support from NYS DHSES planning staff, the partners were able to develop action-oriented and achievable mitigation strategies. For that reason, many of the actions in the updated mitigation strategy were ranked as high or medium priority, as reflective of the community's clear intent to implement them, available resources not-withstanding. In general, actions that would have had low priority rankings were appropriately screened out during the local action evaluation process.

16.3.5 Benefit/Cost Review

Federal regulations require the prioritization of the mitigation strategy to emphasize the extent to which benefits are maximized according to a benefit/cost review of the proposed projects (44 CFR Section 201.6.c.3iii). For all actions included in the local strategies, jurisdictions identified the associated costs and benefits as follows:

- **Costs** include the total project estimation. This can include administrative, construction (engineering, design, and permitting), and maintenance costs.
- Benefits are the savings from losses avoided due to project implementation. These can include life safety, structure and infrastructure damage, loss of service or function, and economic and environmental losses.

When possible, jurisdictions were asked to identify the actual or estimated dollar costs and associated benefits. Where estimates of costs and benefits were available, the ratings were defined follows:

Low < = $10,000 Medium = $10,000 to $100,000 High >= $100,000

Often numerical costs and/or benefits were not identified and may be impossible to quantify. In this case, jurisdictions were asked to evaluate project cost-effectiveness using qualitative high, medium, and low ratings based on the definitions in Table 16-3. 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.

Table 16-3 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.
Benefits	
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.

For some of the Seneca County actions identified, the Planning Partnership may seek financial assistance under FEMA's Hazard Mitigation Assistance (HMA) programs. These programs require detailed benefit/cost analysis as part of the application process. The benefit/cost review applied for the prioritization of actions in this update did not include the level of detail required by FEMA for project grant eligibility under HMA grant programs. These analyses will be performed when funding applications are prepared, using FEMA's Benefit-Cost Analysis model.

The Planning Partnership 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 Partnership reserves the right to define benefits according to parameters that meet its needs and the goals and objectives of this plan.

PART 5: PLAN MAINTENANCE

17. PLAN MAINTENANCE AND IMPLEMENTATION PROCEDURES

This chapter details the formal process that will ensure that the HMP remains an active and relevant document and that the Planning Partnership maintains its 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 5 years. In addition, this chapter 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.

17.1 HMP COORDINATOR AND JURISDICTION POINTS OF CONTACT

The HMP Coordinator is assigned to manage the maintenance and update of the plan during its performance period, with the following responsibilities:

- Convene the Planning Partnership.
- Be the prime point of contact for questions regarding the plan and its implementation.
- Coordinate the incorporation of additional information into the plan.
- Manage the monitoring, evaluation, and updating responsibilities identified in this section.

Currently, the Seneca County HMP Coordinator is designated as:

Melissa Taylor, Director, Emergency Management Office
Seneca County Department of Public Safety
1 DiPronio Drive
Waterloo, New York 13165
(315) 539-1756
mtaylor@co.seneca.ny.us

As of the date of this plan, primary and secondary mitigation planning representatives (points of contact) are identified in each jurisdictional annex in Volume II. It will be the responsibility of each jurisdiction and its representatives to inform the HMP Coordinator of any changes in representation.

17.2 MAINTENANCE AND IMPLEMENTATION TASKS

The procedures for monitoring, evaluating, and updating the plan are provided below. The plan maintenance matrix shown in Table 17-1 provides a synopsis of responsibilities for plan monitoring, integration, evaluation, and update, which are discussed in further detail in the sections below.

Table 17-1. Plan Maintenance Matrix

Task	Approach	Timeline	Lead Responsibility	Support Responsibility
Monitoring	Planning partners to recommend update of mitigation strategies, progress toward implementation of actions, identification of new actions, and update of information on funding opportunities.	Each June or after the occurrence of a presidentially declared disaster	Jurisdictional points of contact identified in Volume II	Jurisdictional implementation lead identified in Volume II
Integrating	Distribute the safe growth worksheet (see Table 17-2) for annual review and update by all participating jurisdictions.	June each year with interim email reminders to address integration in County and municipal activities	HMP Coordinator and jurisdictional points of contact identified in Volume II	HMP Coordinator
Evaluating	Review the status of mitigation actions, as submitted by the monitoring task lead, and assess the effectiveness of the plan; compile and finalize update of mitigation strategy.	Updated progress report completed by September 30 of each year	Jurisdictional points of contact identified in Volume II	Alternate jurisdictional points of contact
Updating	Reconvene the Planning Partners to guide a comprehensive update to review and revise the plan.	Every 5 years or upon major update to Comprehensive Plan or after the occurrence of a major disaster	HMP Coordinator	Jurisdictional points of contact identified in Volume II
Grant Monitoring	Notify Planning Partners about grant opportunities, maintain a list of eligible jurisdiction-specific projects for funding consideration, and notify Planning Partners of fiscal year mitigation priorities.	Continuously and as grant opportunities are identified	HMP Coordinator	Jurisdictional points of contact identified in Volume II
Public Involvement	Maintain the HMP, inform the public of hazard events via social media outlets, promote educational workshops on hazard topics, and track and file public comments received regarding the HMP.	Continuously	HMP Coordinator and jurisdictional points of contact identified in Volume II	Alternate jurisdictional points of contact

