Cattaraugus County, New York

Hazard Mitigation Plan

Volume I – Basic Plan



May 2025

TETRA TECH

Cattaraugus County Hazard Mitigation Plan

May 2025
#105s039526

PREPARED FOR

Cattaraugus County Department of Public Works
8810 Route 242,
Little Valley, NY 14755

PREPARED BY

Tetra Tech
2301 Lucien Way,
Maitland, FL 32751

P +1 (321) 441-8500
tetratech.com

TETRA TECH

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 are experiencing 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.

Cattaraugus 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. The County and 43 participating local jurisdictions (the Planning Partners) prepared this plan as an update to the 2020 Cattaraugus County HMP. The updated 2025 HMP (also referred to as "the plan") 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 Department of Homeland Security and Emergency Services (NYS DHSES) supports plan development for jurisdictions in the State of New York.

The Planning Process

This HMP update documents the process and outcomes of the Planning Partners' mitigation planning efforts. To support the planning process, the Planning Partners accomplished the following:

- Developed a Steering Committee consisting of key stakeholders and a countywide Planning Partnership made up of the Steering Committee members, the Planning Partners, and other regional stakeholders
- Reviewed the 2020 Cattaraugus County HMP
- Identified hazards of concern to the County to be included in the update
- Profiled the 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 2020 Cattaraugus County 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 Cattaraugus County that participated as Planning Partners in this HMP update:

- Cattaraugus County
- Town of Allegany
- Village of Allegany
- Town of Ashford
- Town of Carrollton
- Village of Cattaraugus
- Town of Coldspring
- Town of Conewango
- Town of Dayton
- Village of Delevan
- Town of East Otto
- Town of Ellicottville
- Village of Ellicottville
- Town of Farmersville
- Town of Franklinville
- Village of Franklinville
- Town of Freedom
- Village of Gowanda
- Town of Great Valley
- Town of Hinsdale
- Town of Humphrey
- Town of Ischua
- Town of Leon
- Town of Little Valley
- Village of Little Valley
- Town of Lyndon
- Town of Machias
- Town of Mansfield
- Town of Napoli
- Town of New Albion
- City of Olean
- Town of Olean
- Town of Otto
- Town of Perrysburg
- Town of Persia
- Town of Portville
- Village of Portville
- Town of Randolph Town of Red House
- City of Salamanca
- Town of Salamanca
- Village of South Dayton
- Town of South Valley
- Town of Yorkshire

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 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 Cattaraugus County Department of Public Works (DPW), the Cattaraugus County Hazard Mitigation Steering Committee provided oversight for the preparation of this plan. The Steering Committee includes representatives from the following:

- Cattaraugus County Attorney's Office Risk Management Division
- Cattaraugus County Department of Public Works
- Cattaraugus County Department of Community Services
- Cattaraugus County Health Department
- Cattaraugus County Office of Emergency Services
- Cattaraugus County Office of Real Property and GIS Services
- Cattaraugus County Engineering

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 Cattaraugus County are presented in Table ES-1.

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

Hazard of Concern	Hazard Ranking
Dam and Levee Failure	Medium
Flood	Medium
Landslide	Medium
Pandemic	Medium
Severe Storm	High
Severe Winter Storm	High
Utility Failure	Medium
Wildfire	Medium

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 Cattaraugus 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

Hazard Mitigation Plan Goals and Objectives

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

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

2025 Cattaraugus County HMP Goals

Goal 1: Protect life, property, environment, economy, and critical infrastructure from hazard impacts.

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

Goal 3: Educate the public, officials, and other stakeholders about the hazards they face and what can be done to mitigate hazard impacts.

Goal 4: Enhance mitigation capabilities to reduce hazard vulnerabilities.

Goal 5: Support continuity of operations pre-, during, and post-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 2020 Cattaraugus County HMP

The status of the mitigation projects identified in the 2020 Cattaraugus County HMP was reviewed for this HMP update. 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. 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 focus on the 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.

TABLE OF CONTENTS

EXECUTIVE SUMMARY I

PART 1: THE PLANNING PROCESS AND PLANNING AREA 1

1. Introduction 1-1
   - 1.1 Overview of Hazard Mitigation Planning 1-1
   - 1.2 History of Hazard Mitigation Planning in Cattaraugus County 1-4
   - 1.3 Plan Organization 1-5
2. Planning Process 2-1
   - 2.1 General Mitigation Planning Approach 2-1
   - 2.2 Organization of Planning Process 2-2
   - 2.3 Stakeholder Outreach and Involvement 2-8
   - 2.4 Incorporation of Existing Plans, Studies, Reports and Technical Information 2-23
   - 2.5 Integration with Existing Planning Mechanisms and Programs 2-25
   - 2.6 Plan Adoption 2-25
   - 2.7 Continued Public Involvement 2-26
3. County Profile 3-1
   - 3.1 Location 3-1
   - 3.2 History 3-1
   - 3.3 Jurisdictions Within the County 3-1
   - 3.4 Physical Setting 3-2
   - 3.5 Land Use 3-7
   - 3.6 Population and Demographics 3-10
   - 3.7 Economy 3-16
   - 3.8 General Building Stock 3-17
   - 3.9 Community Lifelines 3-24
   - 3.10 Other Critical Facilities 3-40
   - 3.11 Natural, Historic, and Cultural Resources 3-40

PART 2: RISK ASSESSMENT 1

4. Risk Assessment Methodology and Tools 4-1
   - 4.1 Asset Inventories 4-2
   - 4.2 Methodology 4-3
   - 4.3 Rating Probability of Occurrence 4-7
   - 4.4 Data Source Summary 4-7
   - 4.5 Limitations 4-7
   - 4.6 Considerations for Mitigation and Next Steps 4-8
5. Identification of Hazards of Concern 5-1
   - 5.1 Hazard Groupings 5-7
6. Dam and Levee Failure 6-1

6.1 Hazard Profile ... 6-1
6.2 Vulnerability and Impact Assessment ... 6-13
6.3 Future Changes That May Affect Risk ... 6-20
7. Flood ... 7-1
7.1 Hazard Profile ... 7-1
7.2 Vulnerability and Impact Assessment ... 7-17
7.3 Future Changes That May Affect Risk ... 7-37
8. Landslide ... 8-39
8.1 Hazard Profile ... 8-39
8.2 Vulnerability and Impact Assessment ... 8-45
8.3 Future Changes That May Affect Risk ... 8-57
9. Pandemic ... 9-1
9.1 Hazard Profile ... 9-1
9.2 Vulnerability and Impact Assessment ... 9-7
9.3 Future Changes That May Affect Risk ... 9-13
10. Severe Storm ... 10-1
10.1 Hazard Profile ... 10-1
10.2 Vulnerability and Impact Assessment ... 10-25
10.3 Future Changes That May Affect Risk ... 10-39
11. Severe Winter Storm ... 11-1
11.1 Hazard Profile ... 11-1
11.2 Vulnerability and Impact Assessment ... 11-10
11.3 Future Changes That May Affect Risk ... 11-17
12. Utility Failure ... 12-19
12.1 Hazard Profile ... 12-19
12.2 Vulnerability and Impact Assessment ... 12-24
12.3 Future Changes That May Affect Risk ... 12-30
13. Wildfire ... 13-1
13.1 Hazard Profile ... 13-1
13.2 Vulnerability and Impact Assessment ... 13-11
13.3 Future Changes That May Affect Risk ... 13-31
14. Hazard Ranking ... 14-1
14.1 Hazard Ranking Methodology ... 14-1
14.2 Categories Used in Ranking ... 14-1
14.3 Hazard Ranking Results ... 14-4
PART 3: CAPABILITY ASSESSMENT ... 1
15. Capability Assessment ... 15-1
15.1 Capability Assessment Process ... 15-1
15.2 Planning and Regulatory Capabilities ... 15-1
15.3 Administrative and Technical Capabilities ... 15-11

15.4 Fiscal Capabilities 15-20
PART 4: MITIGATION STRATEGY 15-1
16. Mitigation Strategy 16-1
16.1 Past Mitigation Accomplishments 16-1
16.2 Review and Update of Mitigation Goals and Objectives 16-1
16.3 Mitigation Strategy Development and Update 16-3
PART 5: PLAN MAINTENANCE 1
17. Plan Maintenance and Implementation Procedures 17-1
17.1 HMP Coordinator and Jurisdiction Points of Contact 17-1
17.2 Maintenance and Implementation Tasks 17-1
References 1
Abbreviations 1

LIST OF TABLES

Table ES-1. Countywide Ranking for Cattaraugus County Hazards of Concern iii
Table 1-1. FEMA Local Mitigation Plan Review Crosswalk 1-2
Table 2-1. Cattaraugus County Hazard Mitigation Planning Partnership Members 2-3
Table 2-2. Cattaraugus County Hazard Mitigation Steering Committee Members 2-5
Table 2-3. Summary of Mitigation Planning Activities/Efforts 2-6
Table 2-4. Participation of Federal and State Agencies 2-8
Table 2-5. County and Regional Agencies 2-9
Table 3-1. Cattaraugus County Municipalities 3-1
Table 3-2. Cattaraugus County 2021 Land Use Classification 3-7
Table 3-3. Historical and Projected Population Change in Cattaraugus County 3-10
Table 3-4. Cattaraugus County Population and Demographic Statistics American Community Survey 5-Year Estimates 3-13
Table 3-5. Cattaraugus County Internet Access by Jurisdiction 3-15
Table 3-6. Building Replacement Cost Value by Occupancy 3-22
Table 4-1. RCV Regional Location Factor 4-3
Table 4-2. Summary of Risk Assessment Analyses 4-4
Table 4-3. Summary of Hazus Analysis Levels 4-5
Table 4-4. Risk Assessment Data Documentation 4-7
Table 5-1. Identification of Hazards of Concern for Cattaraugus County 5-2
Table 6-1. High Hazard Potential Dams in Cattaraugus County 6-4
Table 6-2. Recent Dam Inspection Dates 6-5
Table 6-3. United States Army Corps of Engineers Hazard Potential Classification 6-14
Table 6-4. Cattaraugus County Socially Vulnerable Populations by Municipality 6-16
Table 6-5. Cattaraugus County ALICE Data 6-18
Table 7-1. Flood Map Terms 7-5
Table 7-2. Number of Acres Cattaraugus County Is Exposed to 1 Percent Annual Chance Flood 7-5
Table 7-3. Stream Gages in Cattaraugus County 7-10
Table 7-4. FEMA Declarations for Flood Events in Cattaraugus County (1954 to 2024) 7-12
Table 7-5. USDA Declarations for Flood Events in Cattaraugus County (2018-2024) 7-12
Table 7-6. Flood Events in Cattaraugus County (2018 to 2024) 7-12
Table 7-7. Probability of Future Flood Events in Cattaraugus County 7-15

Table 7-8. Mean Annual Changes in Precipitation in the Southern Tier Region ... 7-16
Table 7-9. Estimated Population Exposed to the 1 Percent Annual Chance Flood Event Hazard Area ... 7-18
Table 7-10. Estimated Number of Vulnerable Persons Located in the 1 Percent Annual Chance Flood Hazard Area by Jurisdiction ... 7-21
Table 7-11. Cattaraugus County ALICE Data ... 7-23
Table 7-12. Estimated Population Displaced or Seeking Short-Term Shelter from the 1 Percent Annual Chance Flood Event Hazard Area ... 7-24
Table 7-13. Estimated General Building Stock Exposure to the 1 Percent Annual Chance Flood Event ... 7-25
Table 7-14. Estimated Building Stock Potential Loss by Occupancy to the 1 Percent Annual Chance Flood Event ... 7-27
Table 7-15. Occupancy Class of Repetitive Loss Structures in Cattaraugus County ... 7-29
Table 7-16. Occupancy Class of Repetitive Loss Structures in Cattaraugus County by Municipality ... 7-29
Table 7-17. NFIP Statistics in Cattaraugus County ... 7-31
Table 7-18. Number of Critical Facilities Located in the 1 Percent Annual Chance Flood Hazard Area ... 7-33
Table 7-19. Estimated Debris Generated from the 1 Percent Annual Chance Flood Event ... 7-35
Table 8-1. USDA Declarations for Landslide Events in Cattaraugus County (2018 to 2024) ... 8-43
Table 8-2. Estimated Population Exposed to Landslides in Cattaraugus County ... 8-45
Table 8-3. Cattaraugus County Socially Vulnerable Populations Impacted by Landslide Susceptibility ... 8-48
Table 8-4. Cattaraugus County ALICE Data ... 8-50
Table 8-5. Number of Buildings located in the Landslide Hazard Area ... 8-51
Table 8-6. Buildings in Landslide Susceptibility Areas by General Occupancy Class ... 8-53
Table 8-7. Number of Critical Lifelines Located in the Landslide Susceptibility Hazard Area ... 8-55
Table 9-1. WHO Global Pandemic Phases ... 9-3
Table 9-2. FEMA Declarations for Pandemic Events in Cattaraugus County (1954 to 2024) ... 9-4
Table 9-3. Pandemic Events in Cattaraugus County (2018 to 2024) ... 9-5
Table 9-4. Cattaraugus County Socially Vulnerable Populations by Municipality ... 9-9
Table 9-5. Cattaraugus County ALICE Data ... 9-11
Table 10-1. NWS Wind Descriptions ... 10-11
Table 10-2. National Weather Service Alerts ... 10-14
Table 10-3. FEMA Declarations for Severe Storm Events in Cattaraugus County (1954 to 2024) ... 10-17
Table 10-4. USDA Declarations for Severe Storm Events in Cattaraugus County (2018 to 2024) ... 10-17
Table 10-5. Severe Storm Events in Cattaraugus County (2018 to 2024) ... 10-18
Table 10-6. Probability of Future Severe Storm Events in Cattaraugus County ... 10-22
Table 10-7. Changes in Extreme Events in the Southern Tier Region – Extreme Heat and Cold ... 10-23
Table 10-8. Adverse Effects of Prolonged Exposure to Direct Sunlight ... 10-25
Table 10-9. Cattaraugus County Socially Vulnerable Populations by Municipality ... 10-28
Table 10-10. Cattaraugus County ALICE Data ... 10-30
Table 10-11. Example of Structural Damage State Definitions for a Light Wood-Framed Building ... 10-31
Table 10-12. Estimated Building Damages (Structure and Contents) from the 500-Year MRP Hurricane Events 10-32
Table 10-13. Estimated Building Losses Caused by the 500-Year MRP Hurricane by Occupancy ... 10-33
Table 10-14. Estimated Damage for Critical Facilities in Cattaraugus County for the 500-Year MRP Hurricane Event ... 10-35
Table 10-15. Estimated Debris Created During the 500-Year Mean Return Period Hurricane Wind Event ... 10-36
Table 10-16. Agricultural Land in Cattaraugus County in 2022 ... 10-38
Table 11-1. RSI Ranking Categories ... 11-3
Table 11-2. Winter Storm Category Thresholds ... 11-3
Table 11-3. FEMA Declarations for Severe Winter Storm Events in Cattaraugus County (1954 to 2024) ... 11-4
Table 11-4. USDA Declarations for Severe Winter Storm Events in Cattaraugus County (2018 to 2024) ... 11-5

Table 11-5. Severe Winter Storm Events in Cattaraugus County (2018 to 2024) 11-5
Table 11-6. Probability of Future Severe Winter Storm Events in Cattaraugus County 11-9
Table 11-7. Cattaraugus County Socially Vulnerable Populations by Municipality 11-12
Table 11-8. Cattaraugus County ALICE Data 11-14
Table 11-9. General Building Stock Exposure and Estimated Losses from Severe Winter Storm Events 11-15
Table 12-1. FEMA Declarations for Utility Failure Events in Cattaraugus County (1954 to 2024) 12-22
Table 12-2. Utility Failure Events in Cattaraugus County (2018 to 2024) 12-22
Table 12-3. Cattaraugus County Socially Vulnerable Populations by Municipality 12-26
Table 12-4. Cattaraugus County ALICE Data 12-28
Table 13-1. Description of Fire Danger Ratings in New York State 13-6
Table 13-2. Fuel Moisture Classifications 13-7
Table 13-3. Haines Index 13-8
Table 13-4. Wildfire Events in Cattaraugus County (2018 to 2024) 13-9
Table 13-5. Estimated Population Located Within the Wildfire Threat Hazard Areas 13-14
Table 13-6. Cattaraugus County Socially Vulnerable Populations by Municipality 13-16
Table 13-7. Cattaraugus County ALICE Data 13-18
Table 13-8. Vulnerable Populations Located in the WUI Interface Hazard Area 13-19
Table 13-9. Vulnerable Populations Located in the WUI Intermix Hazard Area 13-20
Table 13-10. Buildings In the Wildland Urban Interface and Intermix Hazard Areas 13-22
Table 13-11. Building Stock within the WUI in Cattaraugus County 13-24
Table 13-12. Facilities within the WUI Interface in Cattaraugus County 13-27
Table 13-13. Facilities within the WUI Intermix in Cattaraugus County 13-29
Table 14-1. Values and Weights for Probability of Occurrence 14-2
Table 14-2. Values and Weights for Consequence 14-2
Table 14-3. Values and Weights for Adaptive Capacity 14-3
Table 14-4. Values and Weights for Climate Change 14-3
Table 14-5. Probability of Occurrence for Hazards of Concern for Cattaraugus County 14-5
Table 14-6. Consequence Rating for Hazards of Concern for Cattaraugus County 14-5
Table 14-7. Adaptive Capacity and Climate Change Ratings for Hazards of Concern for Cattaraugus County . 14-6
Table 14-8. Total Hazard Ranking Scores for the Hazards of Concern for Cattaraugus County 14-6
Table 14-9. Preliminary Overall Ranking of Hazards by Jurisdiction 14-7
Table 15-1. FEMA HMA Grant Cost Share Requirements 15-21
Table 16-1 Qualitative Cost and Benefit Ratings 16-9
Table 17-1. Plan Maintenance Matrix 17-2
Table 17-2. Safe Growth Check List 17-4

LIST OF FIGURES

Figure 2-1. Cattaraugus County HMP Webpage and Local Online Outreach 2-20
Figure 2-2. Cattaraugus County HMP Webpage and Local Online Outreach 2-21
Figure 2-3. Most Frequently Experienced Natural Hazard Events in Cattaraugus County 2-23
Figure 3-1. Cattaraugus County HMP Area 3-3
Figure 3-2. Watershed 3-4
Figure 3-3. Watersheds in Cattaraugus County 3-5
Figure 3-4. Cattaraugus County Land Use and Land Cover 3-9
Figure 3-5. Population Distribution in Cattaraugus County 3-11
Figure 3-6. Socially Vulnerable Populations In Cattaraugus County 3-12
Figure 3-7. Distribution of Total Building Stock and Value Density in Cattaraugus County 3-18

Figure 3-8. Distribution of Residential Building Stock and Value Density in Cattaraugus County 3-19
Figure 3-9. Distribution of Commercial Building Stock and Value Density in Cattaraugus County 3-20
Figure 3-10. Distribution of Industrial Building Stock and Value Density in Cattaraugus County 3-21
Figure 3-11. Safety and Security Facilities in Cattaraugus County 3-26
Figure 3-12. Dam Locations in Cattaraugus County 3-27
Figure 3-13. Food, Hydration, and Shelter Facilities in Cattaraugus County 3-29
Figure 3-14. Health and Medical Facilities in Cattaraugus County 3-31
Figure 3-15. Energy Facilities in Cattaraugus County 3-33
Figure 3-16. Communications Facilities in Cattaraugus County 3-34
Figure 3-17. Transportation Facilities in Cattaraugus County 3-37
Figure 3-19. Evacuation Routes in Cattaraugus County 3-38
Figure 3-20. Hazardous Materials Facilities in Cattaraugus County 3-42
Figure 3-21. Water Facilities in Cattaraugus County 3-43
Figure 3-22. Cattaraugus County Water Authority Service Area 3-44
Figure 3-23. Other Critical Facilities in Cattaraugus County 3-45
Figure 6-1. Dam Failure Causes 6-2
Figure 6-2. Dams Located in Cattaraugus County 6-7
Figure 6-3. Left and Right Bank Olean Levee System 6-8
Figure 6-4. North and South of Dodge Creek Levee System 6-9
Figure 6-5. Left Bank and Right Bank Allegheny Levee System and Right Bank West Salamanca Levee System 6-10
Figure 7-1. Characteristics of a Floodplain 7-4
Figure 7-2. FEMA Flood Hazard Areas in Cattaraugus County 7-7
Figure 7-3. Stream Gages in Cattaraugus County 7-11
Figure 8-1. National Risk Index, Landslide Risk Index 8-41
Figure 8-2. Landslide Incidence and Susceptibility in Cattaraugus County 8-42
Figure 10-1. Average Number of Weather-Related Fatalities in the U.S. 10-4
Figure 10-2. National Risk Index of Hail in Cattaraugus County 10-6
Figure 10-3. National Risk Index of Strong Wind in Cattaraugus County 10-7
Figure 10-4. National Risk Index of Hurricanes in Cattaraugus County 10-7
Figure 10-5. Historical Tropical Storm and Hurricane Tracks 1950 to 2024 10-8
Figure 10-6. National Risk Index of Lightning in Cattaraugus County 10-10
Figure 10-7. National Risk Index of Tornadoes in Cattaraugus County 10-10
Figure 10-8. National Risk Index of Cold Waves in Cattaraugus County 10-11
Figure 10-9. The Saffir-Simpson Scale 10-12
Figure 10-10. Severe Thunderstorm Risk Categories 10-15
Figure 10-11 Explanation of EF-Scale Ratings 10-15
Figure 10-12. Wind Speeds for the 500-Year Mean Return Period Event 10-16
Figure 11-1. Winter Storm Warning Thresholds 11-4
Figure 12-1. Electric Service Delivery Companies in New York 12-20
Figure 12-2. Projected Annual Average Temperature in New York State 12-23
Figure 13-1. Fire Triangle 13-1
Figure 13-2. Forest Ranger Division Wildfire Protection Areas 13-2
Figure 13-3. Forest Ranger Divisions in New York State 13-3
Figure 13-4. New York State Fire Danger Rating Areas 13-4
Figure 13-5. Wildland-Urban Interface and Intermix Areas in Cattaraugus County 13-5
Figure 13-6. Wildfire Occurrences in New York State, 2003-2017 13-9

Part 1: The Planning Process and Planning Area

1. INTRODUCTION

Cattaraugus County (the 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 the County and 43 participating local jurisdictions (the Planning Partners), this Hazard Mitigation Plan (HMP) updates the 2020 Cattaraugus County HMP. The updated 2025 HMP (also referred to as "the plan") includes countywide analysis and assessment of hazards, risks, and capabilities.

1.1 OVERVIEW OF HAZARD MITIGATION PLANNING

1.1.1 What Is Hazard Mitigation?

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risks 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 disasters 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 local communities
- A more sustainable and disaster-resistant community
- Financial savings through partnerships that support planning and mitigation efforts
- Focused use of limited resources on hazards that have the biggest impact on the community
- Reduced long-term impacts and damage 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 communities, 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 grounded in the principle that a disaster-resistant community can recover from a natural disaster more quickly, with reduced property loss, fewer human injuries, and at a significantly lower cost. Moreover, other costs associated with disasters are minimized, such as the time lost from productive activity by businesses and industries.