17.3 MONITORING

The Planning Partnership will be responsible for monitoring and documenting annual progress on the plan. Each year, beginning one year after plan development, Seneca County and local Planning Partnership representatives will collect and process information from the persons responsible for initiating or overseeing the mitigation projects in each department, agency, and organization involved in implementing mitigation actions identified in their jurisdictional annexes. In the first year of the performance period, this will be accomplished using an online performance progress reporting system (the BATool^{SM}), which will enable each planning partner to:

- Directly access mitigation actions

- Easily update the status of each project
- Document successes or obstacles to implementation
- Add or delete projects to maintain mitigation strategy implementation

Participating partners will be prompted by the tool to update progress on a quarterly basis, providing an incentive for them to refresh their mitigation strategies and to continue implementation of actions. This reporting system facilitates the sorting and prioritization of projects and will support the submittal of an increased number of project grant fund applications. Planning Partnership representatives will be expected to document the following:

- Progress on the implementation of mitigation actions
- Obstacles or impediments to implementation of actions
- 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 performance period will be addressed via the BATool[SM] or manually.

17.4 INTEGRATING THE HMP INTO MUNICIPAL 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 it is critical that this HMP integrate and coordinate with and complement those existing plans and programs. Integrating hazard mitigation into a community's existing plans, policies, codes, and programs leads to development patterns or redevelopment that reduce risk from known hazards.

Planning Partnership representatives will incorporate mitigation planning as an integral component of daily government operations. They 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. By doing so, the Planning Partnership anticipates that:

- Hazard mitigation planning will be formally recognized as an integral part of overall emergency management efforts.
- The HMP, 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.

Planning processes to be coordinated with the recommendations of the HMP 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 and improved public participation
- Educational programs
- Continued interagency coordination

During the HMP annual review process, each participating jurisdiction will be asked to document how they are utilizing and incorporating the HMP into their day-to-day operations and planning and regulatory processes. Each municipality will also 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 checklist present in Table 17-2 will help a community identify areas that currently integrate hazard mitigation and where to make improvements and reduce vulnerability to future development.

Table 17-2. Safe Growth Checklist

Planning Mechanisms	Do You Do This?		How is it being done or how will this be utilized in the future?
	Yes	No	
Operating, Municipal, and Capital Improvement Program Budgets			
When constructing upcoming budgets, are hazard mitigation actions funded as budget allows?			
Are construction projects evaluated to see if they meet the hazard mitigation goals?			
Does the municipality review mitigation actions when allocating funding during annual budget adoption processes?			
Do budgets limit expenditures on projects that would encourage development in areas vulnerable to natural hazards?			

Planning Mechanisms	Do You Do This? Yes	No	How is it being done or how will this be utilized in the future?
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 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, does the municipality review the HMP 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 the zoning ordinance contain natural overlay zones that set conditions?			
Does the zoning 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?			
Does the zoning ordinance prohibit development within or 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 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 HMP?			
Does the future land use map clearly identify natural hazard areas?			
Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas?			
Land Use			
Does the future land use map clearly identify natural hazard areas?			
Do the land use policies discourage development or redevelopment in natural hazard areas?			

Planning Mechanisms	Do You Do This? Yes	No	How is it being done or how will this be utilized in the future?
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 located outside protective ecosystems?			
Grant Applications			
Are data and maps used as supporting documentation in grant applications?			
Municipal Ordinances			
Is hazard mitigation a priority when updating municipal ordinances?			
Economic Development			
Does the local economic development group take into account 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?			