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 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous law's mitigation planning provisions (Section 409) and replacing them with a new set of requirements (Section 322). Under the new Section 322, communities seeking certain hazard-related federal funding must have a plan that identifies actions to mitigate hazards, risks, and vulnerabilities and establishes a strategy to implement those actions.

Regulations implementing the intent and requirements of DMA 2000 are included in Title 44 of the Code of Federal Regulations, Section 201 (44 CFR 201). In New York, responsibility for fulfilling the requirements of DMA 2000 and 44 CFR 201 and administering the FEMA Hazard Mitigation Program has been delegated to the New York State Division of Homeland Security and Emergency Services (NYS DHSES).

The federal regulations require that states and local governmental agencies update HMPs on a 5-year basis to prepare for and reduce the potential impacts of natural hazards. Each local jurisdiction must identify potential natural hazards to the health, safety, and well-being of its residents and identify and prioritize actions that can be taken by the community to mitigate those hazards before disaster strikes. To be eligible for hazard mitigation assistance from the federal government, communities must prepare, maintain, and update an HMP.

One goal of the federal regulations is to facilitate cooperation between state and local authorities, prompting them to work together. This enhanced planning 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.

Table 1-1 summarizes the 44 CFR 201 requirements 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; Chapter 4; 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 over the years with particular meanings within the hazard mitigation practice. The list below provides a quick reference for specialized terms whose use is especially prominent in this hazard mitigation plan:

- **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 CATTARAUGUS COUNTY

1.2.1 Previous Cattaraugus County HMPs

Cattaraugus County has been included in 26 federal hazard-related declarations (major disaster, fire management, and emergency) since 1954. Following the adoption of DMA 2000 and the new national focus on mitigating hazards through advance planning, the County prepared and adopted its first HMP in 2007. The plan has been regularly updated since then, with updates adopted in 2013 and 2020. The most recent update identified the following as the greatest hazards of concern in Cattaraugus County:

- Dam Failure
- Flood
- Landslide
- Pandemic
- Severe Storm
- Severe Winter Storm
- Utility Failure
- Wildfire

1.2.2 Key Changes in the Current Update

The following are the most significant changes made between the previous County HMP (2020) and the current (2025) update:

- The 2020 Cattaraugus County HMP did not identify dam failure as a hazard of concern. Members of the Steering Committee and Planning Partnership identified this as a hazard of concern for the 2025 HMP update.
- The 2020 Cattaraugus County HMP did not identify pandemic as a hazard of concern. Members of the Steering Committee and Planning Partnership identified this as a hazard of concern for the 2025 HMP update.
- In the 2020 Cattaraugus County HMP, the hazard profile section was presented in Section 5. For the 2025 HMP update, each profile is presented in stand-alone chapters.

- In the 2020 Cattaraugus County HMP, the methodology and tools, hazards of concern identification, and hazard ranking sections were presented in Section 5. For the 2025 HMP update, these sections are presented as stand-alone chapters.
- In the 2020 Cattaraugus County HMP, the planning partnership section was presented in Section 8. For the 2025 HMP update, this section is presented as an introductory chapter in Volume II.

1.3 PLAN ORGANIZATION

The Cattaraugus County HMP provides a detailed review and analysis of each hazard of concern, resources, and relevant statistical information for the Planning Partners. The plan is organized into two volumes: Volume I includes all information that applies to the entire planning area (Cattaraugus 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 of the plan 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 each participating jurisdiction.
  - Chapter 3: County Profile: An overview of Cattaraugus County, including general information and physical conditions, land use patterns and trends, population and demographics, economy, general building stock inventory, community lifelines, and natural, historic, and cultural resources.
- 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.
  - Chapters 6 – 13: 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; the economy, and natural, historic, and cultural resources).
  - Chapter 14: Hazard 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 planning, regulatory, and fiscal capabilities; evaluates vulnerabilities to hazards; describes the status of past mitigation actions; 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:** Mitigation Strategy Supplementary Data: Summarizes additional activities and resources provided to plan participants to support the update of the mitigation strategy
- **Appendix I:** NYS DHSES Planning Standards: Includes planning standards and guidelines for hazard mitigation planning.

2. PLANNING PROCESS

This chapter describes the planning process used to update the Cattaraugus 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, including all municipalities in the County. Cattaraugus County invited all jurisdictions in the County to join in the planning process. To date, all 43 local municipal governments in the County (the Planning Partnership) have participated in the 2025 plan update process:
  - Cattaraugus County
  - Town of Allegany
  - Village of Allegany
  - Town of Ashford
  - Town of Carrollton
  - Village of Cattaraugus
  - Town of Coldspring
  - Town of Conewango
  - Town of Dayton
  - Village of Delevan
  - Town of East Otto
  - Town of Ellicottville
  - Village of Ellicottville
  - Town of Farmersville
  - Town of Franklinville
  - Village of Franklinville
  - Town of Freedom
  - Village of Gowanda
  - Town of Great Valley
  - Town of Hinsdale
  - Town of Humphrey
  - Town of Ischua
  - Town of Leon
  - Town of Little Valley
  - Village of Little Valley
  - Town of Lyndon
  - Town of Machias
  - Town of Mansfield
  - Town of Napoli
  - Town of New Albion
  - City of Olean
  - Town of Olean
  - Town of Otto
  - Town of Perrysburg
  - Town of Persia
  - Town of Portville
  - Village of Portville
  - Town of Randolph
  - Town of Red House
  - City of Salamanca
  - Town of Salamanca
  - Village of South Dayton
  - Town of South Valley
  - Town of Yorkshire
- The format of this plan is such that other entities can easily 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, as required by 44 CFR 201. Non-natural hazards that pose significant risk were considered as well.
- The plan was developed following FEMA regulations and prevailing FEMA and state guidance. This ensures that all the requirements are met and supports plan review. In addition, this plan will meet criteria for the Flood Mitigation Assistance (FMA) programs.

2.1 GENERAL MITIGATION PLANNING APPROACH

FEMA provides hazard mitigation planning support to local communities through guidance, resources, and plan reviews. This HMP was prepared in accordance with the following regulations and guidance:

- FEMA Mitigation Planning How-to Series (FEMA 386-1 through 4, 2002).
- FEMA How-To Guide for Using Hazus for Risk Assessment FEMA Document No. 433, February 2004.
- FEMA Local Mitigation Plan Review Guide, October 1, 2011.
- FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, January 2013.

- FEMA Integrating Hazard Mitigation into Local Planning, March 1, 2013.
- FEMA Plan Integration: Linking Local Planning Efforts, July 2015.
- FEMA Local Mitigation Planning Policy Guide, April 19, 2022.
- FEMA Local Mitigation Planning Handbook, May 2023.
- DMA 2000 (Public Law 106-390, October 30, 2000).
- 44 CFR 201 and 206 (including: Feb. 26, 2002, Oct. 1, 2002, Oct. 28, 2003, and Sept. 13, 2004, Interim Final Rules).
- NYS DHSES Hazard Mitigation Planning Standard, 2022.
- NYS DHSES Hazard Mitigation Plan. 2019.

2.2 ORGANIZATION OF PLANNING PROCESS

2.2.1 Planning Process Participants

Project Management and Planning Consultant

Project management was the responsibility of the Cattaraugus County Department of Public Works. 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
- Assistance with the review and update of mitigation planning goals and objectives
- Assistance with the review of past mitigation strategy progress
- Assistance with the screening of mitigation actions and the identification of appropriate actions
- Assistance with the prioritization of mitigation actions
- Authoring of the draft and final plan documents

Planning Partnership

In January 2024, the County notified all municipalities of the pending planning process and invited them to formally participate. Jurisdictions were asked to formally notify the County of their intent to participate via a letter of intent and to identify planning points of contact to facilitate their participation and represent the interests of their communities. All participating jurisdictions, including the County, are recognized as Planning Partners and belong to the Planning Partnership for this HMP. 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

Table 2-1 shows the current members of the Planning Partnership as of the time of publication of this plan update.

Table 2-1. Cattaraugus County Hazard Mitigation Planning Partnership Members

Jurisdiction	Primary Point of Contact	Title	Alternate Point of Contact	Title
Cattaraugus County	Kimberly Merrill	HMP Coordinator / Secretary to Commissioner	Naomi Gennings	NIMS Coordinator
Allegany (T)	John Moshier	Highway Superintendent	Jim Hitchcock	Town Council
Allegany (V)	John Helgager	Code Enforcement Officer	Anthony Papasergi	Highway Superintendent
Ashford (T)	John Pfeffer	Supervisor	Keith Butcher	Highway Superintendent
Carrollton (T)	Michael Fox	Highway Superintendent	Robert Rinfrette	Supervisor
Cattaraugus (V)	Jonathon Wolfe	Public Works Superintendent	Anthony Nagel	Mayor
Coldspring (T)	Kirk Hayes	Tina Hyde	Supervisor	Tina Hyde
Conewango (T)	Bryan Farmer	Highway Superintendent	Scott Patterson	Deputy Highway Superintendent
Dayton (T)	Aaron Huber	Supervisor	Chris Rupp	Deputy Supervisor
Delevan (V)	Gina Maltby	Clerk	Daren Smith	Public Works Superintendent
East Otto (T)	Ann Rugg	Supervisor	Thomas Benz	Highway Superintendent
Ellicottville (T)	Gregory Keyser	Town Planner	Matthew McAndrew	Supervisor
Ellicottville (V)	Gregory Keyser	Town Planner	Mark Chudy	Highway Superintendent
Farmersville (T)	Donna Vickman	Town Representative	Pamela Tilton	Supervisor
Franklinville (T)	Catharyn Campbell	Supervisor	Andrea Stanbro	Town Clerk
Franklinville (V)	Cary Hatch	Highway Superintendent	Patricia Sage	Clerk
Freedom (T)	James Haggerty	Highway Superintendent	Mindy Holland	Town Clerk
Gowanda (V)	Carol Sheibley	Deputy Mayor	Nicholas Crassi	Disaster Coordinator
Great Valley (T)	Daniel Brown	Supervisor	Richard Rinko	Code Enforcement Officer
Hinsdale (T)	Jeff VanDeCar	Supervisor	Ted Mascho	Highway Superintendent

Jurisdiction	Primary Point of Contact	Title	Alternate Point of Contact	Title
Humphrey (T)	Jason Pearl	Highway Superintendent	Carrie Childs	Supervisor
Ischua (T)	Jeff Goodyear	Supervisor	Richard Michael	Highway Superintendent
Leon (T)	Fredrick Filock	Supervisor	Joel Fiebelkorn	Highway Superintendent
Little Valley (T)	Megan Morgenstern	Clerk	Thomas J. Crouse	Highway Superintendent
Little Valley (V)	Kory Gross	Streets Superintendent	John Helgager	Code Enforcement Officer
Lyndon (T)	George Schneider	Highway Superintendent	Emily Robinson	Clerk
Machias (T)	Tim Byroads	Highway Superintendent	Scott Ludka	Code Enforcement Officer
Mansfield (T)	Carl Calarco	Supervisor	Jeffrey Williams	Highway Superintendent
Napoli (T)	Dan Martonis	Supervisor	Gerod Stacey	Highway Superintendent
New Albion (T)	Patrick Murphy	Supervisor	George Borrowdale	Highway Superintendent
Olean (C)	James Sprague	Public Works Director	Eric Maurouard	Fire Chief
Olean (T)	Patrick Zink	Highway Superintendent	Annette Parker	Supervisor
Otto (T)	Robert Barber	Highway Superintendent	Paul Stang	Deputy Supervisor
Perrysburg (T)	Daniel Stang	Highway Superintendent	David Heckman	Code Enforcement Officer
Persia (T)	Daniel Ackley	Highway Superintendent	John Walgus	Supervisor
Portville (T)	John Krist	Code Enforcement Officer	Tim Emley	Supervisor
Portville (V)	Anthony Evans	Mayor	Andy Hall	Public Works Superintendent
Randolph (T)	Cody Uhl	Highway Superintendent	Dale Senn	Supervisor
Red House (T)	Tamara Booth	Supervisor	Brian Booth	Highway Superintendent
Salamanca (C)	Tom Sturdevant	Fire Chief	Robert Carpenter	Highway Superintendent
Salamanca (T)	Chuck Oyler	Supervisor	Shelley Bryant	Clerk
South Dayton (V)	Robert Killock	Mayor	Steve Pollock	Public Works Superintendent
South Valley (T)	Heather Lamberson	Supervisor	Mary Ruth	Clerk
Yorkshire (T)	Christopher Lexer	Highway Superintendent / Code Enforcement Officer	Marcia Lexer	Supervisor

Note: (T) = Town; (V) = Village; (C) = City

The various jurisdictions in Cattaraugus 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 Cattaraugus 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 have 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.

Ultimately, jurisdictional participation is evidenced by a completed annex of the HMP, wherein jurisdictions individually identify their planning points of contact, 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. Annexes are included in Volume II of this HMP.

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

It is noted that all but one municipality in the County actively participate in the National Flood Insurance Program 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

Cattaraugus 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
- Assisting with the development and completion of certain planning elements, including:
  - Reviewing and updating the hazards of concern
  - Developing a public and stakeholder outreach program
  - 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. Cattaraugus County Hazard Mitigation Steering Committee Members

Affiliation	Name	Title
Cattaraugus Co. Attorney's Office Risk Management Division	Thomas Ruper	Safety Engineer
Cattaraugus Co. Dept of Public Works	Kathy Ellis	Commissioner
Cattaraugus Co. Dept. of Community Services	Mary O'Leary	Director
Cattaraugus Co. Dept. of Public Works	Kimberly Merrill	HMP Coordinator/Secretary to the Commissioner
Cattaraugus Co. Dept. of Public Works	Michael Prinino	Deputy Commissioner

Affiliation	Name	Title
Cattaraugus Co. Emergency Services	Chris Baker	Director & County Fire Coordinator
Cattaraugus Co. Health Department	James Lawrence	Emergency Preparedness Director
Cattaraugus Co. Office of Emergency Services	Naomi Gennings	NIMS Coordinator
Cattaraugus Co. Office of Real Property & GIS Services	Chris Holewinski	GIS Coordinator
Cattaraugus Co. Engineering	Mark Burr	Director

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 44 CFR 201 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	44 CFR 201 Requirement	Description of Activity	Participants
November 2, 2023	2	<u>Steering Committee Kick-Off Meeting</u>: Welcome and Introductions, Plan Timing and Administration, Data Collection and Sharing, Hazards of Concern, Public and Stakeholder Outreach, Next Steps, and Schedule	Cattaraugus County Department of Public Works, Cattaraugus County Attorney's Office Risk Management Division, Cattaraugus County Department of Community Services, Cattaraugus County Office of Emergency Services, Cattaraugus County Health Department, Cattaraugus County Office of Real Property & GIS Services, Tetra Tech
March 7, 2024	2, 3c, 4a	<u>Planning Partnership Kick-Off Meeting</u>: Welcome and Introductions, Overview of Hazard Mitigation, Project Scope Review, Project Schedule Review, Next Steps, and Schedule	County and municipal representatives and stakeholders. See Appendix D
May 7–9, 2024	2	<u>Planning Partnership – Jurisdictional Meetings:</u> Welcome and Introductions, Worksheet Reviews, Assistance to Jurisdictions on Completing Assigned Worksheet	See Appendix D
September 17, 2024	2, 3b, 3c, 3d, 3e, 4b	<u>Steering Committee and Planning Partnership Risk Assessment Meeting</u>	County and municipal representatives and stakeholders. See Appendix D

Date	44 CFR 201 Requirement	Description of Activity	Participants
		(AM and PM): Welcome and Introductions, Project Report and Status Review, Risk Assessment Overview, Risk Assessment Results, Hazard Rankings, Next Steps	
September 17, 2024	2, 3c, 3d, 3e, 4a, 4b	Steering Committee and Planning Partnership Mitigation Strategy Meeting (AM and PM): Welcome and Introductions, Project Report and Status Review, Identifying and Developing Mitigation Strategies, Developing New Potential Actions, 2025 Proposed Goals, Workshop, Next Steps	County and municipal representatives and stakeholders. See Appendix D
May 19, 2025	2	Draft Plan Review Meeting (afternoon): Overview of entire plan and sections; confirmed plan maintenance schedule; public invited to attend.	County and municipal representatives and stakeholders. See Appendix D
May 19, 2025	2	Draft Plan Review Meeting (afternoon): Overview of entire plan and sections; confirmed plan maintenance schedule; public invited to attend.	County and municipal representatives and stakeholders. See Appendix D
May 20, 2025	1b, 2	Draft HMP posted to public project website; all plan participants were notified and asked to assist with the public outreach including social media. Neighboring communities and stakeholders were notified of the posting as well.	Public and Stakeholders
May 20, 2025	2	HMP submitted to NYS DHSES	Public and Stakeholders
TBD	2	HMP submitted to FEMA Region II	NYS DHSES, FEMA Region II
Upon plan approval by FEMA	1a	Plan adoption by resolution by the governing bodies of all participating jurisdictions	All plan participants

Note: TBD = to be determined.
Numbers in column 2 identify specific federal 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 Cattaraugus County HMP update was written using the best available information obtained from a wide variety of sources. Throughout the HMP update process, a concerted effort was made to gather information from municipal and regional agencies and staff as well as stakeholders, federal and state agencies, and the residents of the County. 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 updated planning guidance; provided summary and detailed NFIP data for planning area; presented preliminary regulatory flood products to municipalities and the public; 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
New York State Department of Homeland Security and Emergency Services (NYS DHSES: Headquarters and Region II)	Administered planning grant and facilitated FEMA review; provided updated planning guidance; attended meetings; 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 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
• Cattaraugus Co. Attorney's Office Risk Management Division • Cattaraugus Co. Dept of Public Works • Cattaraugus Co. Dept. of Community Services • Cattaraugus Co. Emergency Services • Cattaraugus Co. Health Department • Cattaraugus Co. Office of Emergency Services • Cattaraugus Co. Office of Real Property & GIS Services • Cattaraugus Co. Engineering	Served on the Steering Committee, attended meetings, provided input, and reviewed the draft plan.
• Randolph Central School District • Allegany-Limestone Central School District • Olean City Fire Department	Attended meetings, provided input, and reviewed 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 Section 3.9.

Safety and Security

Law Enforcement

Many municipalities directly involved police and other law enforcement representatives in the planning process. Municipalities were asked to invite their law enforcement agencies to complete a stakeholder survey. Further, the following police departments and law enforcement agencies were invited via email to complete a stakeholder survey and review the draft plan:

- Allegany Village Police Department
- Cattaraugus Village Police Department
- Ellicottville Town Police Department
- Franklinville Village Police Department
- New York State Park Police - Allegany Headquarters
- New York State Police Troop A Zone 4 - Machias
- New York State Police Troop A Zone 4 - Olean
- Olean City Police Department
- Portville Village Police Department
- Salamanca City Police Department
- Cattaraugus County Sheriff's Office

Fire Districts and Fire Departments

Many jurisdictions directly involved fire districts or departments, hazardous materials response teams, and rescue team representatives in the planning process. Jurisdictions were asked to invite their fire departments to complete a stakeholder survey. The following fire districts or departments, hazardous materials response teams, and rescue teams were invited via email to complete a stakeholder survey and review the draft plan:

- Allegany Fire Department
- Cattaraugus Fire Department
- Coldspring Fire Department
- Conewango Fire Department
- Dayton Fire Department
- Delevan Fire Department
- East Otto Fire Department
- East Randolph Fire Department
- Ellicottville Fire Department
- Farmersville Fire Department
- Franklinville Fire Department
- Gowanda Fire Department
- Great Valley Fire Department
- Hinsdale Fire Department

- Humphrey Fire Department
- Ischua Fire Department
- Kill Buck Fire Department
- Knapp Creek Fire Department
- Leon Fire Department
- Limestone Fire Department
- Little Valley Fire Department
- Lyndon Fire Department
- Machias Fire Department
- Olean City Fire Department
- Olean Town Fire Department
- Otto Fire Department
- Perrysburg Fire Department
- Portville Fire Department
- Randolph Fire Department
- Salamanca Fire Department
- Cattaraugus County Fire Department
- South Dayton Fire Department
- Versailles Fire Department
- West Valley Fire Department
- Westons Mills Fire Department
- Yorkshire Fire Department

Dams

In order to address High Hazard Potential Dams, outreach was conducted with the following dam owners and/or the dam safety agency via email.

- Cattaraugus County
- NYSDEC Division of Fish and Wildlife
- Holimont Incorporated
- Win-Sum Ski Corporation

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, geologic impacts, and severe storms
- 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

Food, Hydration, 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 via email to complete a stakeholder survey and review the draft plan:

- American Red Cross
- Agricultural and Farmland Protection Board

Health and Medical

Hospitals and Healthcare Facilities

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

- Olean General Hospital
- Cattaraugus County Board of Health
- Cattaraugus County Health Department
- Absolute Care
- CASA-Trinity
- Cattaraugus Comm. Action Inc.
- Coatney Professional Center
- Community Care of Western NY
- Declaration Development
- Eden Heights of Olean Assisted Living & Memory Care
- Gowanda Rehabilitation and Nursing Center
- Jn Adam Developmental Center
- Medical Arts Building of Olean
- Pines Healthcare and Rehab Center
- Southern Tier Health Care System Inc
- The Rehab Center
- TLC Health Network

Ambulance/Emergency Medical Services

Jurisdictions were asked to invite their ambulance and emergency medical service providers to complete a stakeholder survey. In addition, the following ambulance and emergency medical service providers in the County were invited via email to complete a stakeholder survey and review the draft plan:

- Allegany Rescue & EMS Inc
- Cattaraugus Area Ambulance Service

- Coldspring Fire Department - Ambulance
- Delevan Vol Fire Department
- East Otto Fire Department
- Ellicottville Fire Department
- Franklinville Fire Department
- Great Valley Fire Department
- Hinsdale Fire Department
- Ischua Fire Department
- Knapp Creek Volunteer Fire Department
- Leon Fire Department
- Limestone Fire Department
- Little Valley Fire Department
- Machias Fire Department
- Olean City Fire Department
- Otto Fire Department
- Portville Fire Department
- Randolph Regional EMS Corp
- Salamanca City Fire Department
- Cattaraugus County EMS Allegany Territory
- South Dayton Fire Department
- Trans Am Ambulance Service
- West Valley Fire Department
- West Valley Fire Department - Ambulance
- Westons Mills Fire Department
- Yorkshire Fire Department

Energy

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

- National Grid
- Steuben Rural Electric Cooperative
- Village of Arcade Electric
- Valley Village Power
- New York State 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 via email to complete a stakeholder survey and review the draft plan:

- Starlink
- DFT Communications
- Armstrong
- HughesNet
- ViaSat
- Spectrum

Transportation

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

- Olean Area Transportation System
- Interfaith Caregivers, Inc.
- Southern Tier Extension Railroad Authority
- Western New York & Pennsylvania Railroad
- Buffalo and Pittsburgh Railroad
- Cattaraugus County Transit System
- CORVUS Bus
- First Transit, Inc.
- Wyoming Transit Services

Hazardous Materials

The following hazardous material facilities were invited via email to complete a stakeholder survey and review the draft plan:

- National Grid
- McCraken Oil & Gas
- Indeck Olean Energy Center

2.3.4 Additional Stakeholder Groups

Additional stakeholder outreach was made to academia, organizations that support socially vulnerable populations and underserved populations, and businesses, as listed in the sections below.