17.5 EVALUATING

Evaluation of the mitigation plan is an assessment of whether the planning process and actions have been effective, whether the HMP goals are being achieved, and whether changes are needed. The HMP Coordinator will consult with the Planning Partnership members to evaluate the effectiveness of the plan implementation 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 meeting of the Planning Partnership to be held either in person or via teleconference approximately one year from the date of local adoption of this update and successively thereafter. The HMP Coordinator will be responsible for calling participants, coordinating the annual plan review meeting, and soliciting input regarding progress toward meeting plan goals and objectives. At least two weeks before the annual plan review meeting, the HMP Coordinator will advise Planning Partnership members of the meeting date, agenda, and expectations of the members. 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 are present, such as technical, political, legal, or coordination issues with other agencies
- Outcomes have occurred as expected
- Changes in local resources impacted plan implementation (e.g., funding, personnel, and equipment)
- New agencies, departments, and staff are included, involving other local governments as defined under 44 CFR 201.6

The Planning Partnership will review the mitigation goals, objectives, and activities using performance-based indicators, including:

- New agencies/departments
- Project completion
- Underspending/overspending
- Achievement of the goals and objectives
- Resource allocation
- Timeframes
- Budgets
- Lead/support agency commitment
- Resources
- Feasibility

The Planning Partnership will evaluate how other programs and policies have conflicted with or augmented planned or implemented mitigation actions and will identify policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions Other programs and policies can include those that address:

- Economic development
- Environmental preservation
- Historic preservation
- Redevelopment
- Health and safety
- Recreation

- Land use and zoning
- Public education and outreach
- Transportation

The Planning Partnership should refer to evaluation forms in the FEMA 386-4 guidance document to assist in the evaluation process (Worksheets #2 and #4; see Appendix F–Plan Maintenance Tools). Further, the Planning Partnership 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 HMP Coordinator will be responsible for preparing an annual HMP progress report for each year of the performance period based on the information provided by the planning partners and other information as appropriate. These annual reports will provide data for the 5-year update of this HMP and will assist in pinpointing any implementation challenges. By monitoring the implementation of the HMP, the Planning Partnership will be able to assess which actions are completed, which are no longer feasible, and which require additional funding.

Following any major disasters, the HMP will be evaluated and revised 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 damage or if data listed in the 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.

17.6 UPDATING

Federal regulations require that communities review, revise, and resubmit local hazard mitigation plans to remain eligible for certain federal funding opportunities (44 CFR 201.6.d.3). It is the intent of the Seneca County HMP Planning Partnership to update this plan on a 5-year cycle from the date of initial plan adoption.

The HMP Coordinator, with support of the Planning Partnership, will use the second annual Planning Partnership meeting to develop and commence the implementation of a detailed plan update program. Prior to the five-year update, the HMP Coordinator will invite representatives from the New York State Division of Homeland Security and Emergency Services to provide guidance on plan update procedures. At a minimum, this will establish who will be responsible for managing and completing the plan update effort, items that need to be included in the updated plan, and a detailed timeline with milestones to ensure that the update is completed according to regulatory requirements. This meeting will determine what resources will be needed to complete the update.

A draft of the updated plan will be distributed for public comment. After all comments are addressed, the HMP will be revised and distributed to all participating jurisdictions.

17.7 GRANT MONITORING AND COORDINATION

Seneca 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 planning partners during openings for grant applications. As part of grant monitoring and coordination, Seneca 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.

17.8 CONTINUED PUBLIC INVOLVEMENT

The planning partners are committed to the continued involvement of the public in the hazard mitigation process. This HMP update will continue to be posted online at the following link: https://www.senecacountynyhmp.com/. In addition, public outreach and dissemination of the HMP will include the following:

- Links to the plan on local websites of each jurisdiction with capability
- Continued utilization of existing social media outlets (Facebook, X [formerly Twitter], etc.) to inform the public of natural hazard events, such as floods and severe weather; the public can be educated via the jurisdictional websites on how these applications can be used in an emergency situation
- Promotion of articles or workshops on hazards to educate the public and keep them aware of the dangers of hazards

The 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 ensure that:

- Public and stakeholder comments and input on the plan, and hazard mitigation in general, are collected, recorded, and addressed as appropriate.
- The Seneca 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.

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ACRONYMS AND DEFINITIONS

%g	percent of gravitational acceleration
ACS	American Community Survey
ALICE	Asset, Limited, Income, Constrained, Employed
ASDSO	Association of State Dam Safety Officials
BCA	Benefit Cost Analysis
BRIC	Building Resilient Infrastructure and Communities
CAC	Community Assistance Contacts
CAP-SSSE	Compliance Assistance Program–State Support Services Element
CAV	Community Assisted Visit
CCAHA	Conservation Center of Art and Historic Artifacts
CDBG	Community Development Block Grant
CDBG-DR	Community Development Block Grant Disaster Recovery
CDC	Centers for Disease Control
CFR	Code of Federal Regulations
CMP	Coastal Management Program
CRRA	Community Risk and Resiliency Act
CRREL	Cold Regions Research and Engineering Laboratory
CRS	Community Rating System
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CSC	Climate Smart Communities (NYSDEC)
CSD	Central School District
CWSRF	Clean Water State Revolving Fund
DFIRM	Digital Flood Insurance Rate Map