School Districts and Other Academic Institutions

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 via email to complete a stakeholder survey and review the draft plan:

- Ellicottville Central School District
- Franklinville Central School District
- West Valley Central School District
- Yorkshire-Pioneer Central School District
- Cattaraugus Central School District
- Little Valley Central School District
- Gowanda Central School District
- Randolph Central School District
- Allegany-Limestone Central School District

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 via email to complete a stakeholder survey and review the draft plan:

- Cattaraugus County Health Department
- Cattaraugus County Board of Health
- Cattaraugus County Department of Social Services
- Cattaraugus County Human Resources Office
- Love INC of the Greater Gowanda Area
- Interfaith Caregivers, Inc.
- Directions in Independent Living

Business and Commerce

The following business and commerce entities were invited via email to complete and share amongst their networks a stakeholder survey and review the draft plan:

- Greater Olean Area Chamber of Commerce
- Ellicottville New York Chamber of Commerce
- Gowanda Area Chamber-Commerce
- Salamanca Chamber of Commerce

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 county and jurisdictional representatives were contacted via email 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:

- Erie County (NY)
  - Department of Homeland Security and Emergency Services
  - Planning and Community Development
  - Local Jurisdictions
- Wyoming County (NY)
  - Office of Emergency Services
  - Department of Planning and Development
  - Local Jurisdictions
- Allegany County (NY)
  - Office of Emergency Management
  - Department of Planning
  - Local Jurisdictions
- Chautauqua County (NY)
  - Office of Emergency Services
  - Planning and Community Development
  - Local Jurisdictions
- Warren County (PA)
  - Emergency Management Agency
  - Planning and Zoning Department
  - Local Jurisdictions
- McKean County (PA)
  - Emergency Management Agency
  - Planning Commission
  - Local Jurisdictions

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 Cattaraugus 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 county and municipal departments and agencies.

Overview of Respondents

As of April 30, 2025, one stakeholder completed the survey, with the respondents coming from the emergency services sector. The respondent provides police services to the City of Olean.

The respondent noted that they do not work with socially vulnerable populations.

Hazard and Damage Identification

When asked if the organization maintains or manages anything within their designated service area, the respondent indicated the following facilities: buildings, roads, water/sewer, and stormwater. Further, the respondent notes the organization both owns and leases its facilities and is unsure if those facilities are susceptible to any natural hazards.

Community Preparedness

The respondent noted they are unaware of the location and number of socially vulnerable populations in their community/operating area and would appreciate additional information on how to better serve and protect the populations.

The respondent notes it is covered by an Emergency Operations Plan.

Project Identification

The respondent 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 County and municipal governments that border Cattaraugus County due to their proximity to the County and because the effects of hazard events that impact Cattaraugus County would be similar to that of their neighbors. As of April 30, 2025, office from two counties submitted the survey (Warren County and Chautauqua County).

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

Respondents indicated they share an MOU with Cattaraugus County for fire services and overall public safety.

25 percent of respondents noted that Cattaraugus County and/or its local jurisdictions are involved in their jurisdiction's emergency operations planning; 75 percent are unsure if they participate in Cattaraugus County and/or its local jurisdictions emergency operations planning. 25 percent of respondents noted that Cattaraugus County and/or its local jurisdictions are involved in their jurisdiction'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 Cattaraugus County's emergency operations center.

75 percent of respondents indicated they are unsure if their jurisdiction share risk, vulnerability assessments, and information regarding mitigation with Cattaraugus County.

Projects, Grants, Education, and Outreach

One respondent noted flooding from Cattaraugus Creek is a hazard risk they share with Cattaraugus County, while another respondent stated a shared hazard is the lack of interoperable emergency communication and cellular communication in areas along their shared border.

Respondents identified there are watershed, floodplain, and natural infrastructure projects which may require cross-collaboration between county boundaries. One respondent indicates they have collaborated with Cattaraugus County on grants for technical rescue and hazardous material response.

Most of the respondents (66.67) were unaware of any organizations that support socially vulnerable or underserved populations in their county and Cattaraugus County; however, one respondent did indicate the United States Army Corps of Engineers, and the United States Forest Service may serve these populations. None of the respondents were aware of any organizations that carry out education and outreach regarding hazards in their jurisdiction and Cattaraugus County.

Respondents indicated projects to ensure radio communications between their entity and Cattaraugus County would assist in optimizing cross-county cooperation. Further, one respondent noted their county is starting a Countywide Resiliency Plan and would be interested in having Cattaraugus County as a stakeholder to potentially identify cross-county partnership opportunities for projects.

Evacuation and Sheltering

One survey participant (33.33 percent) indicated collaboration with Cattaraugus County and/or its local jurisdictions is taken when establishing evacuation routes or making evacuation decisions. The majority of respondents (66.67 percent) noted they are unsure if collaboration with Cattaraugus County and/or its local jurisdictions is taken when establishing shelters or making sheltering decisions. No shared spaces for temporary housing were identified.

2.3.7 Public Outreach

In order to facilitate better coordination and communication between the Planning Partnership and all community members and to involve the public in the planning process, draft documents were made available to the public through an online format. The Steering Committee and Planning Partnership made the following efforts toward public participation in the development and review of the HMP:

- The public was informed of the hazard mitigation planning effort commencement at the kickoff meeting and through press releases, news articles, and public service announcements released throughout the planning process. Copies of these announcements may be found in Appendix C.
- A public website is being maintained as another way to facilitate communication between the Steering Committee, planning partnership, public and stakeholders (https://www.cattcohmp.com/). The public

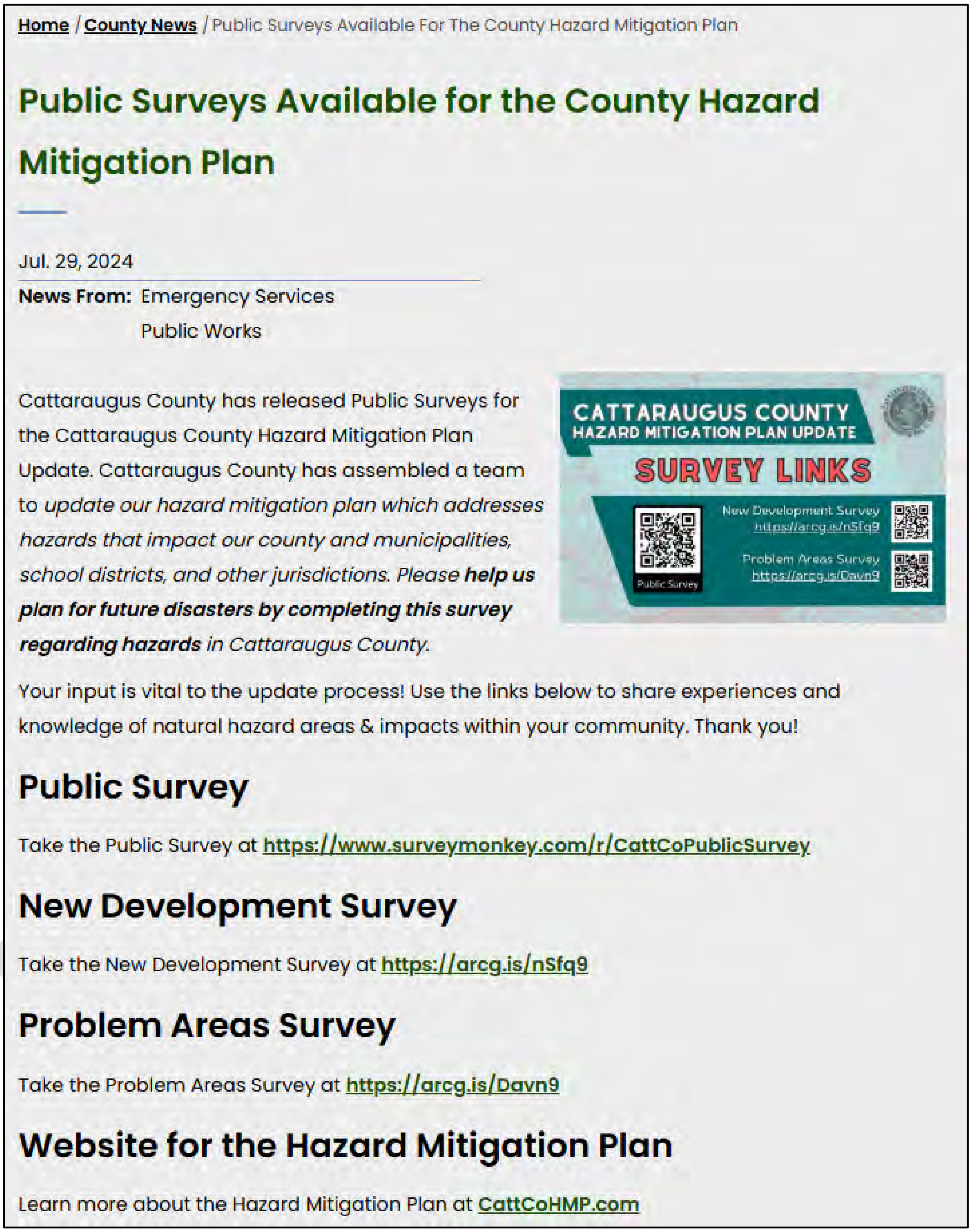
website contains a project overview, County and local contact information, access to the citizens survey and various stakeholder surveys, and sections of the HMP for public review and comment.

- All participating jurisdictions have been encouraged to conduct outreach for the project, including links to the project webpage and public 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 Plan Update will be available to the public through a variety of venues. A printed version of the Plan will be maintained at the Cattaraugus County Department of Public Works.
- An online natural hazards preparedness public survey was developed to gauge household preparedness that may impact Cattaraugus 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 February 1, 2024, and was available through April 30, 2025 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, Twitter, email blasts, etc.). Roughly 85 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, EMS, 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.
- A Public Information meeting on the HMP update process was held on March 7, 2024.
- The Draft Plan was posted to the public website as of May 20, 2025, for public review and comment. All public comments were directed to the Cattaraugus County Department of Public Works for collection and review by the Steering Committee. All public comments received were forwarded to the appropriate jurisdiction and/or agency and incorporated into the final plan as appropriate.
- Once submitted to NYS DHSES/FEMA, the Final Plan will be available for public review and comment in the same manner and format as the Draft Plan, 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.

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

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



Home / County News / Public Surveys Available For The County Hazard Mitigation Plan

Public Surveys Available for the County Hazard Mitigation Plan

Jul. 29, 2024

News From: Emergency Services
Public Works

Cattaraugus County has released Public Surveys for the Cattaraugus County Hazard Mitigation Plan Update. Cattaraugus County has assembled a team to *update our hazard mitigation plan which addresses hazards that impact our county and municipalities, school districts, and other jurisdictions. Please* ***help us plan for future disasters by completing this survey regarding hazards*** *in Cattaraugus County.*

Your input is vital to the update process! Use the links below to share experiences and knowledge of natural hazard areas & impacts within your community. Thank you!

Public Survey

Take the Public Survey at https://www.surveymonkey.com/r/CattCoPublicSurvey

New Development Survey

Take the New Development Survey at https://arcg.is/nSfq9

Problem Areas Survey

Take the Problem Areas Survey at https://arcg.is/Davn9

Website for the Hazard Mitigation Plan

Learn more about the Hazard Mitigation Plan at CattCoHMP.com

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 April 30, 2025, the survey received 85 responses.

Demographically, survey respondents were from 22 municipalities within Cattaraugus County, with 50.88 percent having lived in the County for 20 years or more. The most common (42.86 percent) age of respondents was over the age of 60. The majority (83.93 percent) of residents receive information concerning hazards through mass notification systems, followed by receiving information from the internet and social media (76.79 percent) and (51.79 percent) rely on broadcast media.

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

- Utility Failure (71.25 percent)
- Winter Storm–blizzard, heavy snow, ice (60 percent)
- Severe Storms–wind, lightning, hail (57.5 percent)
- Extreme Temperatures (56.96 percent
- Extreme Wind (55.7 percent)

Respondents identified the following as priorities regarding planning for hazards:

- Protecting critical facilities and community lifelines (89.47 percent)
- Protecting and reducing damages to utilities (78.95 percent)
- Strengthening emergency services (e.g., police, fire, EMS) (75.44 percent)
- Promoting cooperation among public agencies, residents, non-profit organizations, and local businesses (71.93 percent)
- Protecting private property (66.67 percent)

Respondents were asked which activities have been performed to mitigate hazard impacts to their homes. Approximately 96 percent of respondents have installed smoke detectors; roughly 66 percent have talked with other household members about what to do in case of a natural disaster or emergency; 68 percent have become trained in first aid and/or CPR; 46 percent have attended meetings or received information on natural disasters or emergency preparedness; 45 percent have prepared a disaster supply kit; and 57 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 84 respondents who answered this question, eight (9.52 percent) indicated that their property is located in a designated floodplain. Ten residents indicated that their home is covered by flood insurance.

The most self-selected jurisdictions respondents indicated that they live in, include the City of Olean (17.54 percent), the Town of Allegany (14.04 percent), and the Town of Machias (8.77 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 2-3. Most Frequently Experienced Natural Hazard Events in Cattaraugus County

	YES, IN THE PAST YEAR.	YES, IN THE PAST FIVE (5) YEARS.	YES, MORE THAN FIVE (5) YEARS AGO.	NEVER	TOTAL
Dam Failure	0.00% 0	1.32% 1	3.95% 3	94.74% 72	76
Disease/Pandemic Outbreak	2.50% 2	82.50% 66	5.00% 4	10.00% 8	80
Drought	9.46% 7	21.62% 16	13.51% 10	55.41% 41	74
Earthquake	2.67% 2	8.00% 6	21.33% 16	68.00% 51	75
Extreme Temperature (heat and cold)	56.96% 45	18.99% 15	7.59% 6	16.46% 13	79
Extreme Wind	55.70% 44	29.11% 23	6.33% 5	8.86% 7	79
Flooding - Street/Land	34.15% 28	26.83% 22	13.41% 11	25.61% 21	82
Flooding - Stormwater	29.87% 23	22.08% 17	11.69% 9	36.36% 28	77
Flooding - Basement	17.95% 14	7.69% 6	16.67% 13	57.69% 45	78
Flooding - 1st floor or above.	0.00% 0	0.00% 0	3.90% 3	96.10% 74	77
Hazardous Materials	9.33% 7	4.00% 3	4.00% 3	82.67% 62	75
Ice Jam	3.80% 3	8.86% 7	7.59% 6	79.75% 63	79
Landslide	2.60% 2	2.60% 2	2.60% 2	92.21% 71	77
Lightning	44.16% 34	19.48% 15	10.39% 8	25.97% 20	77
Severe Storms (thunderstorms/hail)	57.50% 46	25.00% 20	8.75% 7	8.75% 7	80
Tornado	2.63% 2	13.16% 10	15.79% 12	68.42% 52	76
Wildfire	1.32% 1	9.21% 7	1.32% 1	88.16% 67	76
Winter Storm	60.00% 48	30.00% 24	6.25% 5	3.75% 3	80
Utility (power, phone, Internet, water, sewer) Failure	71.25% 57	18.75% 15	1.25% 1	8.75% 7	80

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

The Cattaraugus County HMP uses the best available information to support hazard profiling, risk assessment, review and evaluation of mitigation capabilities, and the development and prioritization of County and local mitigation strategies. Plans, reports, and other technical information were identified and accessed online through independent research by the planning consultant or provided directly by the County, participating jurisdictions, and stakeholders involved in the planning effort. Detailed sources of technical data and information used are listed in the References section.

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 provided relevant jurisdiction-specific planning and regulatory documents, which were reviewed to identify:

- 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, considered in the review and update of the overall Goals and Objectives (see Chapter 16)
- 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 to develop mitigation planning goals and objectives and mitigation strategies that are consistent across local and regional planning and regulatory mechanisms:

- 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
- New York State standard multi-hazard mitigation plan, 2023

The County and participating jurisdictions were tasked with updating the assessment of their planning and regulatory capabilities (see capability assessment section of each jurisdictional annex in Volume II). They reviewed relevant plans contributing to the capability of the County and each jurisdiction to integrate effective mitigation efforts into their daily activities. This review is reflected in the capability assessment table in each of the municipal annexes. These tables list plan types, names, and dates as well as a summary of how each plan supports mitigation and resilience.

2.5 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 the County. It is critical that this HMP integrate, coordinate with, and complement those existing plans and programs.

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 the 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").

A description of continued efforts toward a holistic approach to hazard mitigation is presented in Chapter 17.

2.6 PLAN ADOPTION

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

- It lends authority to the plan to serve as a guiding document for all local and state government officials.
- It gives legal status to the plan in the event it is challenged in court.
- It certifies 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 Plan to Life (FEMA 386-4).

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.

All participating jurisdictions will proceed with formal adoption proceedings. Each jurisdiction must submit a copy of its formal adoption resolution or other legal instrument to the Cattaraugus County HMP Coordinator in the Cattaraugus County Department of Public Works. Cattaraugus 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 allows two options for submitting adoption resolutions:

- **Submittal of adoption resolutions with plan**—All participating jurisdictions provide documentation of plan adoption when the plan is initially submitted to the State for review. After receiving the draft plan from the State, FEMA conducts its review and will approve the plan if it meets all requirements.
- **Approvable pending adoption**—A draft HMP is submitted to the State and FEMA for approval prior to adoption by the jurisdictions. When FEMA determines that the plan as a whole and each participating jurisdiction have met all the requirements except adoption, FEMA will inform the State that the plan is "approvable pending adoption" (APA). After that, once FEMA receives documentation of adoption resolutions from at least one jurisdiction, the status is changed from APA to approved for the entire plan and for that jurisdiction. Other jurisdictions that participated in the planning process then receive approval

once they pass their own adoption resolutions. A jurisdiction with a plan in APA status does not meet the requirement for an approved mitigation plan to apply for and receive funding assistance.

FEMA will transmit acknowledgement of verification of formal plan adoption and the official approval of the plan to the Cattaraugus County HMP Coordinator. The plan approval date begins the 5-year approval period and sets the expiration date for the plan. All participating jurisdictions will have the same expiration date regardless of their own jurisdiction's adoption date. The date indicated on FEMA's approval letter is the official approval date.

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

2.7 CONTINUED PUBLIC INVOLVEMENT

The Planning Partners are committed to the continued involvement of the public in the hazard mitigation process. This HMP update will be posted on-line (currently at https://www.cattcohmp.com/), and jurisdictions will be encouraged to maintain links to the plan website. Further, the County will make hard copies of the HMP available for review at public locations as identified on the public plan website.

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

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

After completion of this plan, implementation and ongoing maintenance will continue to be a function of the Planning Partnership. The Planning Partnership will review the plan and accept public comment as part of an annual review and as part of 5-year HMP updates.

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

Kimberly A. Merrill of the Cattaraugus County Department of Public Works has been identified as the ongoing County HMP Coordinator (see Chapter 17) and is responsible for receiving, tracking, and filing public comments regarding this HMP update. Contact information is:

Mailing Address:	Cattaraugus County Department of Public Works 8810 Route 242, Jack Ellis Drive Little Valley, NY 14755
Contact Name:	Kimberly A. Merrill
Email Address:	kamerrill@cattco.org
Telephone:	(716) 938-9121 ext. 2480

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

3. COUNTY PROFILE

The planning area for this HMP is comprises the entirety of Cattaraugus County. This chapter presents general information about the land, people, and assets of Cattaraugus 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

Cattaraugus County is 1,322 square miles and lies in the southwestern portion of New York State, south of Buffalo. The County shares its southern border with northwestern Pennsylvania, while Chautauqua County forms the County's western boundary, Allegany County marks the eastern border, and Erie and Wyoming make up the northern border. Figure 3-1 displays Cattaraugus County and its municipalities. Cattaraugus County encompasses the entirety of the Allegany Territory for the Seneca Nation of Indians, and portions of its Cattaraugus and Oil Springs territories.

3.2 HISTORY

Cattaraugus County was established in 1808 and is composed of several municipalities, which include two cities, 32 towns, and nine villages. Three Cattaraugus County Nation Territories are also located in the County: the Allegany Reservation, located in the southwest portion of the County; the Cattaraugus Reservation, located in the northwest corner of the County; and the Oil Springs Reservation, located along the central east border of the County.

Cattaraugus was formed from what was originally part of Genesee County. Under the act of its formation, Cattaraugus County was provisionally annexed to Niagara County until enough taxable residents qualified to vote for members of the NY Assembly. In 1812, for judicial purposes and convenience of the residents, the eastern part of the County was annexed to Allegany County. In 1817, the required number of taxable residents was met, and Cattaraugus was chartered as it is today. Court and County business was conducted in Ellicottville until 1868 when the County seat was moved to Little Valley (Cattaraugus County n.d.).

3.3 JURISDICTIONS WITHIN THE COUNTY

Today, the County consists of 43 municipalities: 2 cities, 32 towns, and 9 villages, as listed in Table 3-1.

Table 3-1. Cattaraugus County Municipalities

City	Village	
City of Olean City of Salamanca	Village of Allegany Village of Cattaraugus Village of Delevan Village of Ellicottville Village of Franklinville	Village of Gowanda Village of Little Valley Village of Portville Village of South Dayton
Towns		
Town of Allegany Town of Ashford Town of Carrollton Town of Coldspring	Town of Great Valley Town of Hinsdale Town of Humphrey Town of Ischua	Town of Olean Town of Otto Town of Perrysburg Town of Persia

Town of Conewango Town of Dayton Town of East Otto Town of Ellicottville Town of Farmersville Town of Franklinville Town of Freedom	Town of Leon Town of Little Valley Town of Lyndon Town of Machias Town of Mansfield Town of Napoli Town of New Albion	Town of Portville Town of Randolph Town of Red House Town of Salamanca Town of South Valley Town of Yorkshire

3.4 PHYSICAL SETTING

3.4.1 Hydrography and Hydrology

The major river of Cattaraugus County is the Allegheny River; however, the County has numerous waterbodies and streams. Cattaraugus Creek forms the border between Cattaraugus County and Erie County and flows west into Lake Erie. Great Valley Creek and Little Valley Creek drain the central portion of the County into the Allegheny River. Other important waterways within the County include Ischua, Oil, Olean, Tunungwant, Conewango, Little Conewango, Mansfield, and Caneadea Creeks.

3.4.2 Watersheds

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 into 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. Drainage basins generally refer to large areas that encompass the watersheds of many smaller rivers and streams (NYCDEP 2015).Figure 3-2 depicts the hydrologic system of a watershed (NYCDEP 2015). Watersheds can cross municipal and County boundaries. New York State's waters (lakes, rivers, and streams) fall within one of 17 major watersheds (or drainage basins).