DMA 2000	Disaster Mitigation Act of 2000
DOH	Department of Health
DPW	Department of Public Works
DR	Major Disaster Declaration (Federal)
EAP	Emergency Action Plan
ECL	Environmental Conservation Law
EF	Enhanced Fujita Scale
EM	Emergency Declaration (Federal)
EMO	Emergency Management Office
EOC	Emergency Operation Center
EPA	Environmental Protection Agency
EPF	Environmental Protection Fund
ES	Executive Summary
ESF	Emergency Support Function
ESRI	Environmental Systems Research Institute
EWP	Emergency Watershed Protection
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
FLR	Finger Lakes Region
FMA	Flood Mitigation Assistance
FTA	Federal Transit Administration

FY	Fiscal Year
GIS	Geographic Information System
HAZMAT	Hazardous Materials
Hazus	Hazards U.S.
HEAP	Home Energy Assistance Program
HHPD	High Hazard Potential Dams
HIFLD	Homeland Infrastructure Foundation-Level Data
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HUD	U.S. Department of Housing and Urban Development
HVAC	Heating, Ventilation, and Air Conditioning
ICS	National Incident Command System
IDA	Industrial Development Agency
IT	Information Technology
KBDI	Keetch-Bryam Drought Index
LCSN	Lamont-Doherty Cooperative Seismographic Network
LWRP	Local Waterfront Revitalization Program
MMI	Modified Mercalli Intensity Scale
Mph	Miles per Hour
MRP	Mean Return Period
MS4	Municipal Separate Storm Sewer Systems
N/A	Not Applicable
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration

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
NEP	National Estuary Program
NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NHC	National Hurricane Center
NID	National Inventory of Dams
NIDIS	National Integrated Drought Information System
NLDN	National Lightning Detection Network
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NPDP	National Performance of Dams Program
NPL	National Priorities List (EPA)
NRCC	Northeast Regional Climate Center
NRCS	Natural Resources Conservation Service
NSSL	National Severe Storms Library
NWS	National Weather Service
NY	New York
NYCEM	New York City Emergency Management
NYCDEP	New York City Department of Environmental Protection
NYPA	New York Power Authority

NYCRR	New York Codes, Rule, and Regulations
NYS	New York State
NYS DBSC	New York State Division of Building Standards and Codes
NYS DHSES	New York State Division of Homeland Security and Emergency Services
NYS DOH	New York State Department of Health
NYS DPC	New York State Disaster Preparedness Commission
NYS ERDA	New York State Energy Research and Development Authority
NYS ESD	New York State Empire State Development
NYS GIS	New York State Geographic Information System
NYS GS	New York State Geological Survey
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
PDM	Pre-Disaster Mitigation Program
PDSI	Palmer Drought Severity Index
PGA	Peak Ground Acceleration
PPD-8	Presidential Policy Directive 8
RAISE	Rebuilding American Infrastructure with Sustainability and Equity
RCV	Replacement Cost Value
REDC	Regional Economic Development Council
Risk MAP	Risk Mapping, Assessment, and Planning
RL	Repetitive Loss
RLF	Revolving Loan Fund
RSI	Regional Snowfall Index
RTP	Recreational Trails Program
RTS	Regional Transit Service

SBA	Small Business Administration
SDI	State Drought Index
SEDA	Seneca Army Depot
SFHA	Special Flood Hazard Area
SFRMG	State Flood Risk Management Guidance
SILVIS	Spatial Analysis for Conservation and Sustainability
SPC	Storm Prediction Center
SPEI	Standardized Precipitation Evapotranspiration Index
SRL	Severe Repetitive Loss
SSI	Supplemental Security Income
STEPS	Seneca Towns Engaging People for Solutions
SWCD	Soil and Water Conservation District
SWOO	Strengths, Weaknesses, Obstacles and Opportunities
T	Town
TBD	To Be Determined
THIRA	Threat Hazard Identification and Risk Assessment
U.S.	United States
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USDHS	United States Department of Homeland Security
USDI	United States Department of Interior
USEDA	United States Economic Development Administration
USGS	United States Geological Survey
USSD	United States Society on Dams

V	Village
WCT	Wind Chill Temperature
WFO	Weather Forecast Office
WHO	World Health Organization
WIC	Women, Infants, and Children
WUI	Wildland/Urban Interface