There are portions of five watersheds located within Cattaraugus County. These watersheds drain into the Great Lakes Basin and the Allegheny River Basin. Cattaraugus County is part of three drainage basins: the Allegheny River Basin, the Lake Erie and Niagara River Basin, and the Genesee River Basin. The Allegheny River Watershed makes up 1,920 square miles of land within New York and is composed of a total of 4,086 miles of freshwater rivers and streams as well as 23 significant freshwater lakes, ponds, and reservoirs. The Allegheny River Watershed is a part of the headwaters of the larger Ohio River Basin, and some of the larger tributaries of the watershed eventually empty into the Gulf of Mexico. The Niagara River and Lake Erie Watershed make up the northern part of Cattaraugus County and make up 2,280 square miles of land area within New York. It is composed of a total of 4,086 miles of freshwater rivers and streams as well as 24 significant freshwater lakes, ponds, and reservoirs. The Genesee River Watershed makes up 2,373 square miles of land area within New York and is composed of a total of 5,048 miles of freshwater rivers and streams as well as 31 significant freshwater lakes, ponds, and reservoirs (NYSDEC n.d.). Figure 3-3 shows the location of watershed and sub watersheds in Cattaraugus County.

Figure 3-1. Cattaraugus County HMP Area

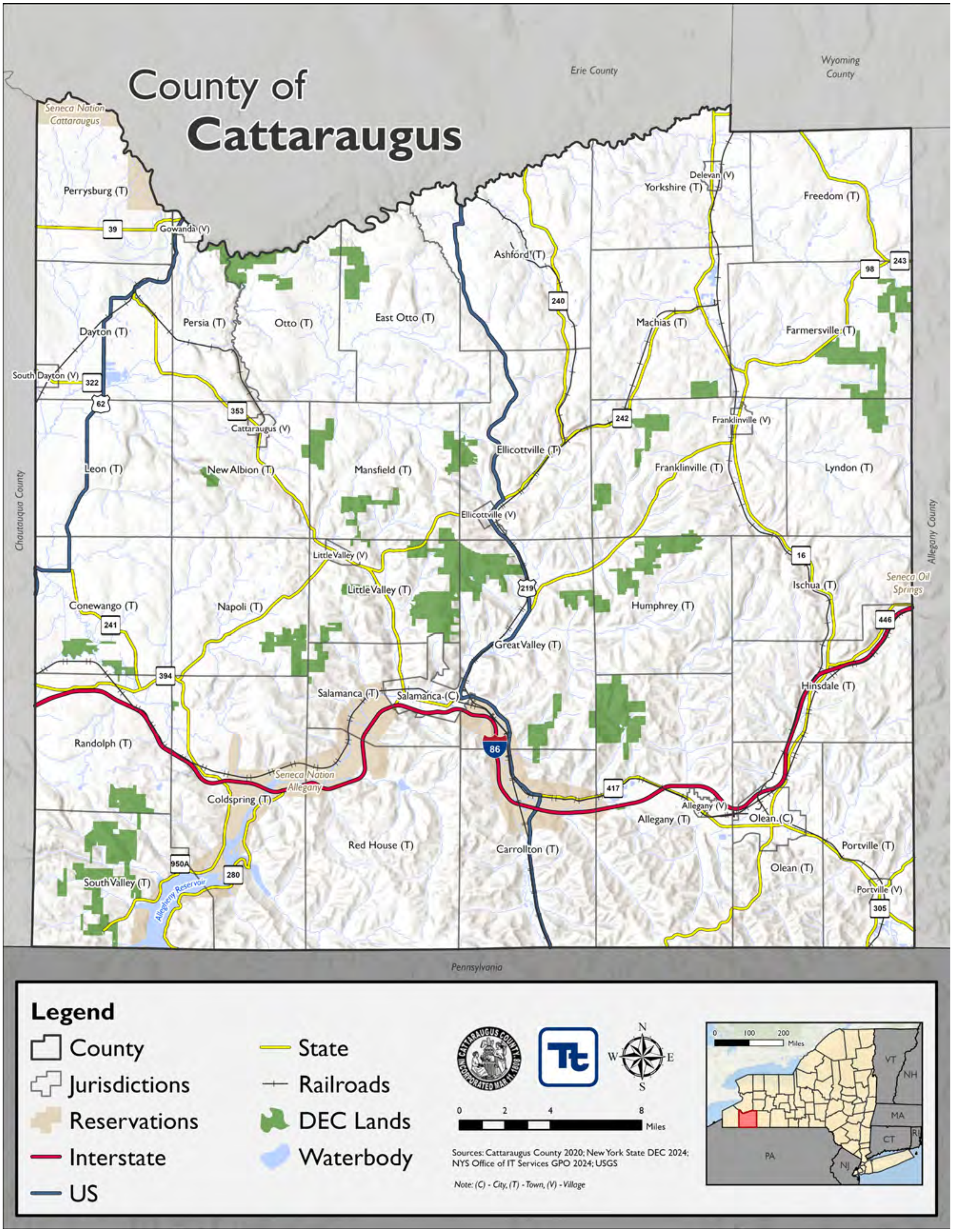
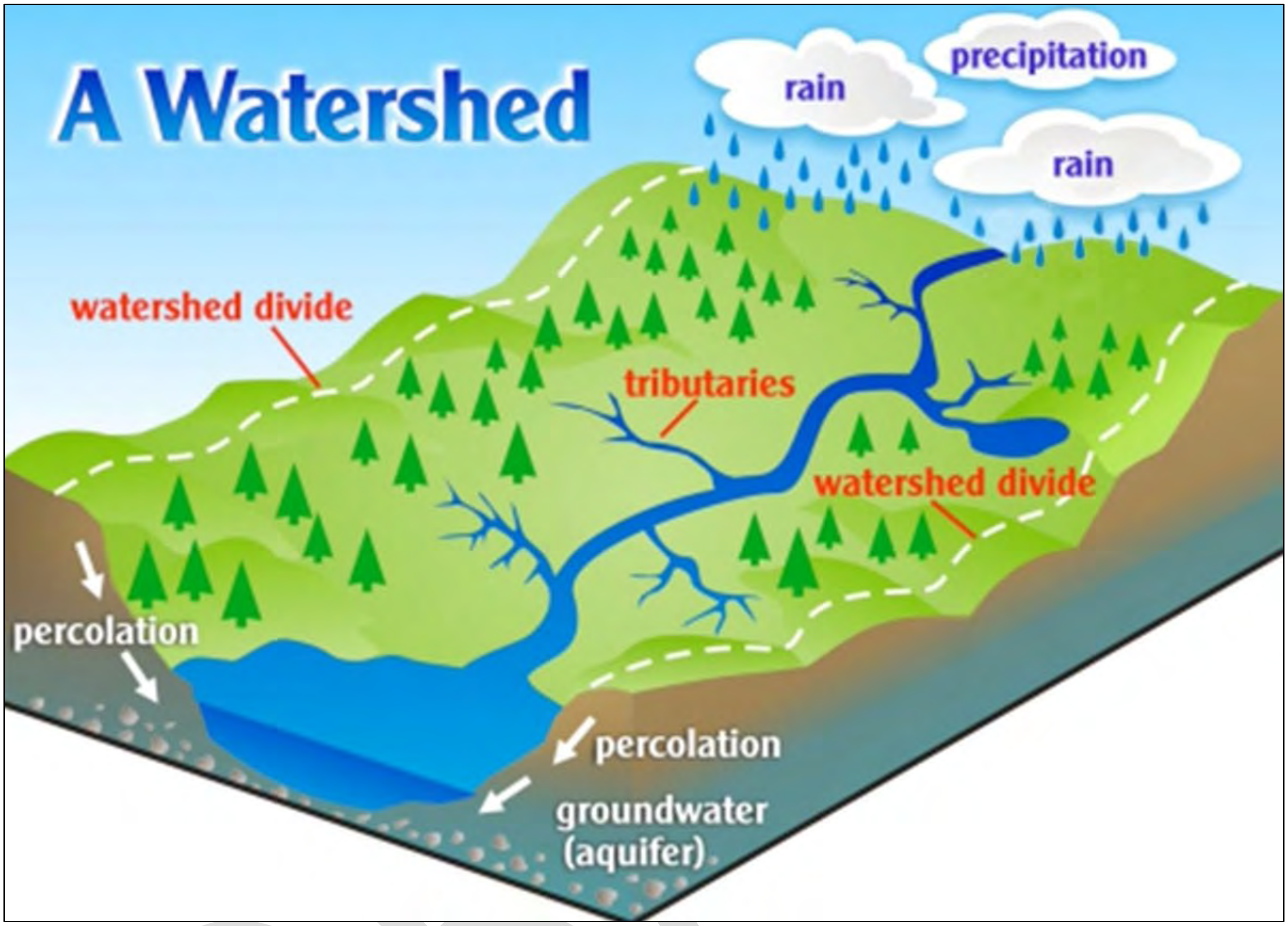
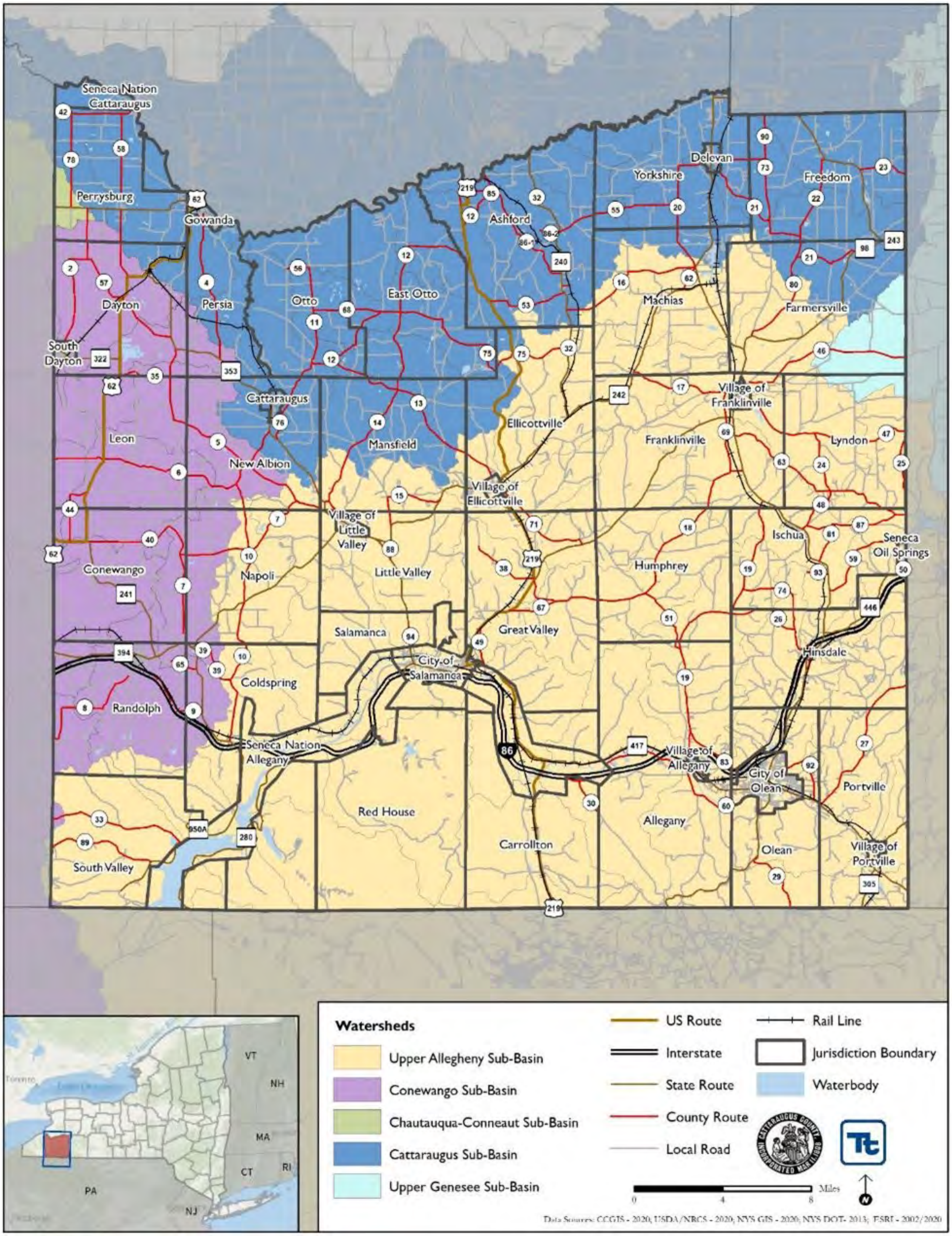


Figure 3-2. Watershed



Source: Riverside-Corona Resource Conservation District 2022

Figure 3-3. Watersheds in Cattaraugus County



3.4.3 Topography and Geology

Cattaraugus County is in the northwest portion of the Allegheny Plateau region of New York State. Consistent with the rest of western New York, the geography and topography of the land that encompasses Cattaraugus County owes its formation to the thawing of glaciers during the last Ice Age. The region is marked by rolling and rounded hills, often elongated with steeper slopes towards the north and more gradual, gentle slopes towards the south. Soils in Cattaraugus County originated from glacial rivers, flowing terraces, and alluvial fans. Many boulders found in the region are foreign to the area and were transported to Cattaraugus County by the massive glaciers that once covered the region (Miller 2004).

The northern part of the County is generally flat, while steeper slopes are found in the central and southern parts of the County. The southern region of the County, characterized by hills and valleys, is the only unglaciated portion of western New York State. Both Rock City Park and Little Rock City provide majestic geological formations, offering a prehistoric experience. Allegany State Park is the largest state park in New York State and the third largest state park in the United States. The Allegheny River flows through the southern towns, two cities and the Cattaraugus County Nation of Indians Reservation. Cattaraugus Creek forms a major portion of the northern boundary of Cattaraugus County. Bob's Pond, Cabic Pond, Case Lake, Crystal Lake, Cuba Lake, Harwood Lake, Lime Lake, New Albion Lake, Quaker Lake, Rainbow Lake, Red House Lake, Science Lake, and Timber Lake are within the County (NYS n.d.).

Most of the geology in the County is the result of glacial debris and sediment left behind after the Ice Age. Bedrock in the area is layered by shale, dolomite, and sandstone and is overlain by soils of sandy loam, silt loam, and gravelly loam. There is a sharp boundary between soils and bedrock in Cattaraugus County, which is evidence of the glacial activity that characterized the region, as soils were transported to their present location rather than created by gradual weathering of rock over time.

3.4.4 Climate

The climate of New York State is very similar to most of the Northeast U.S. and is classified as Humid Continental. Differences in latitude, character of topography, and proximity to large bodies of water all influence the climate across New York State. Precipitation during the warm, growing season (April through September) is characterized by convective storms that generally form in advance of an eastward-moving cold front or during periods of local atmospheric instability. Occasionally, tropical cyclones will move up from southern coastal areas and produce large quantities of rain. Both types of storms are typically characterized by relatively short periods of intense precipitation that produce large amounts of surface runoff and little recharge (Cornell 2023).

The cool season (October through March) is characterized by large, low-pressure systems that move northeastward along the Atlantic coast or the western side of the Appalachian Mountains. Storms that form in these systems are characterized by long periods of steady precipitation in the form of rain, snow, or ice, and tend to produce less surface runoff and more recharge than the summer storms because they have a longer duration and occasionally result in snowmelt (Cornell 2023).

Average yearly temperature is about 49.4° Fahrenheit (F). Cattaraugus County's summers are typically warm and sunny, with average temperatures between 70 and 72°F and some rain every third or fourth day. Temperatures at any one place in the County normally exceed 90°F roughly one time each summer. It is uncommon for air temperatures to reach triple digits; however, higher temperatures combined with humidity may lead to days that feel much hotter (NOAA 2023).

Cold temperatures prevail whenever arctic air masses, under high barometric pressure, flow southward from central Canada or from Hudson Bay (Cornell University College of Agriculture and Life Sciences 2011). Total annual snowfall is roughly 95 inches, and total annual precipitation is roughly 45.5 inches in the center of the County but may vary slightly in other areas of the County. Cattaraugus County's average annual low temperature is 33°F (U.S. Climate Data 2023).

3.4.5 Land Cover

Cattaraugus County is home to numerous forests that are composed of conifer and hardwood trees and bushes that cover the steeper slopes and flatlands that make up the County. Many of these forests make up larger state forests that foster a variety of habitat types, including trees with varying heights of canopy.

3.5 LAND USE

3.5.1 Current Land Use

According to the 2021 National Land Cover Database, the greatest share of land use in Cattaraugus County is forest, making up 70.2 percent of land cover in the County. The next largest shares are agricultural with 18.6 percent, followed by urban areas and wetlands, with 6.1 percent and 3.4 percent, respectively. Table 3-2 and Figure 3-4 summarize the land use categories.

Table 3-2. Cattaraugus County 2021 Land Use Classification

Category Description	Number of Properties in Category	
	Count	% of Total
Agriculture	157,068	18.6%
Barren Land	1,495	0.2%
Forest	593,728	70.2%
Rangeland	4,783	0.6%
Urban Area	51,715	6.1%
Water	8,621	1.0%
Wetland	28,765	3.4%
Cattaraugus County (Total)	**846,176**	**100.0%**

Source: USGS/NLCD 2021

3.5.2 Land Use Trends

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

Residential and Commercial

Land use in Cattaraugus County is influenced by natural resources, topographic constraints, water lines, sewers, and roads. The County has a relatively compact development pattern and is made up of rural, suburban, and urban areas (Cattaraugus County 2022).

The urbanized area in the County is mainly found in the Cities of Olean and Salamanca. Suburban areas include villages and hamlets and are surrounded by farmland, wooded areas, parks, and protected open space. Retail and commercial uses are concentrated in central business districts and along heavily developed and travelled roadways and intersections. Agriculture remains a large land use. Although the number of farms is decreasing slightly, the size of farms is increasing. This trend toward fewer but larger farm operations parallels statewide trends (Cattaraugus County 2022).

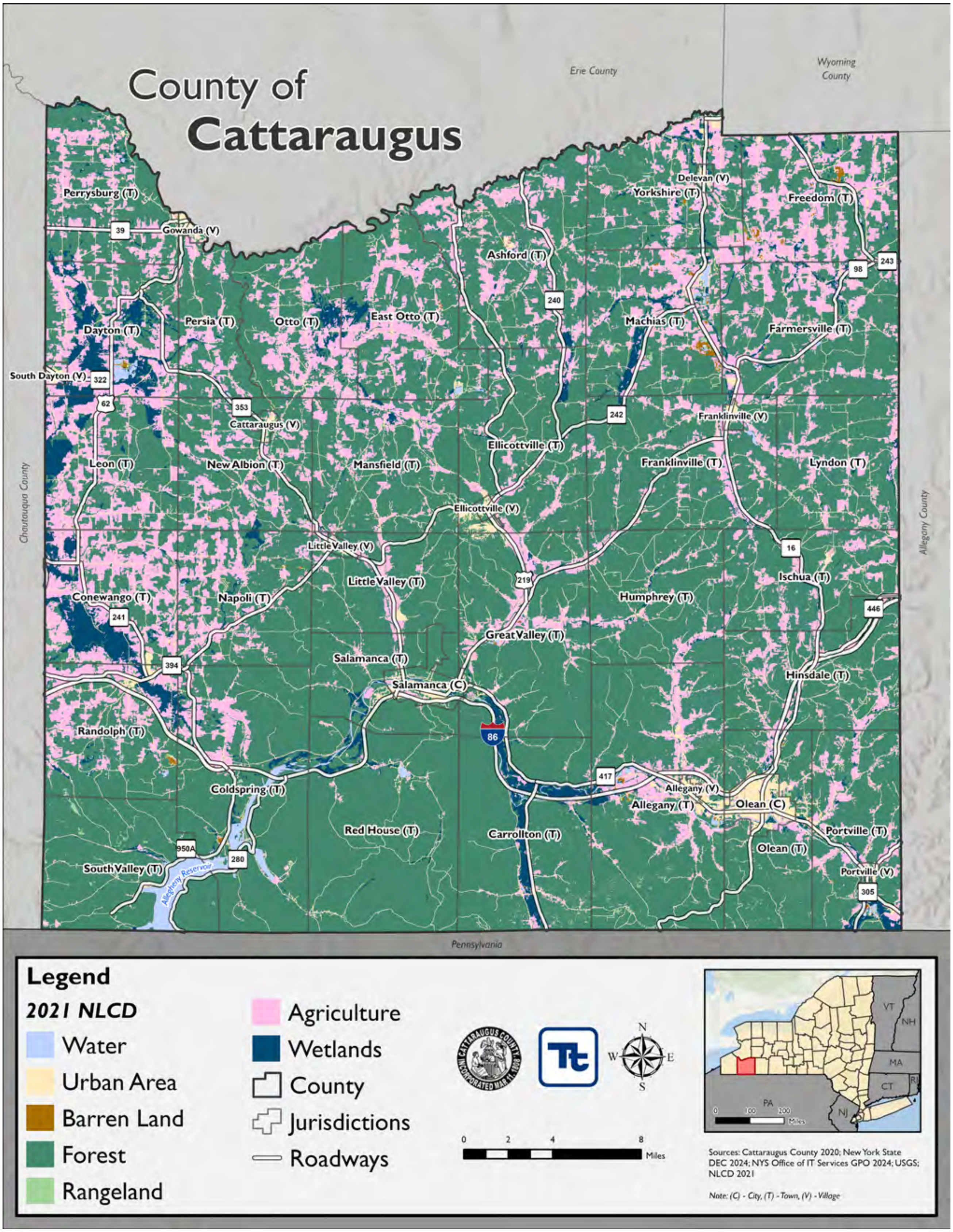
Agriculture

Agriculture in Cattaraugus County has undergone significant changes in recent decades as expanding non-farm development put pressure on landowners for farmland conversion, profitability of certain agricultural markets decreased, and more. According to the 2022 Census of Agriculture, the number of farms in Cattaraugus County has decreased by 13 percent and total farmland is down 2 percent; however, the average size of each farm increased 12 percent since 2017. Between 2017 and 2022, the number of farms decreased from 956 to 833, for a total reduction of land in farms of 3,293 acres. The market value of products sold in the Cattaraugus County agricultural economies increased by 55 percent between 2017 and 2022. Despite a decrease in number of farms operating, this marked a 78 percent increase in average market value of products sold per farm (USDA 2022).

The County has a well-developed cultivated Christmas tree and short rotation woody crops and is ranked 6th in the state on value of sales by this commodity group. Additionally, Cattaraugus County ranks 7th in the state for the value of its other animals and animal products, and 6th in the state for the value of its aquaculture (USDA 2022).

Article 25AA of the New York State Agriculture and Markets Law, titled Agricultural Districts, provides counties with the opportunity to create agricultural districts for the purpose of protecting and promoting the agriculture industry. Once created, the law requires that each district must be reviewed on an eight-, ten-, or twelve-year basis to see if it is still achieving its intended purpose. In Cattaraugus County, districts are reviewed every eight years. Cattaraugus County has one agricultural district (District 5) which encompasses all jurisdictions and consists of 239,537 total acres. Out of the 239,537 acres, 197,257 acres are farmed, 48,532 acres contain crops, and 505 different farms make up the land (NYS Agriculture and Markets 2022).

Figure 3-4. Cattaraugus County Land Use and Land Cover



3.6 POPULATION AND DEMOGRAPHICS

3.6.1 Current Population

According to the 2020 U.S. Census, Cattaraugus County has a population of 75,690 people. Approximately 18.4 percent of that population resides in the City of Olean.

3.6.2 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 3-3, Cattaraugus County's population increased from 1960 to 1980, and decreased from 1980 to 2020. The population projections for Cattaraugus County from Cornell University for the next two decades anticipate a continued decrease in population.

Table 3-3. Historical and Projected Population Change in Cattaraugus County

Historical Cattaraugus County Population							Projected Cattaraugus County Population	
1960	1970	1980	1990	2000	2010	2020	2030	2040
80,187	82,176	85,697	84,234	83,955	80,317	77,042	73,254	70,468

Source: US Census 2020; Cornell PAD projections 2018

While the overall population of Cattaraugus County has decreased by 4.08 percent since 2010, this decline is not geographically uniform throughout the County, with some areas having experienced a slight increase in population. However, the 2020 U.S. Census data for Hazards-U.S. Multi-Hazard (Hazus) are believed to be sufficient and appropriate to support the risk assessment and mitigation planning efforts of this project. Figure 3-5 depicts the distribution of the County population.

3.6.3 Socially Vulnerable Populations

Federal regulations require that HMPs consider socially vulnerable populations. These populations can be more susceptible to hazard events based on several factors, including physical and financial ability to react or respond during a hazard, and the location and construction quality of housing. This HMP considers several socially vulnerable population groups: the elderly (persons over the age of 65), the young (persons under the age of 5), non-English speaking households, those with disabilities, and those living below the poverty level (as defined by the U.S. Census Bureau). Refer to Table 3-4 for population statistics for these socially vulnerable populations. The distributions of the general population density (persons per square mile) for six metrics of social vulnerability are shown in Figure 3-6.

In Cattaraugus County, 20.6 percent of the population is over the age of 65, and 5.7 percent of the population is under the age of 5. The 2020 U.S. Census data indicate a total of 17.1 percent of all persons living in households fall below the poverty level (Census 2020). Additionally, 0.5 percent of the County's residents live in non-English speaking households (Census 2020).

Figure 3-5. Population Distribution in Cattaraugus County

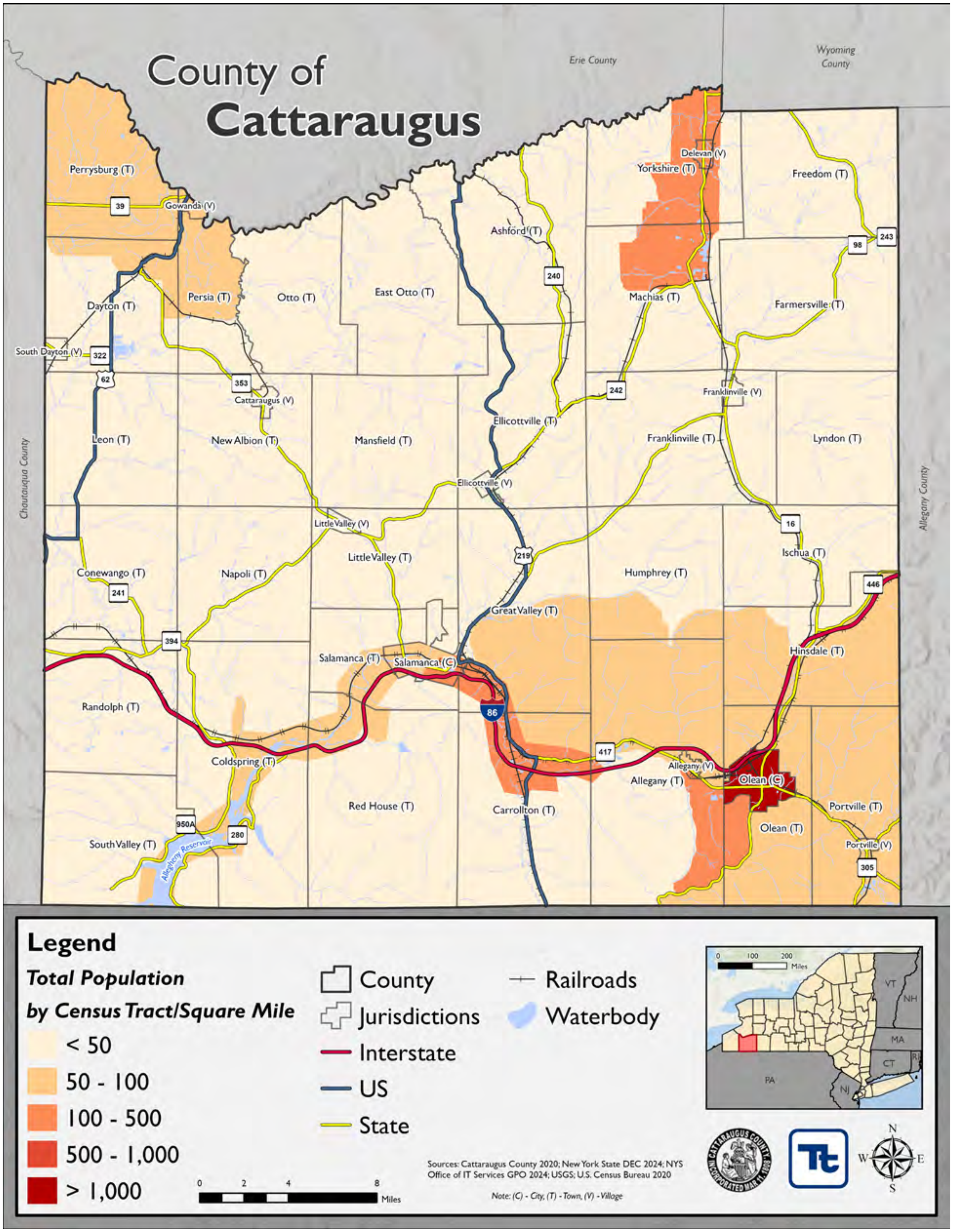


Figure 3-6. Socially Vulnerable Populations In Cattaraugus County

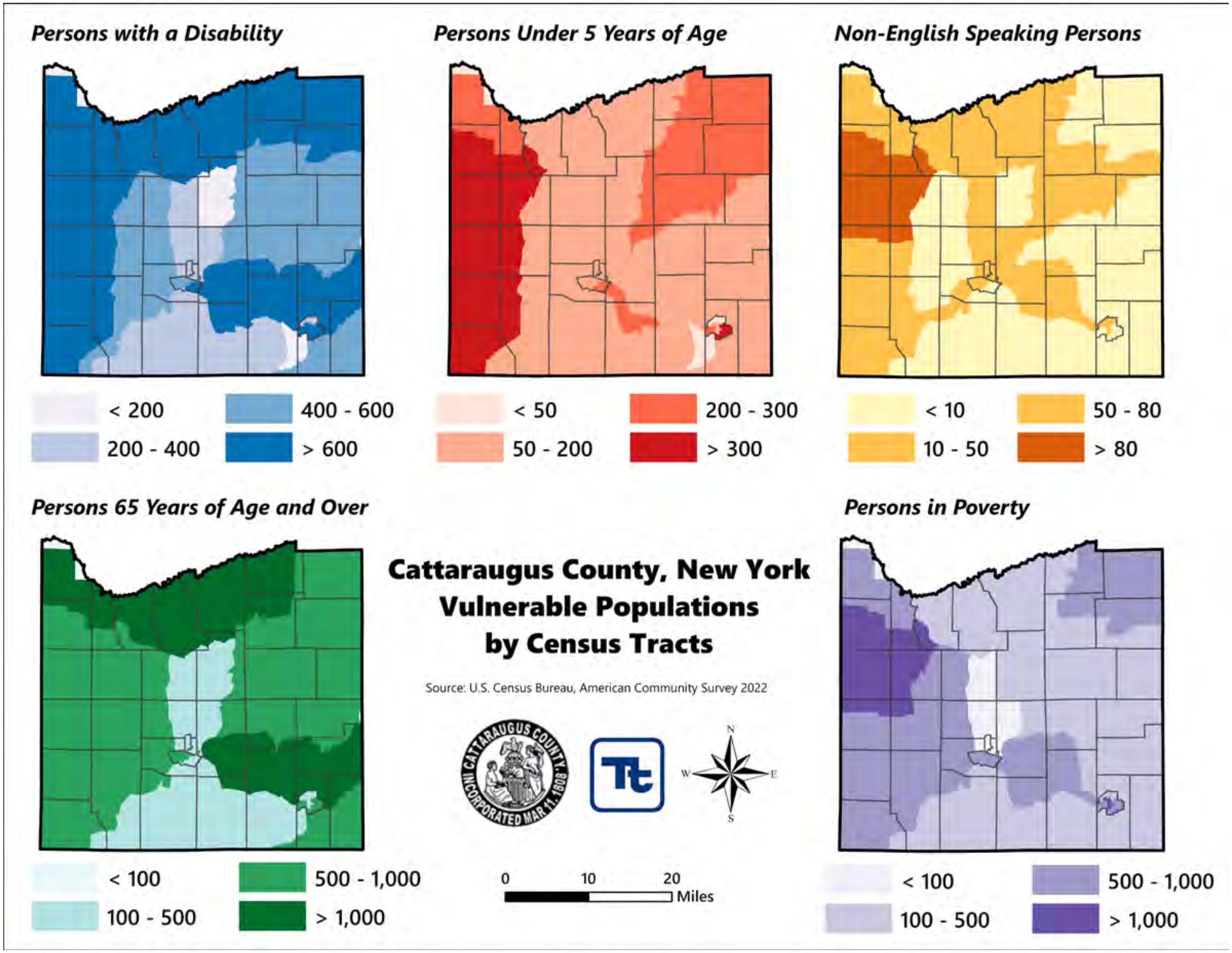


Table 3-4. Cattaraugus County Population and Demographic Statistics American Community Survey 5-Year Estimates

Jurisdiction	American Community Survey Five-Year Population Estimates (2022)									
	Population Over 65		Population Under 5		Non-English-Speaking Population		Population with Disability		Population Below Poverty Level	
	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total
Allegany (T)	1,183	19.9%	213	3.6%	19	0.3%	667	11.2%	640	10.8%
Allegany (V)	401	26.0%	65	4.2%	19	1.2%	214	13.9%	313	20.3%
Ashford (T)	468	23.9%	78	4.0%	0	0.0%	366	18.7%	107	5.5%
Carrollton (T)	268	22.2%	57	4.7%	7	0.6%	197	16.3%	150	12.4%
Cattaraugus (V)	167	17.4%	49	5.1%	31	3.2%	188	19.6%	181	18.9%
Coldspring (T)	102	15.5%	17	2.6%	0	0.0%	130	19.8%	85	12.9%
Conewango (T)	220	12.3%	352	19.7%	31	1.7%	161	9.0%	861	48.2%
Dayton (T)	329	28.6%	46	4.0%	0	0.0%	184	16.0%	144	12.5%
Delevan (V)	234	22.4%	62	5.9%	0	0.0%	269	25.8%	215	20.6%
East Otto (T)	142	14.6%	46	4.7%	9	0.9%	145	14.9%	99	10.2%
Ellicottville (T)	351	33.1%	14	1.3%	0	0.0%	77	7.3%	127	12.0%
Ellicottville (V)	117	45.7%	40	15.6%	0	0.0%	39	15.2%	13	5.1%
Farmersville (T)	322	30.0%	116	10.8%	0	0.0%	218	20.3%	277	25.8%
Franklinville (T)	314	27.3%	21	1.8%	26	2.3%	135	11.7%	83	7.2%
Franklinville (V)	273	16.5%	128	7.7%	0	0.0%	304	18.4%	274	16.6%
Freedom (T)	393	17.4%	119	5.3%	0	0.0%	301	13.3%	243	10.7%
Gowanda (V)	337	18.4%	256	14.0%	24	1.3%	409	22.3%	215	11.7%
Great Valley (T)	419	21.0%	78	3.9%	12	0.6%	274	13.8%	56	2.8%
Hinsdale (T)	448	21.2%	139	6.6%	0	0.0%	493	23.3%	308	14.6%
Humphrey (T)	78	11.1%	8	1.1%	0	0.0%	60	8.5%	105	14.9%
Ischua (T)	215	29.2%	5	0.7%	0	0.0%	162	22.0%	154	20.9%
Leon (T)	137	11.0%	177	14.2%	50	4.0%	192	15.4%	192	15.4%
Little Valley (T)	144	23.3%	3	0.5%	0	0.0%	255	41.3%	37	6.0%
Little Valley (V)	171	16.2%	40	3.8%	0	0.0%	195	18.4%	295	27.9%

Jurisdiction	American Community Survey Five-Year Population Estimates (2022)									
	Population Over 65		Population Under 5		Non-English-Speaking Population		Population with Disability		Population Below Poverty Level	
	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total
Lyndon (T)	156	22.8%	26	3.8%	0	0.0%	124	18.1%	119	17.4%
Machias (T)	566	24.5%	77	3.3%	0	0.0%	348	15.1%	393	17.0%
Mansfield (T)	127	15.1%	35	4.2%	0	0.0%	80	9.5%	36	4.3%
Napoli (T)	241	20.6%	127	10.8%	0	0.0%	192	16.4%	169	14.4%
New Albion (T)	160	15.7%	64	6.3%	31	3.0%	89	8.7%	108	10.6%
Olean (C)	2,469	17.7%	846	6.1%	54	0.4%	2,539	18.2%	3,266	23.4%
Olean (T)	491	26.1%	55	2.9%	0	0.0%	322	17.1%	262	13.9%
Otto (T)	230	29.6%	11	1.4%	7	0.9%	159	20.5%	49	6.3%
Perrysburg (T)	498	32.8%	42	2.8%	0	0.0%	430	28.3%	314	20.7%
Persia (T)	143	24.0%	66	11.1%	9	1.5%	101	16.9%	66	11.1%
Portville (T)	656	25.1%	136	5.2%	0	0.0%	269	10.3%	238	9.1%
Portville (V)	156	17.5%	15	1.7%	0	0.0%	154	17.3%	86	9.6%
Randolph (T)	476	19.3%	84	3.4%	0	0.0%	294	11.9%	222	9.0%
Red House (T)	7	25.9%	1	3.7%	0	0.0%	2	7.4%	2	7.4%
Salamanca (C)	936	15.8%	381	6.4%	57	1.0%	1,092	18.4%	1,492	25.2%
Salamanca (T)	131	27.9%	9	1.9%	2	0.4%	75	16.0%	84	17.9%
South Dayton (V)	244	45.1%	20	3.7%	0	0.0%	94	17.4%	166	30.7%
South Valley (T)	115	46.0%	18	7.2%	0	0.0%	55	22.0%	78	31.2%
Yorkshire (T)	530	19.0%	157	5.6%	0	0.0%	581	20.9%	612	22.0%
Cattaraugus County	15,565	20.6%	4,299	5.7%	388	0.5%	12,635	16.7%	12,936	17.1%

Source: U.S. Census Bureau 2020 Decennial Total Population; U.S. Census Bureau 2021 ACS Vulnerable Population Totals

Low Internet Access

Throughout the State of New York, in particular the more rural counties, including portions of Cattaraugus 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. The total number of households with and without an internet subscription, provided by the 2023 ACS 5-Year estimates, is displayed in Table 3-5.

Table 3-5. Cattaraugus County Internet Access by Jurisdiction

Jurisdiction	Total Households	Households with an Internet Subscription	Households without an Internet Subscription
Allegany (T)	2,614	2,323	291
Allegany (V)	—	—	—
Ashford (T)	854	739	115
Carrollton (T)	552	470	82
Cattaraugus (V)	—	—	—
Coldspring (T)	253	244	9
Conewango (T)	568	308	260
Dayton (T)	664	511	153
Delevan (V)	—	—	—
East Otto (T)	450	309	141
Ellicottville (T)	581	470	111
Ellicottville (V)	—	—	—
Farmersville (T)	501	351	150
Franklinville (T)	1,102	974	128
Franklinville (V)	—	—	—
Freedom (T)	971	775	196
Gowanda (V)	—	—	—
Great Valley (T)	840	631	209
Hinsdale (T)	903	785	118
Humphrey (T)	289	218	71
Ischua (T)	352	287	65
Leon (T)	366	172	194
Little Valley (T)	713	521	192
Little Valley (V)	—	—	—
Lyndon (T)	268	213	55
Machias (T)	952	737	215
Mansfield (T)	277	220	57
Napoli (T)	469	312	157
New Albion (T)	864	669	195
Olean (C)	6,215	5,276	939
Olean (T)	870	720	150
Otto (T)	380	261	119
Perrysburg (T)	692	583	109
Persia (T)	917	829	88
Portville (T)	1,554	1,391	163

Jurisdiction	Total Households	Households with an Internet Subscription	Households without an Internet Subscription
Portville (V)	—	—	—
Randolph (T)	980	790	190
Red House (T)	14	9	5
Salamanca (C)	2,405	2,002	403
Salamanca (T)	250	172	78
South Dayton (V)	—	—	—
South Valley (T)	151	137	14
Yorkshire (T)	1,745	1,455	290
Cattaraugus County	**31,822**	**26,038**	**5,784**

Source: (5-Year American Community Survey 2023)
Note: No data available for the Villages within Cattaraugus County.

3.7 ECONOMY

3.7.1 Major Institutions

Cattaraugus County includes major employers, schools and colleges, retail and service businesses, recreational sites, and tourist attractions. Modern-day Cattaraugus County still resembles its early agricultural start, with numerous farms and small businesses. Higher education institutes include Jamestown Community College, Jamestown Business College Cornplanter College, and St. Bonaventure University (New York State n.d.).

3.7.2 Employment

The Health Care and Social Assistance sector provides the most jobs in the region at 14.2 percent of the total in 2022, followed by Manufacturing and Educational Service sectors making up 13.6 percent and 11.4 percent of the total employment in the County (USA 2022).

3.7.3 Income

After adjusting for inflation, the median household income in the County has been relatively flat over the past three decades. For example, in 2019, the County's median household income was $50,780, compared to the real median household income of $50,758 in 1989, after adjusting for inflation (Cattaraugus County 2022).

The average salary in 2022 in the County of $56,889 was below the state ($81,386) and national ($75,149) figures (Census 2022).

3.7.4 Economic Trends

According to the U.S. Bureau of Labor Statistics (BLS) data, Cattaraugus County's labor force has been decreasing since 1997 (when it was 42,410 persons). As of July 2021, there were 32,810 people in the County's labor force (9,600 fewer than in 1997). Declines in the size of the County's labor force are likely due to shrinking local employment opportunities, an aging workforce, and increasing retirements (Cattaraugus County 2022).

Cattaraugus County is currently part of the Western New York Incubator Network (WIN), which is a collaborative effort among entrepreneurial service providers that work together to expand services and promote startups to grow wealth in the region (NY Regional Economic Development Councils 2023).

3.8 GENERAL BUILDING STOCK

3.8.1 Existing Development

For the purposes of this plan, approximately 44,567 structures were identified by the tax data and spatial data available. These structures account for a replacement cost value of approximately $40.6 billion. Table 3-6 presents building stock statistics by occupancy class for Cattaraugus County.

According to 2020 Census data, 40,152 households are located in Cattaraugus County. A household includes all the people who occupy a housing unit as their usual residence. A housing unit is a house, apartment, mobile home or trailer, a group of rooms, or a single room occupied as separate living quarters (or if vacant, intended for occupancy as separate living quarters). According to the 2020 Census, there are 8,289 vacant housing units in the County (U.S. Census 2020).

The 2022 Economic Surveys Business Patterns data identified 1,518 business establishments employing approximately 19,946 people in Cattaraugus County (Census 2020).

Figure 3-7 through Figure 3-10 show the distribution and value density of residential, commercial, and industrial buildings in Cattaraugus County based on the New York State Department of Taxation and Finance Property Class Code. Value density is the dollar value of structures per unit area, including building content value. The densities are shown in units of $1,000 ($K) per square mile.

3.8.2 New Development

For new development, the County uses best available data to avoid potential exposure of development to hazard events where possible. Additionally, the County intends to (1) discourage development within vulnerable areas, areas with high population density, and the Special Flood Hazard Area; and (2) encourage higher regulatory standards at the local level.

New development over the previous five years (2019 to 2024) and known or anticipated development within the next five years is discussed in the jurisdictional annexes found in Volume II.

Figure 3-7. Distribution of Total Building Stock and Value Density in Cattaraugus County

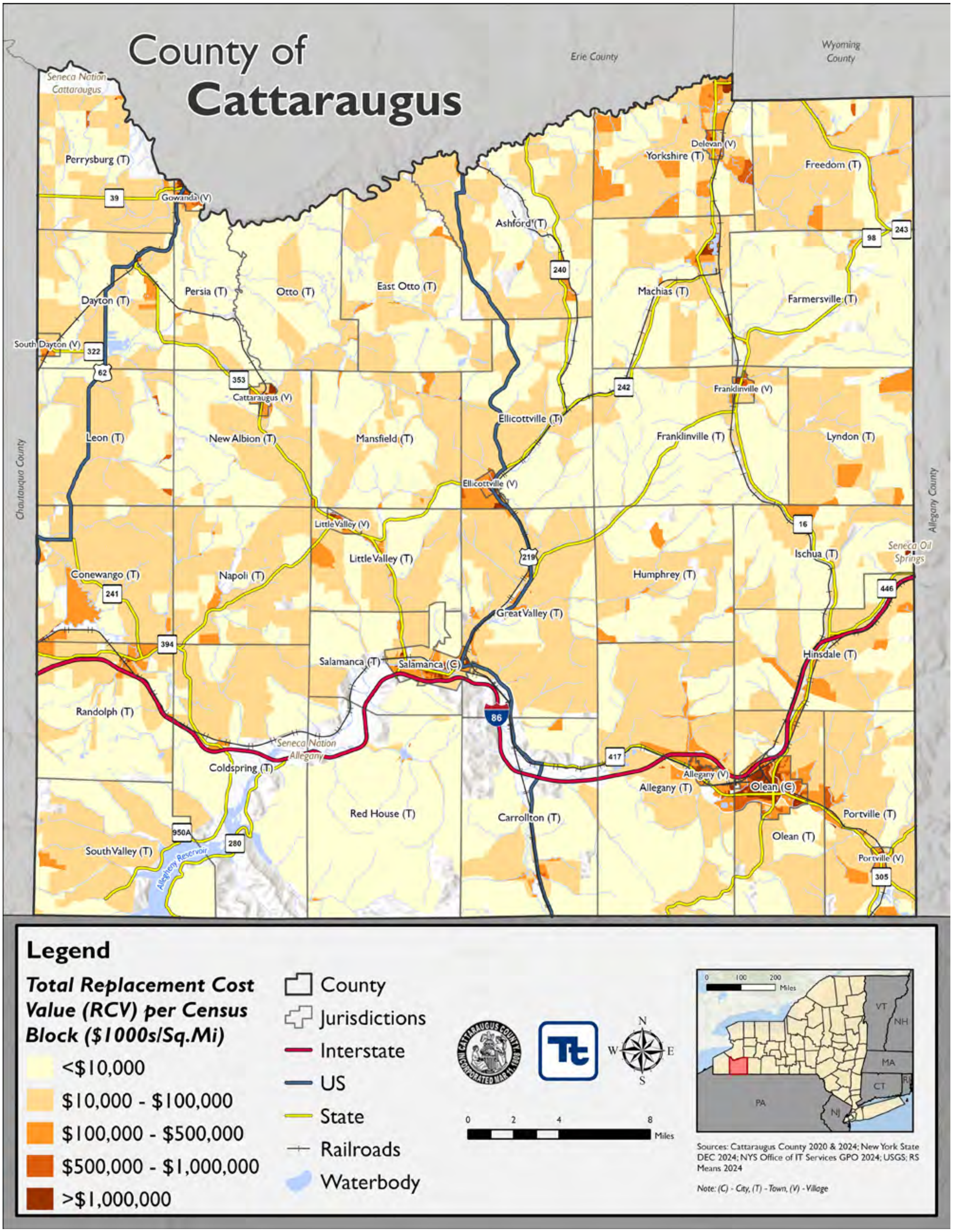


Figure 3-8. Distribution of Residential Building Stock and Value Density in Cattaraugus County

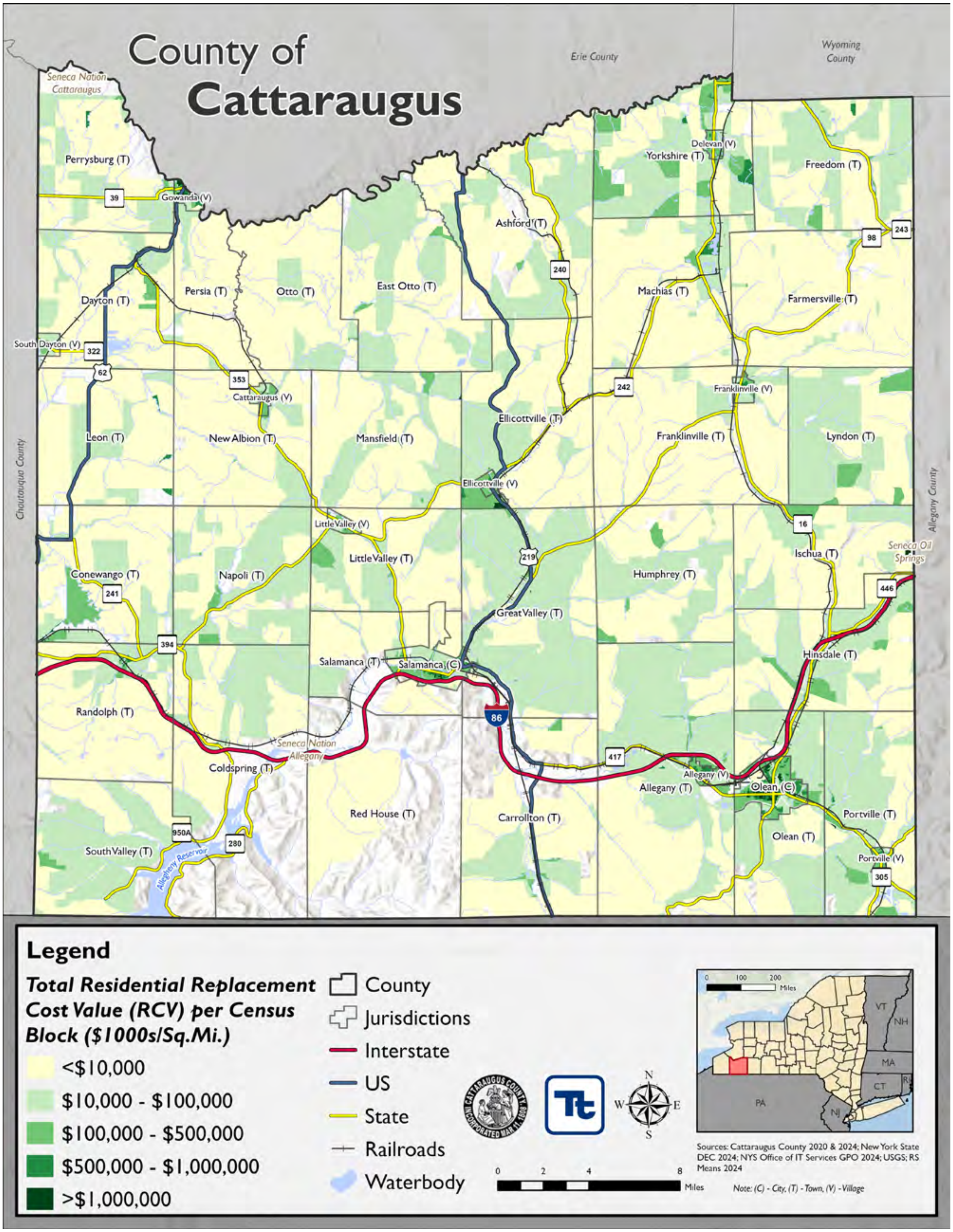


Figure 3-9. Distribution of Commercial Building Stock and Value Density in Cattaraugus County

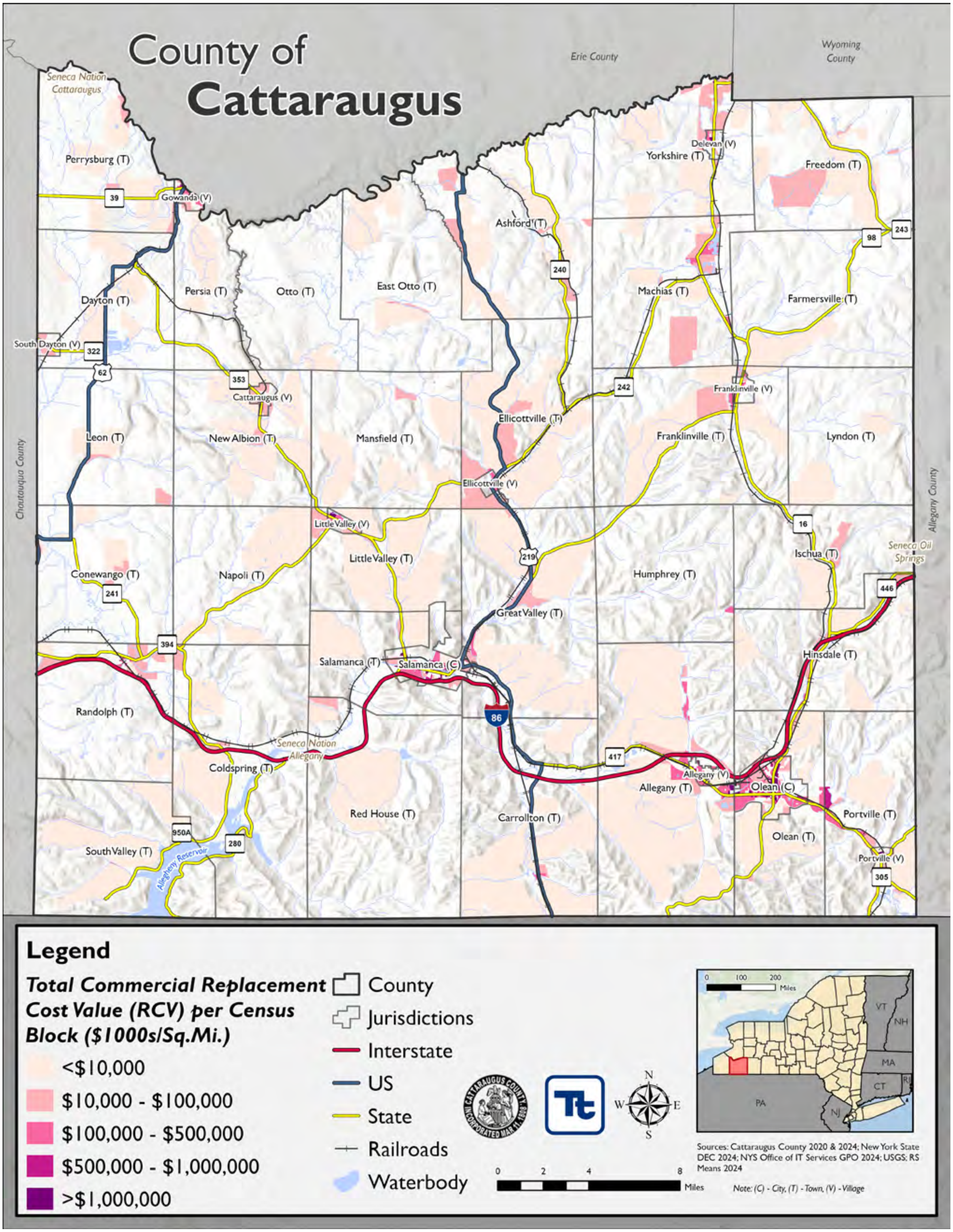


Figure 3-10. Distribution of Industrial Building Stock and Value Density in Cattaraugus County

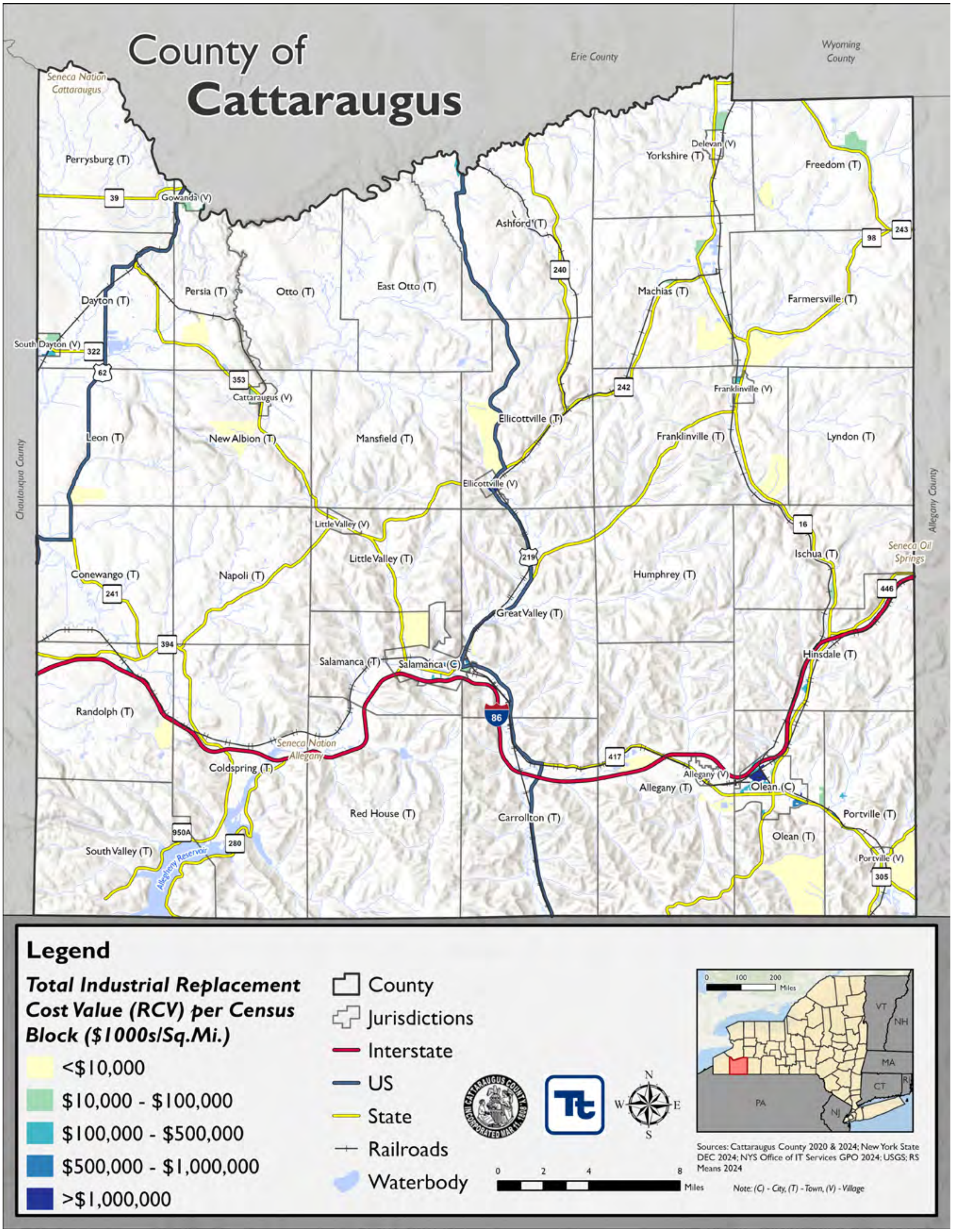


Table 3-6. Building Replacement Cost Value by Occupancy

Jurisdiction	Residential		Commercial		Industrial	
	Building Count	Total Replacement Cost Value	Building Count	Total Replacement Cost Value	Building Count	Total Replacement Cost Value
Allegany (T)	2,300	$1,137,796,961	182	$472,810,260	6	$8,368,105
Allegany (V)	604	$283,772,201	82	$164,949,955	0	$0
Ashford (T)	1,120	$691,952,500	47	$99,903,695	5	$12,507,089
Carrollton (T)	664	$376,739,959	38	$57,301,291	0	$0
Cattaraugus (V)	375	$150,589,902	34	$61,273,925	2	$48,001,262
Coldspring (T)	442	$343,645,598	18	$27,484,459	0	$0
Conewango (T)	633	$740,129,903	25	$20,447,211	0	$0
Dayton (T)	594	$368,165,326	20	$20,014,260	1	$1,318,447
Delevan (V)	372	$167,056,330	19	$108,140,007	0	$0
East Otto (T)	617	$799,375,591	12	$11,611,926	0	$0
Ellicottville (T)	2,207	$986,338,669	69	$161,702,755	1	$2,439,026
Ellicottville (V)	514	$226,681,983	62	$138,487,319	13	$141,940,427
Farmersville (T)	684	$250,967,772	35	$36,578,431	1	$1,071,645
Franklinville (T)	825	$286,389,390	102	$79,181,566	5	$3,345,627
Franklinville (V)	587	$222,731,180	61	$97,760,574	7	$27,365,160
Freedom (T)	1,145	$859,344,714	82	$119,520,944	11	$15,563,540
Gowanda (V)	640	$337,628,789	68	$150,831,102	11	$41,343,998
Great Valley (T)	1,415	$1,415,290,180	51	$110,639,393	1	$411,940
Hinsdale (T)	1,171	$997,142,638	36	$38,942,055	1	$13,748,484
Humphrey (T)	524	$693,210,907	2	$33,635,247	0	$0
Ischua (T)	577	$900,410,593	9	$20,110,555	2	$7,430,417
Leon (T)	495	$441,456,144	12	$21,025,115	2	$2,329,226
Little Valley (T)	399	$525,972,184	55	$93,125,394	0	$0
Little Valley (V)	389	$166,323,418	71	$194,340,385	3	$35,325,979
Lyndon (T)	616	$1,099,607,195	14	$12,086,903	0	$0

Jurisdiction	Residential		Commercial		Industrial	
	Building Count	Total Replacement Cost Value	Building Count	Total Replacement Cost Value	Building Count	Total Replacement Cost Value
Machias (T)	1,391	$776,480,697	122	$150,088,710	12	$19,369,392
Mansfield (T)	756	$700,237,350	19	$17,331,322	0	$0
Napoli (T)	682	$913,757,206	28	$16,407,544	0	$0
New Albion (T)	613	$273,312,571	39	$54,305,428	1	$3,002,010
Olean (C)	5,002	$2,140,774,045	467	$1,684,991,526	43	$782,847,901
Olean (T)	1,027	$503,813,774	78	$131,640,968	2	$28,263,067
Otto (T)	482	$185,644,498	7	$7,447,904	0	$0
Perrysburg (T)	808	$465,905,546	28	$40,704,287	0	$0
Persia (T)	278	$117,901,607	4	$4,401,143	1	$450,216
Portville (T)	1,369	$1,002,599,398	84	$283,298,030	13	$48,031,298
Portville (V)	345	$148,549,225	35	$96,301,552	2	$23,496,863
Randolph (T)	998	$419,757,668	81	$132,971,925	7	$17,707,837
Red House (T)	13	$6,506,547	28	$20,729,500	0	$0
Salamanca (C)	2,098	$956,312,000	169	$2,319,415,722	24	$206,922,409
Salamanca (T)	304	$155,325,506	14	$20,603,785	1	$11,563,917
South Dayton (V)	221	$99,167,446	34	$48,691,813	3	$41,383,297
South Valley (T)	358	$581,801,594	50	$25,485,332	0	$0
Yorkshire (T)	1,788	$2,229,439,073	104	$159,102,913	1	$17,863,417
Cattaraugus County	38,442	$26,146,005,780	2,597	$7,565,824,132	182	$1,563,411,996

Source: Cattaraugus County 2024; RS Means 2024

3.9 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. They also 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).

Critical facilities include services that FEMA defines as “community lifelines.” These represent 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. Lifelines are divided into eight categories (FEMA 2023):

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

A comprehensive inventory of community lifelines in Cattaraugus 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 3-11 shows the location of safety and security facilities.

Emergency Facilities

The Cattaraugus County Office of Emergency Services is organized into three main tiers: Emergency Medical Services, Fire Service, and Preparedness. The Emergency Medical tier includes 33 total EMS services, including 27 state-certified ambulance services and six state-certified first response services. Three of the services are paid agencies, while the remaining are volunteer EMS providers. All of the EMS agencies are overseen by Cattaraugus County EMS Coordinator, Robert F. Kuhn. The Fire Services tier includes 37 fire departments, 35 of which are fully volunteer operated, while two of the fire department are career departments and are staffed 24/7 365 days a year. All 37 departments are overseen by Cattaraugus County Fire Coordinator Christopher J. Baker. The Preparedness sector encourages residents, businesses, and organizations to become prepared in case of an emergency. This sector is responsible for directing sign-ups for the Code Red notification system and the NY-Alert Now! System. They also provide links on their website for family emergency preparedness resources (Cattaraugus County n.d.).

The Cattaraugus County Office of Emergency Services develops, maintains, and executes Cattaraugus County's Comprehensive Emergency Management Plan for disaster relief before, during, and after any type of natural or man-made disaster (or a war-time situation). The EMS Coordinator also assists towns and villages in the preparation of their emergency response plans.

There are a total of 11 police departments in Cattaraugus County, including city, village, and town police departments as well as three state police troops (County Office n.d.).

Dams and Levees

According to the NYSDEC Division of Water Bureau and Flood Protection and Dam Safety, there are three hazard classifications of dams in New York State. The dams are classified in terms of potential for downstream damage if the dam were to fail. The hazard classifications are as follows:

- *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, and minor railroads; interrupt the use of relatively important public utilities; and 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, environmental damage, disruption of lifeline facilities, or impact other concerns. Class B dams are often located in rural 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 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 (NYS DEC n.d.).

According to the USACE National Inventory of Dams (NID), there are 40 dams located in Cattaraugus County, with 12 listed as high hazard, 14 listed as significant hazard, and 14 listed as low hazard (USACE n.d.). There are seven accredited levee systems within Cattaraugus County, made up of 111 structures encompassing 15 miles (USACE n.d.). Dam locations are listed in Figure 3-12.

Military Installations

The County has an armed forces branch of the NYS Army National Guard that is located in Olean.

Figure 3-11. Safety and Security Facilities in Cattaraugus County

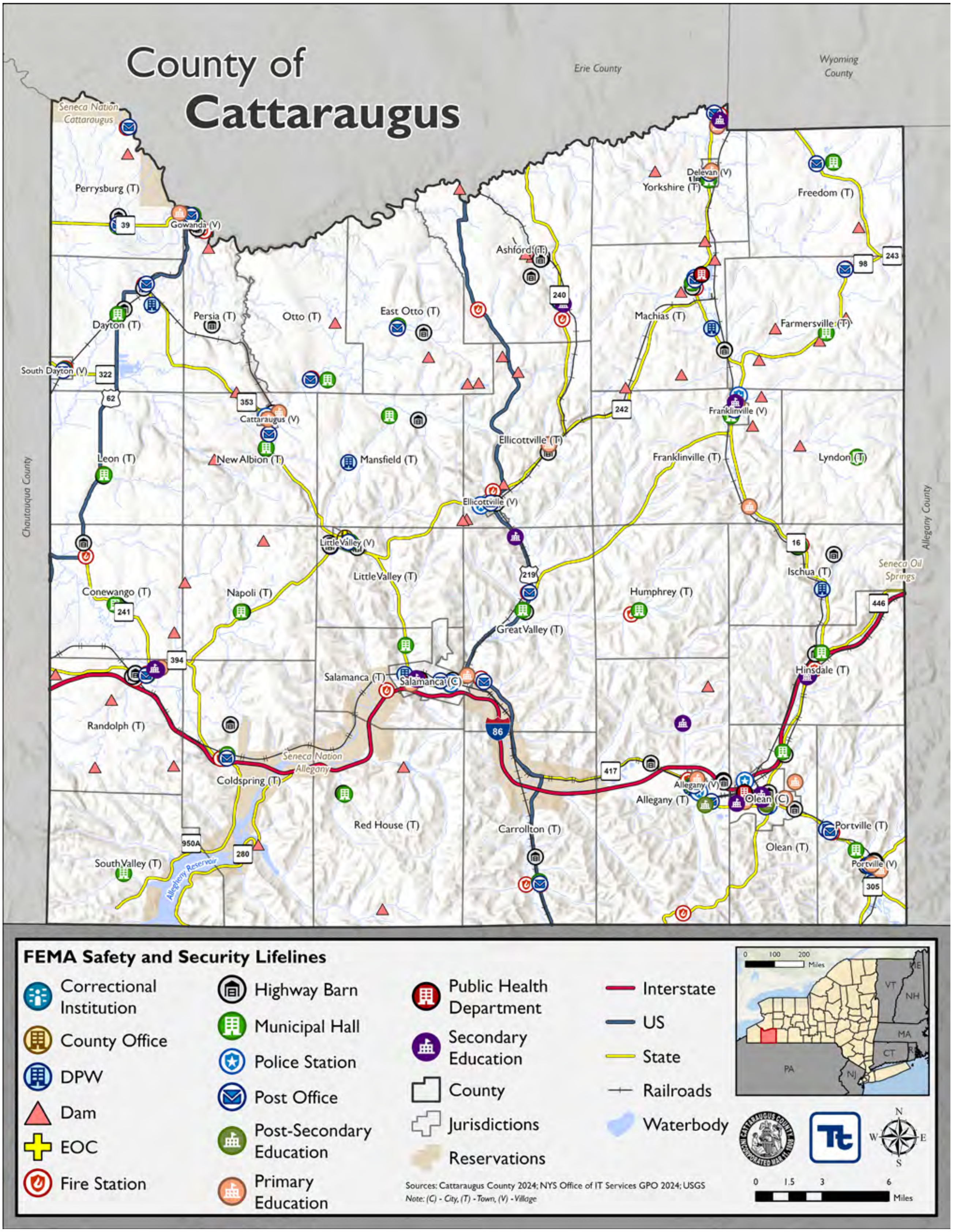
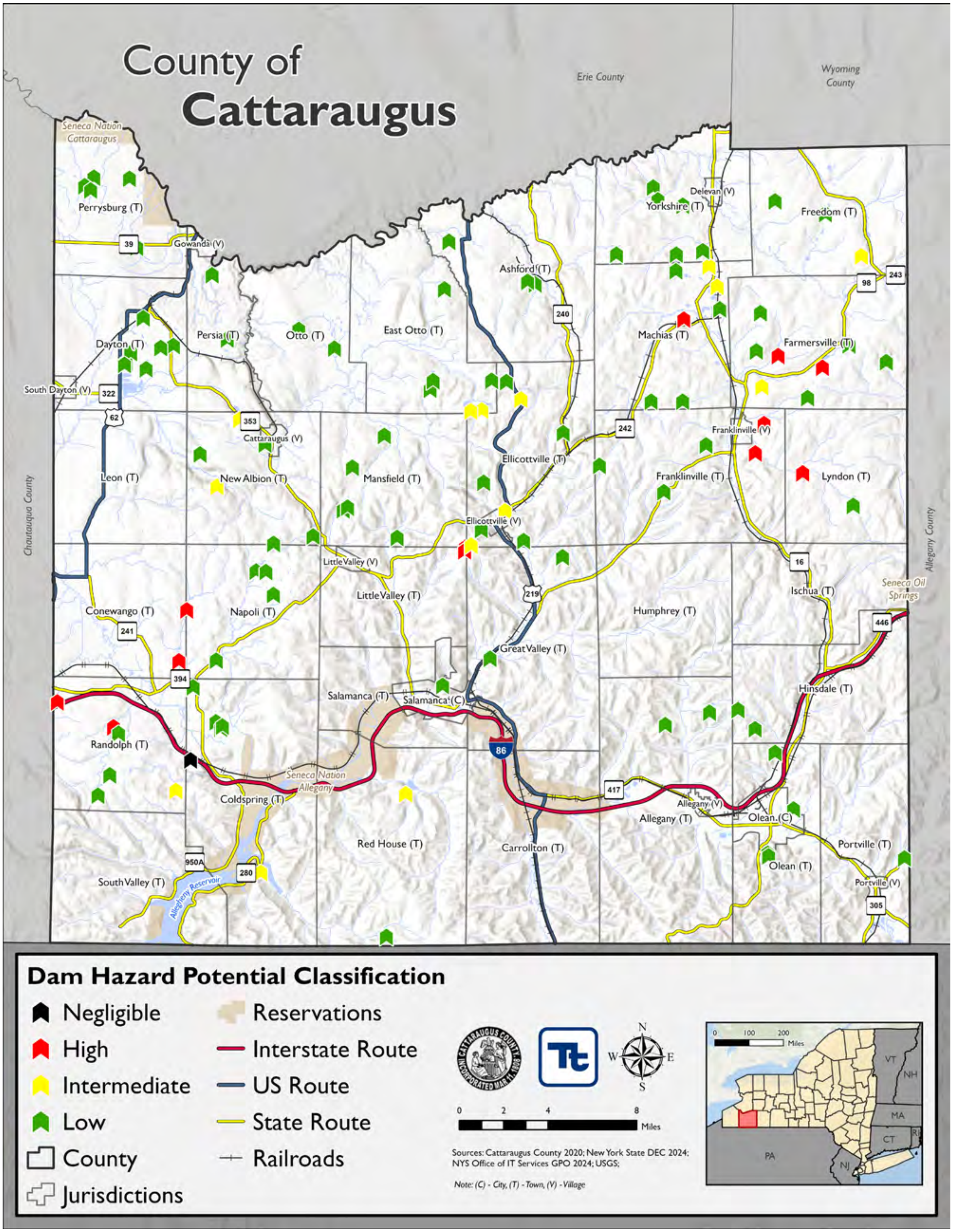


Figure 3-12. Dam Locations in Cattaraugus County



3.9.2 Food, Hydration, and Shelter

The food, hydration, and shelter community lifeline category includes agricultural lifelines. Figure 3-13 shows the location of food, hydration, and shelter facilities.

Shelters

The County is a part of the Western New York Region and has access to resources and shelters as needed through the American Red Cross with access to a searchable shelter database. The County also offers support and guidance for the New York State Emergency Rental Assistance Program (ERAP) which provides significant economic relief to help low and moderate-income households at risk of experiencing homelessness or housing instability by providing rental arrears, temporary rental assistance, and utility arrears assistance. The County also posts when warming and cooling shelters are open to support County residents. Countywide sheltering policies and procedures are documented in the following plans, which are maintained by the Cattaraugus County Office of Emergency Services (Cattaraugus County n.d.):

- Cattaraugus County Comprehensive Emergency Management Plan

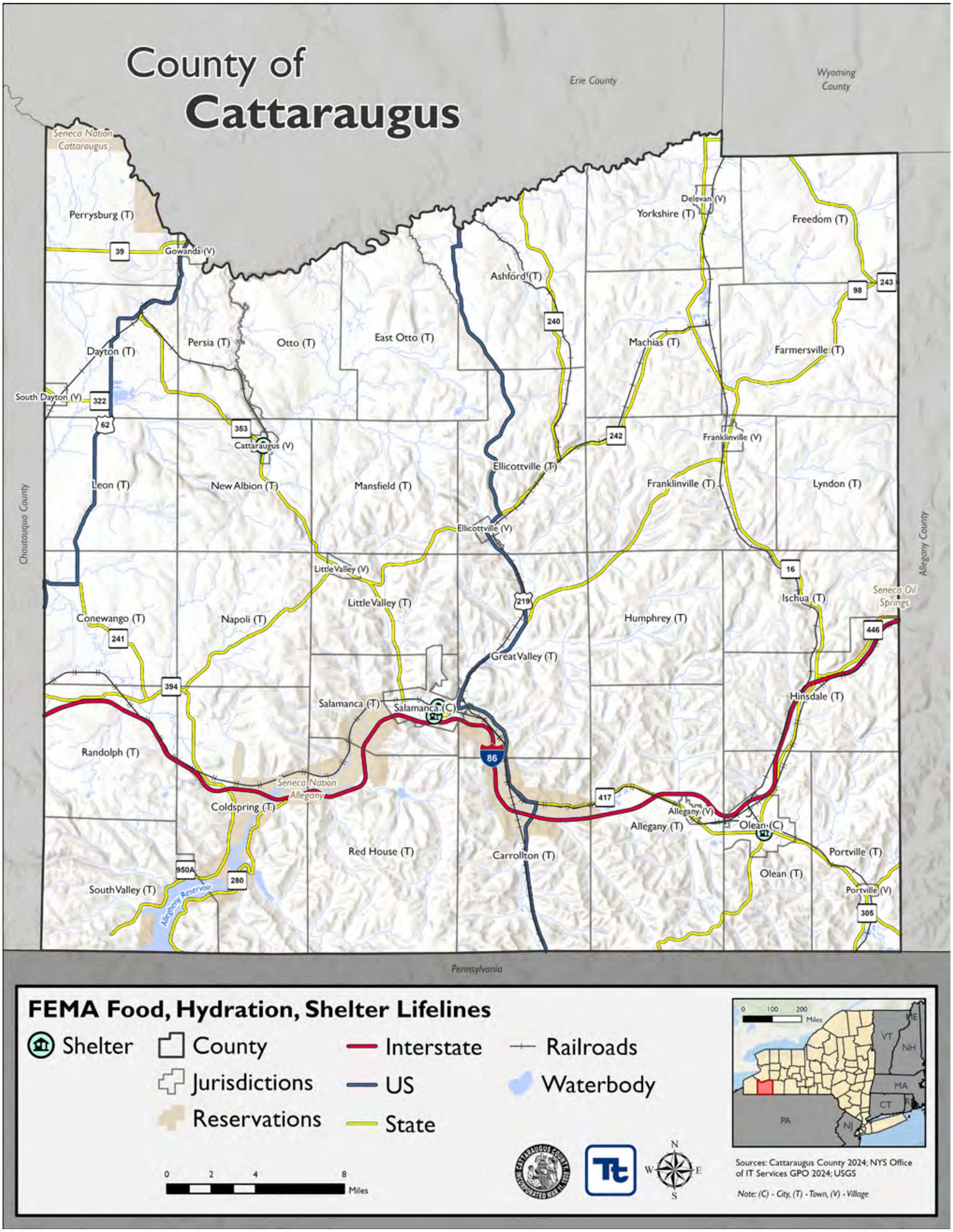
Schools

There are 39 public, 21 private educational facilities (elementary, middle, and high schools) and a few secondary educational facilities (colleges and universities) located in Cattaraugus County. In times of need, some schools can function as shelters and are an important resource to the community.

Socially Vulnerable Populations and Undeserved Community Support Facilities

Cattaraugus County has numerous programs and facilities that provide support for socially vulnerable populations. The Cattaraugus County Department of Social Services has a Homeless Unit that responded to over 585 instances of homelessness in 2021 from COVID-19. The County also has a Youth Bureau that provides support for children with special needs, runaway and homeless youth as well as detention services. The County also offers supplemental programs to help the low income and homeless populations in the County, including rental support, WIC support, and temporary assistance.

Figure 3-13. Food, Hydration, and Shelter Facilities in Cattaraugus County



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 3-14 displays the location of health and medical facilities.

Hospitals and Medical Facilities

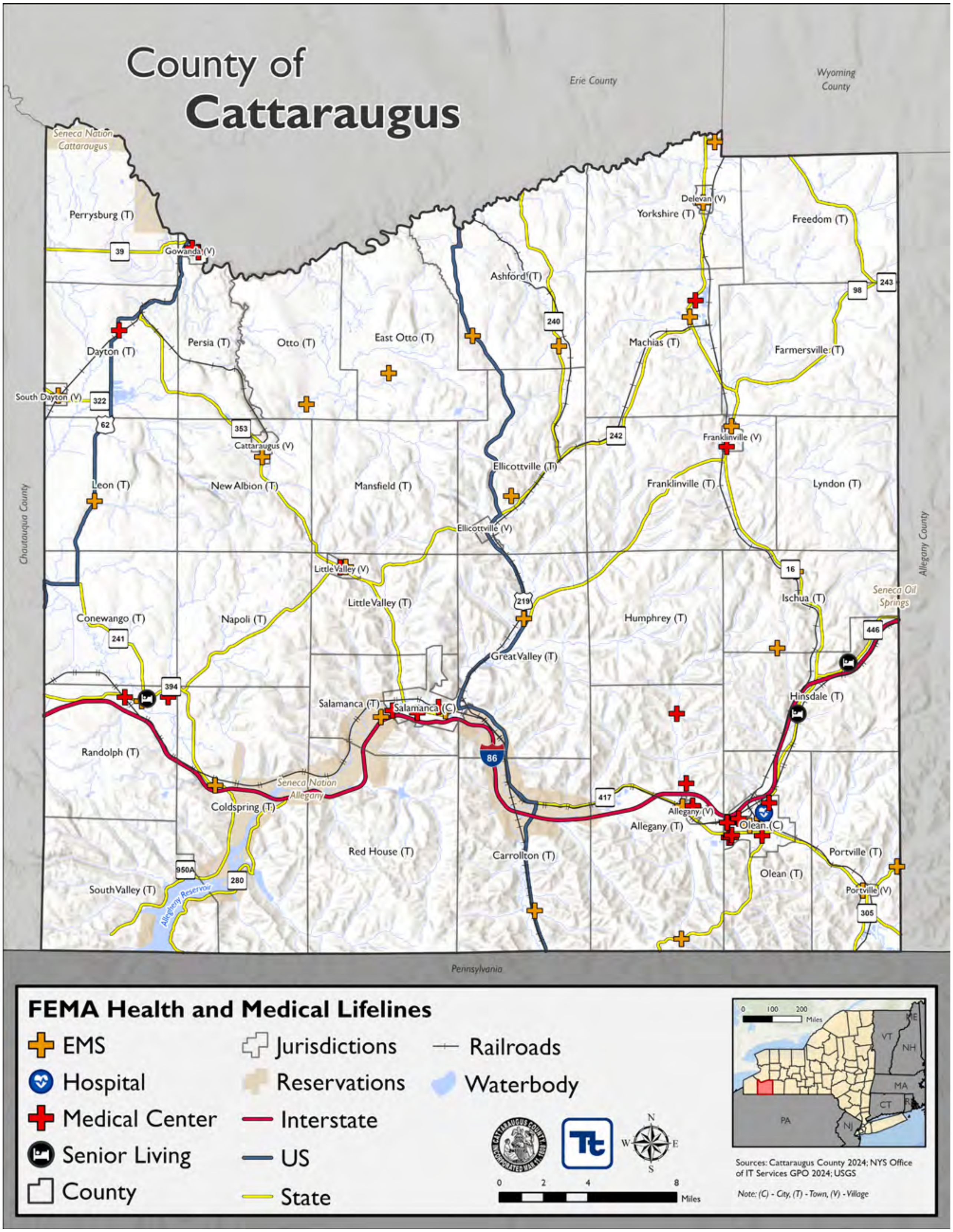
The County has multiple hospitals and health care facilities ranging in size and primary function to include smaller community health centers and the larger regional Bradford Regional Medical Center and Olean General Hospital. For non-emergency health care needs, a number of urgent care centers are located throughout the County. Some of these clinics are open 24 hours per day, and most have evening and weekend hours (Network n.d.).

The Cattaraugus County Health Department (CCHD) is an accredited Health Department that operates under the provisions of the Public Health Law and Sanitary Codes of New York State and Cattaraugus County. Multiple service sites are located throughout the County to facilitate easy access to services. There are six public health core services provided by CCHD, which include: family health, communicable disease control, chronic disease prevention, health promotion, environmental health, and public health emergency preparedness. The department also has a Certified Home Health Agency (CHHA), County Laboratory, Early Intervention Program, and a Women Infant and Children's program that, along with the core programs, comprise all programmatic services within the department. CCHD is governed by a Board of Health (BOH), which is responsible for reviewing agency efforts and setting policy. The BOH is composed of nine members (County, Cattaraugus 2022).

Senior Care and Living Facilities

The County has an extensive system of programs and services for the senior population, including 5 nursing homes, 62 home care providers, and 4 adult care facilities (New York State n.d.). 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 3-14. Health and Medical Facilities in Cattaraugus County



3.9.4 Energy

The energy community lifeline category includes power grids and fuel supplies. Figure 3-15 displays the location of energy facilities.

Gas and electric power in Cattaraugus County are transmitted and distributed primarily by New York State Electric and Gas (NYSEG). NYSEG is a subsidiary of AVANGRID and serves 902,593 electricity customers and 268,806 natural gas customers across more than 40 percent of upstate New York (NYSEG 2024). Numerous gas transmission pipelines and one hazardous liquid pipeline cross the County.

The County also participated in a federal program, called Home Energy Assistance Program (HEAP) that assists low-income families and individuals with utility and fuel payments. There are two components to this program: regular and emergency benefits. One regular benefit is issued to a household, but if the household experiences an emergency, it could be entitled to an emergency fuel and an emergency utility benefit. The HEAP program also authorizes furnace repairs/replacements and clean and tunes (Cattaraugus County n.d.).

3.9.5 Communications

The communications community lifeline category includes communications infrastructure; responder communications; alerts, warnings, and messages; finance; 911; and dispatch. Figure 3-16 displays the location of communications facilities.

Emergency Warnings and Responder Communications

Cattaraugus County Office of Emergency Services is responsible for maintaining and enforcing the County emergency plans, including assisting all towns, cities, and villages with emergency planning and coordination. The County Office of Emergency Services is also trained in National Incident Management System (NIMS) and Incident Command System (ICS) principles, which serves as the backbone to the County Emergency Operations Center (EOC). Emergencies are managed in either the primary EOC, alternate EOCs, or the Mobile Command Post trailer as needed (Cattaraugus County n.d.).

There are 37 fire departments in Cattaraugus County. Within the Office of Emergency Services are the County Fire Coordinator and five Deputy Fire Coordinators, one for each County fire district in Cattaraugus County. These Coordinators oversee and direct fire service activity, including response to multi-agency emergencies and training requests. Additionally, the County has emergency medical services, including the 33 State-certified ambulance and first response agencies in Cattaraugus County. Of the 33, 22 are organized within a fire department, while the remaining 10 are independent organizations (Cattaraugus County n.d.).

Communications

Cattaraugus County is served by a variety of communications systems, including traditional land line and cellular service provided by multiple companies, such as Verizon, AT&T, Sprint, and T-Mobile. Wireless Broadband internet service is provided by Southern Tier Wireless, DFT, and Spectrum. Plans to provide the County with fiber-optic internet by Armstrong Communications are currently in the engineering and design phase. In addition to land line, fiber optic, and cellular communications systems, Cattaraugus County has an extensive radio communications network that is utilized by emergency services agencies, hospitals, law enforcement, public works, transportation, and other supporting organizations.

Figure 3-15. Energy Facilities in Cattaraugus County

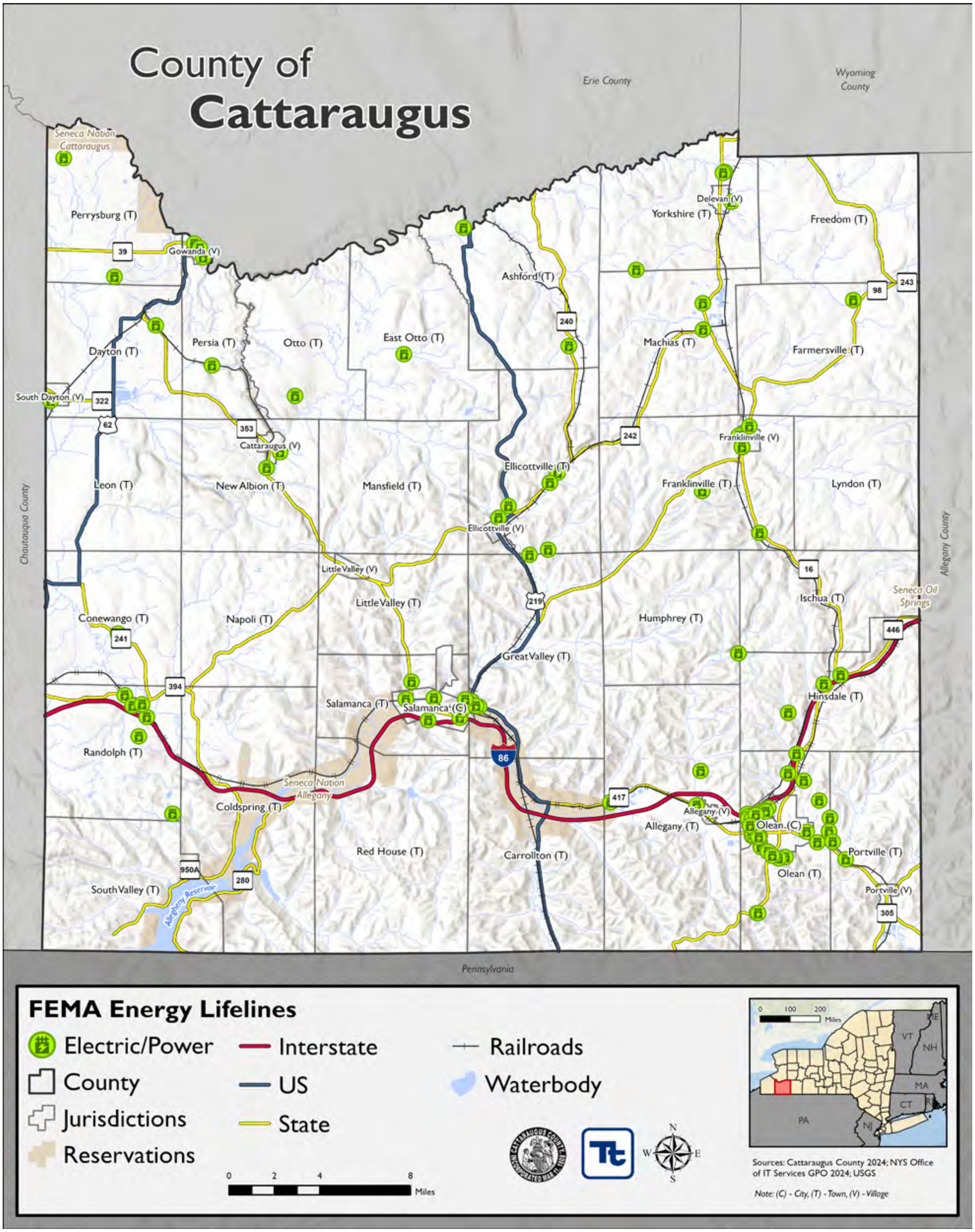
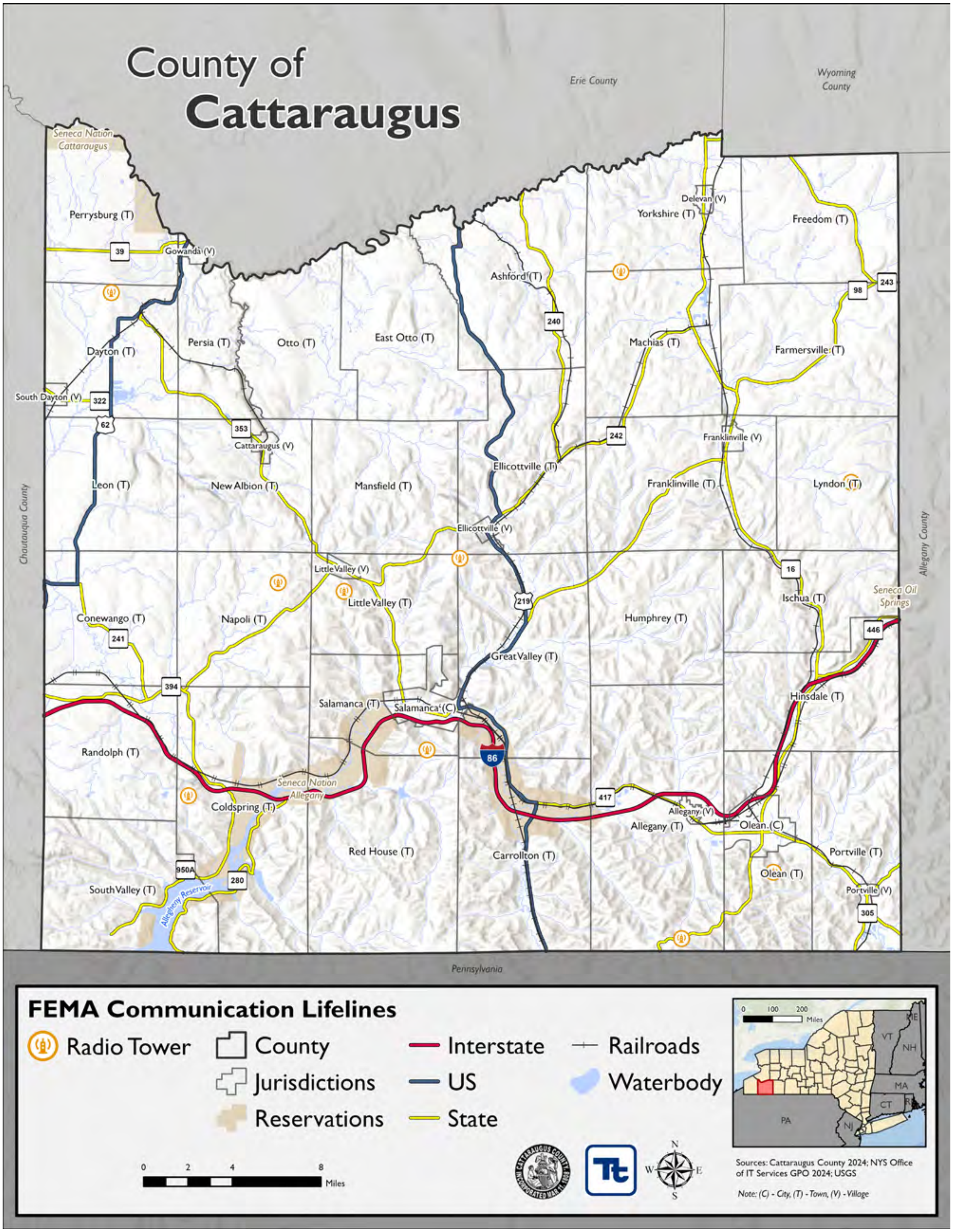


Figure 3-16. Communications Facilities in Cattaraugus County



3.9.6 Transportation

The transportation community lifeline category includes highway, roadway, and motor vehicle networks; mass transit; railways; aviation; and maritime facilities. Figure 3-17 displays the location of transportation facilities in Cattaraugus County.

Cattaraugus County's location and extensive transportation network offer residents and employees' various options for transportation throughout the County and the region. The transportation system includes an extensive network of roads, access to national and commuter rail, countywide bus service, an airport providing domestic and international flights, and a commercial shipping port. Major transportation routes through Cattaraugus County include Interstate Routes 62, 86, 219, State Routes 353, 242, 98, and 16 (Cattaraugus County 2015).

There are 392 miles of roadway owned and maintained by Cattaraugus County. The County Public Works and Highway Division and is responsible for roughly 264 bridge structures, 256 major culverts, 1,500 drainage pipes, 6,800 access culverts, and 40 miles of guard rail along with 5,000 sign installations and over 10,000 road signs. The Department of Public Works also oversees snow and ice control for all County roads in order for residents to have access to adequate driving surface (Public Works n.d.).

Evacuation Routes

Cattaraugus County has identified I-86, U.S. 219, Route 62, and Route 16 as evacuation routes. The primary roads and highways can also serve as evacuation routes for the County. The route used depends on the location of the incident. The County is fortunate to have a variety of well-connected arterial roadways throughout all regions, offering a variety of routing options. Figure 3-18 illustrates the major roadways in Cattaraugus County that would be utilized as evacuation routes in and out of the County in the event of an emergency that results in an evacuation.

Other than evacuation plans based on the geographically specific risks, evacuations are conducted on an event-specific basis. Because of the variable nature of such events, the County assists with the coordination and communication of evacuation routing for the County. County residents can enroll in NY-Alert, a program that allows residents to receive emergency-related information specific to their area. Alerts include severe weather warmings, significant highway closures, hazardous material spills, and other emergency conditions. Residents can receive alerts via text message, phone, and email.

Bus and Other Transit Facilities

Residents of Cattaraugus County have the option of using regional public transportation through Coach USA and Fullington Trailways, which provide inter-city bus services in Chautauqua and Cattaraugus Counties and provide services from Jamestown to Dunkirk to Silver Creek and Irving and from Jamestown to Olean with scheduled stops throughout Cattaraugus and Erie Counties. Additionally, ACCESS Allegany First Transit, Inc., Olean Area Transportation System (OATS), Cattaraugus County Transit System (STS), and Wyoming Transit Service (WYTS) are all public and private transit systems that run throughout the County and provide routine transit services throughout western New York State (Community Transportation Coalition of Cattaraugus County 2019).

Railroad Facilities

The Chautauqua, Cattaraugus, Allegany, and Steuben Southern Tier Extension Railroad Authority, more commonly known as the Southern Tier Extension Railroad Authority or STERA, is a local public authority created by the NYS Legislature in response to home rule requests in Chautauqua, Cattaraugus, Allegany, and Steuben Counties of NYS. STERA's plan is to invigorate the southwestern New York and northwestern Pennsylvania economy by attempting to re-invigorate its railroad system. STERA is currently involved with two railroad lines, which are called the Southern Tier Extension and the Buffalo Line which interconnect in Olean, NY. The Southern Tier Extension is a 145-mile-long rail line that runs between Corry, PA and Hornell, NY. The Southern Tier Extension has interconnections with other rail lines at each end and serves the cities of Jamestown, Salamanca, Olean, and Hornell; the Village of Wellsville; and other small towns along the line. The Buffalo Line is a 40-mile-long rail line that runs between Machias Junction and Cattaraugus County, NY and the PA state line at Portville, NY. The Buffalo Line also has interconnections with other rail lines at each end and serves the City of Olean and other villages and towns along the line in NY and PA. STERA works to promote economic development by improving the efficiency of freight shipping in southwestern NYS and PA (Southern Tier Extension Railroad Authority n.d.).

There are additional railroads in the County that operate for enjoyment and provide round trips and feature seasonal, holiday, sightseeing and event train rides all year round. The New York and Lake Erie Railroad provides train excursions in the countryside of Cattaraugus County (New York and Lake Erie Railroad n.d.). The Buffalo, Cattaraugus and Jamestown Scenic Railway offers passenger train rides with the purpose of educating passengers about train equipment and the history of American railroads (Buffalo Cattaraugus & Jamestown Scenic Railway n.d.).

Airports

There are a total of six airports located within Cattaraugus County. The Berdick Airport is located in Little Valley, NY, and is an airport that includes terminals, hangars, and parking facilities (County Office 2023). The Cattaraugus County Olean Airport is located in Hinsdale, NY, and serves the entire Western New York Region by being centrally located between Buffalo, Ellicottville, Allegany, and Salamanca, NY. The airport is publicly owned and situated on Road 81 off of Route 16. Olean Airport is home to 2 dozen aircraft, with two 10-bay t-hangars and a heated main hangar. The airport is typically used by Washington DC politicians, famous music entertainers, stand-up comedians, and several large companies interested in opening businesses in the area (Dollar General, Dollar Tree, Great Lakes Dairy) and several more (City of Olean n.d.). The Giermek Executive Airport is located in Olean, NY and is a public airport that began operation in 1941. Neverland Airport is in Cattaraugus, NY, and is a privately owned airport that offers flight schools (Airport Guide n.d.). The Randolph Airport is located in Randolph, NY. The South Dayton Airport is located in South Dayton, NY, and is a privately owned airport (County Office 2023).

Figure 3-17. Transportation Facilities in Cattaraugus County

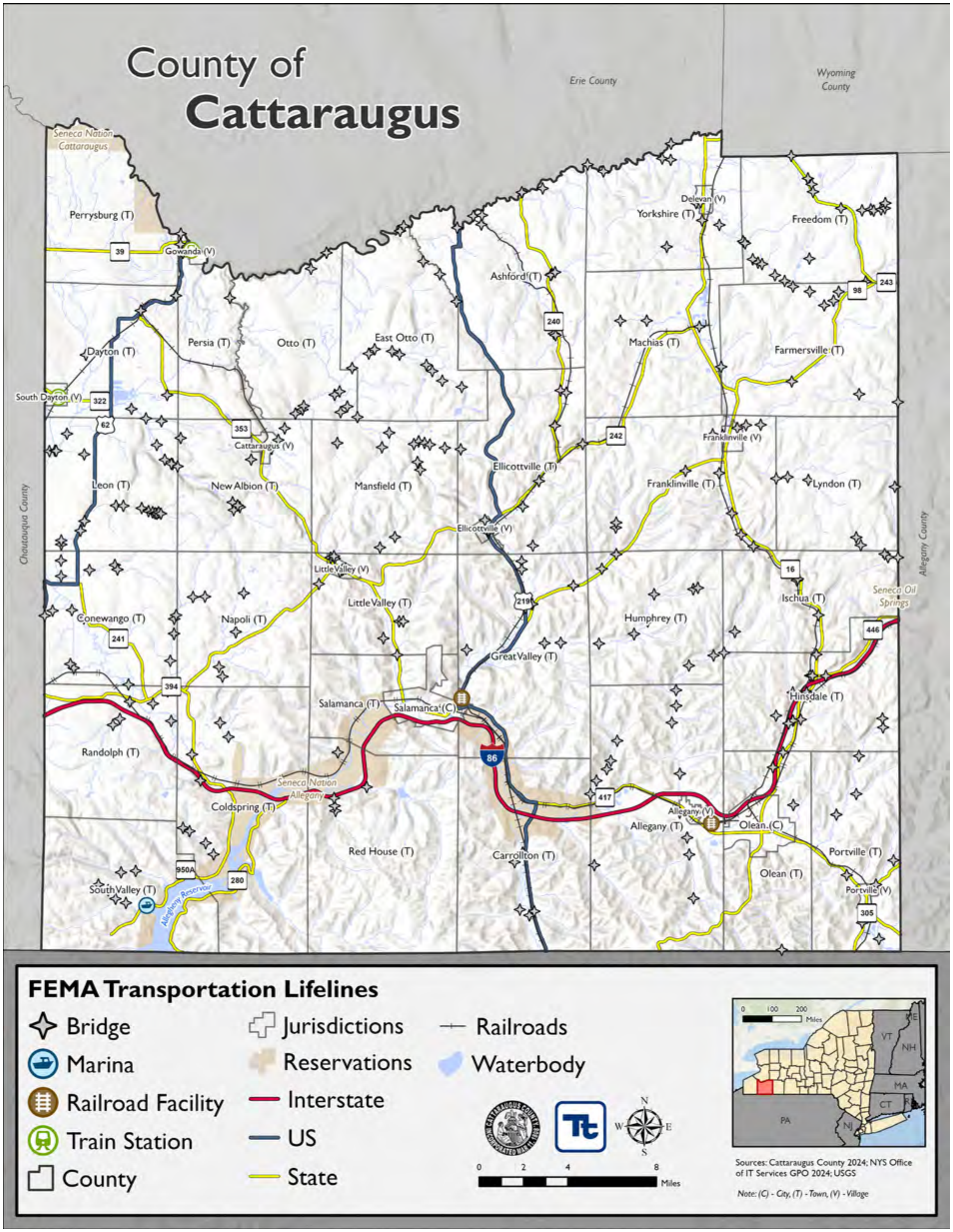
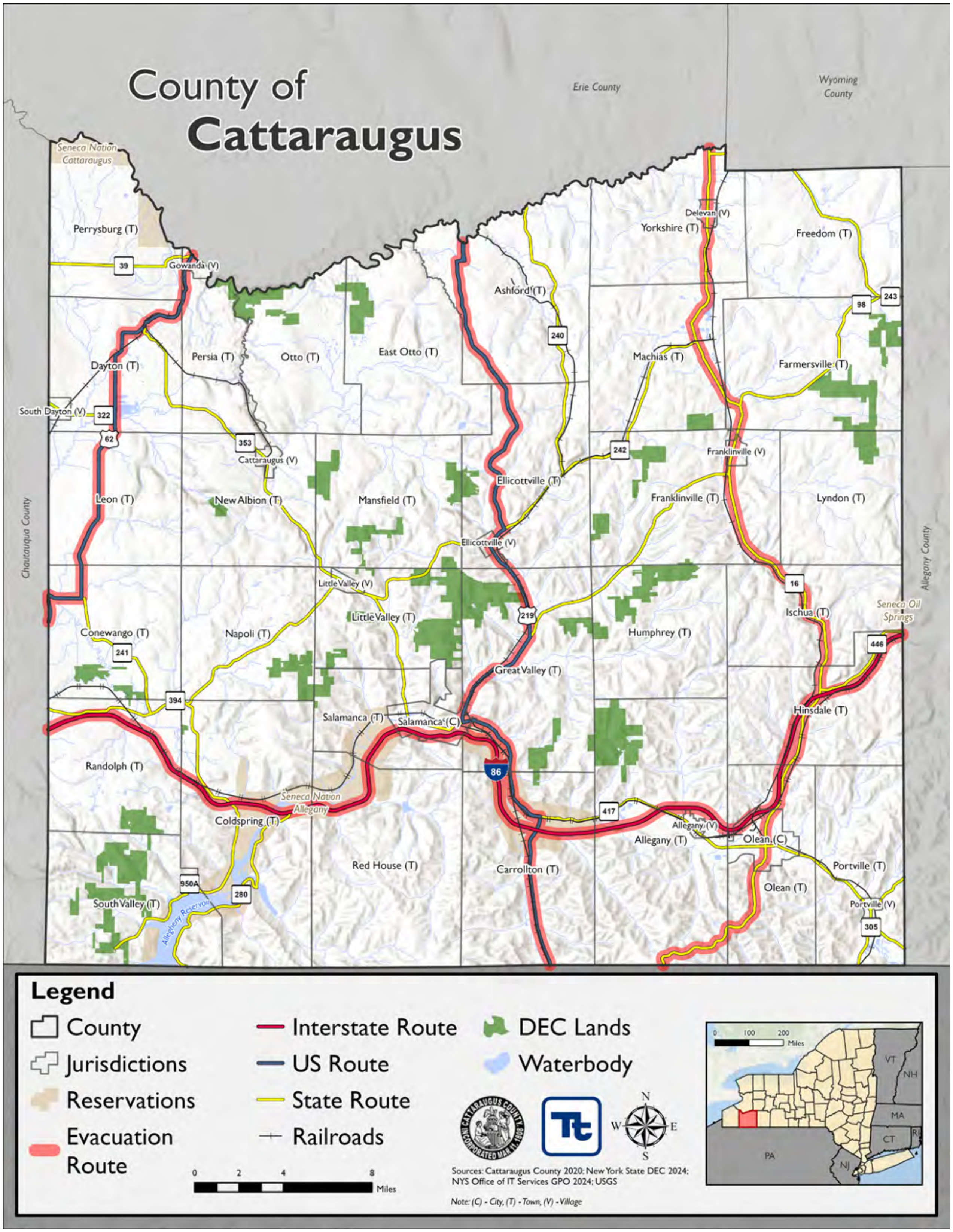


Figure 3-18. Evacuation Routes in Cattaraugus County



3.9.7 Hazardous Materials

The hazardous materials community lifeline category includes hazardous materials facilities, pollutants, and contaminants. Figure 3-19 displays the location of hazardous material sites in Cattaraugus County.

Hazardous Materials Facilities

The U.S. Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) (Superfund) Public Access Database reports that there are currently no Superfund sites in Cattaraugus County. Superfund sites are polluted locations requiring a long-term response to clean up hazardous material contaminations.

Abandoned hazardous waste sites placed on the federal National Priorities List (NPL) include those that the EPA has determined present “a significant risk to human health or the environment,” with the sites being eligible for remediation under the Superfund Trust Fund Program. As of August 2024, Cattaraugus County has four hazardous sites in the federal Superfund Program that are listed on the NPL (CERCLIS 2024).

In addition to the hazardous waste sites, there are numerous hazardous facilities in Cattaraugus County cataloged by the NYSDEC’s Bulk Storage Program Database. The Bulk Storage Program includes three types of facilities: petroleum bulk storage, major oil storage facilities, and chemical bulk storage. Registration with NYSDEC is mandatory for all petroleum bulk storage facilities with a total storage capacity of 1,100 gallons or more; all chemical bulk storage underground tanks and all stationary aboveground tanks with a capacity of 185 gallons or more; and all major oil storage facilities sites storing more than 400,000 gallons of petroleum products. As of September 2024, there are roughly 471 sites in the Bulk Storage Program Database in Cattaraugus County, NY (NYS DEC 2022).

3.9.8 Water Systems

The water system community lifeline category includes potable water and wastewater infrastructure. Due to heightened security concerns, local utility lifeline data sufficient to complete the analysis have only partially been obtained. Figure 3-20 depicts where water facilities are located in the County.

Potable Water

In Cattaraugus County, the Environmental Health Division is responsible for enforcement of state and federal water and sewage disposal regulations as well as the monitoring of public water supplies. Community water suppliers serve most of the County’s population, while a small portion of the population relies on on-site wells. Most residents who live in rural areas get their water from onsite sources. Drilled wells are the most common type of onsite water supply in Cattaraugus County, although driven-point wells and springs are still found serving older homes. These water supplies can come in all shapes and sizes and are collectively referred to as "private water supplies". These “private water supplies” are not regulated, as it is up to the water supply owner to maintain and operate the system for safe usage (Cattaraugus County n.d.); see Figure 3-21.

Wastewater Facilities

Wastewater treatment for most municipalities is provided by municipal or private treatment facilities. There are 26 municipal wastewater treatment facilities in the County. Municipal wastewater treatment services are provided by wastewater treatment plants, wastewater treatment facilities, and sewage treatment plants. Private wastewater treatment within Cattaraugus County includes septic systems and sand filters.

Where municipal sewage treatment is not available, on-site septic systems are used. Soil quality in the County is variable, resulting in many parts of the County being unsuitable for on-site wastewater treatment. Undersized or unmaintained on-site septic systems can be an issue, particularly in the drinking watersheds, where exposure and runoff can impair water quality.

Onsite wastewater treatment systems in Cattaraugus County are regulated by the Environmental Health Division in accordance with NYS standards and specifications and are in effect at the time of construction. All onsite wastewater treatment systems in the County require a permit issued by the Environmental Health Division before construction (Cattaraugus County n.d.).

3.10 OTHER CRITICAL FACILITIES

Some facilities that are identified as critical for hazard mitigation in Cattaraugus County do not fit in any of FEMA's community lifeline categories. These include libraries, churches, and polling places. Figure 3-22 shows the location in Cattaraugus County of these other critical facilities.

3.11 NATURAL, HISTORIC, AND CULTURAL RESOURCES

3.11.1 Natural

The Cattaraugus County Soil & Water Conservation District's mission is to protect and promote the health, safety, and general welfare of the present and future generations of Cattaraugus County residents through the conservation and enhancement of soil, water, air, flora, and fauna through the delivery of science-based technical and educational assistance. The Conservation District has completed numerous projects for the County to better support the County, including agriculture programs and assistance to local government. The District has completed numerous projects, including the rock-lined ditch project that was completed in the Town of Lyndon and the Bunk Silo runoff management project in Farmersville (District, Cattaraugus County Soil and Water Conservation n.d.).

Cattaraugus County makes up 26 various state forests, parks and wildlife management areas that offer various activities, such as hunting, camping, hiking, skiing, horseback riding, fishing, and so much more. In addition, the County released a Countywide Trail System Plan with the purpose to preserve and promote the County's natural resources, maximize opportunities for outdoor recreation, and capitalize on the outdoor tourism industry (Cattaraugus County Planning n.d.).

3.11.2 Historic

Cattaraugus County is rich in history, with buildings and sites that are still present and preserved due to their rich historic and cultural significance. The Cattaraugus County Historical Museum and Research Center offers featured exhibits that analyze the important roles that the County played in history such as the Civil War Exhibit, which looks into the two companies that hailed from Cattaraugus to support the war (Cattaraugus County n.d.).

3.11.3 Cultural

The historical Seneca Nation of Indians occupied territory throughout the Finger Lakes area in Central New York, and in the Genesee Valley in Western New York, living in longhouses on the riversides. The Seneca Nation of Indians were the largest of six Native American nations and they maintained a democratic government that predates that of the United States Constitution. Seneca Nation of Indians' Allegany Territory is located along the Allegheny River and is located entirely within Cattaraugus County, and originally included 30,469 acres of land. This territory most notably includes the City of Salamanca (Seneca Nation of Indians n.d.). Two additional territories are partially located within Cattaraugus County – the Cattaraugus territory near the Village of Gowanda and the Oil Springs territory near the Town of Ischua.

Figure 3-19. Hazardous Materials Facilities in Cattaraugus County

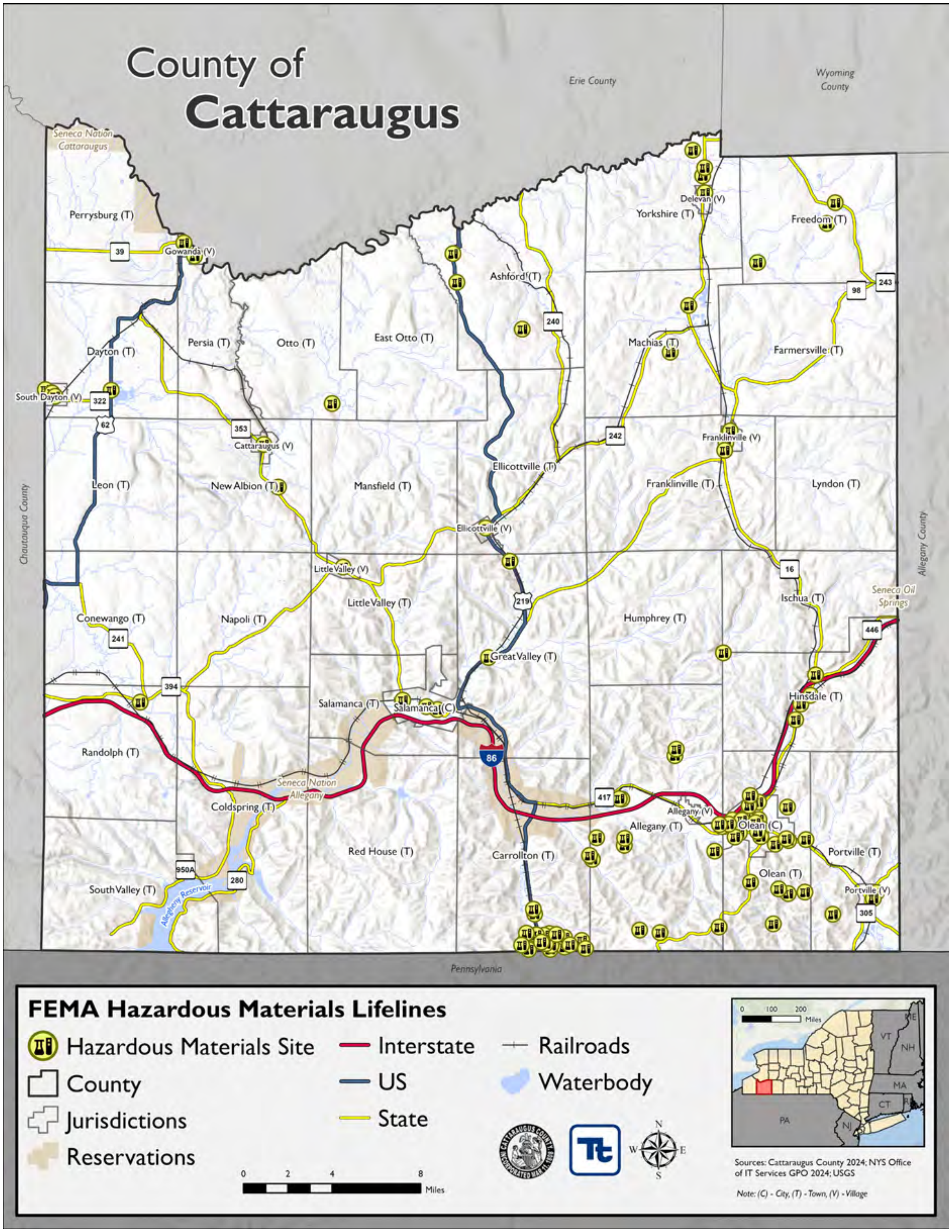


Figure 3-20. Water Facilities in Cattaraugus County

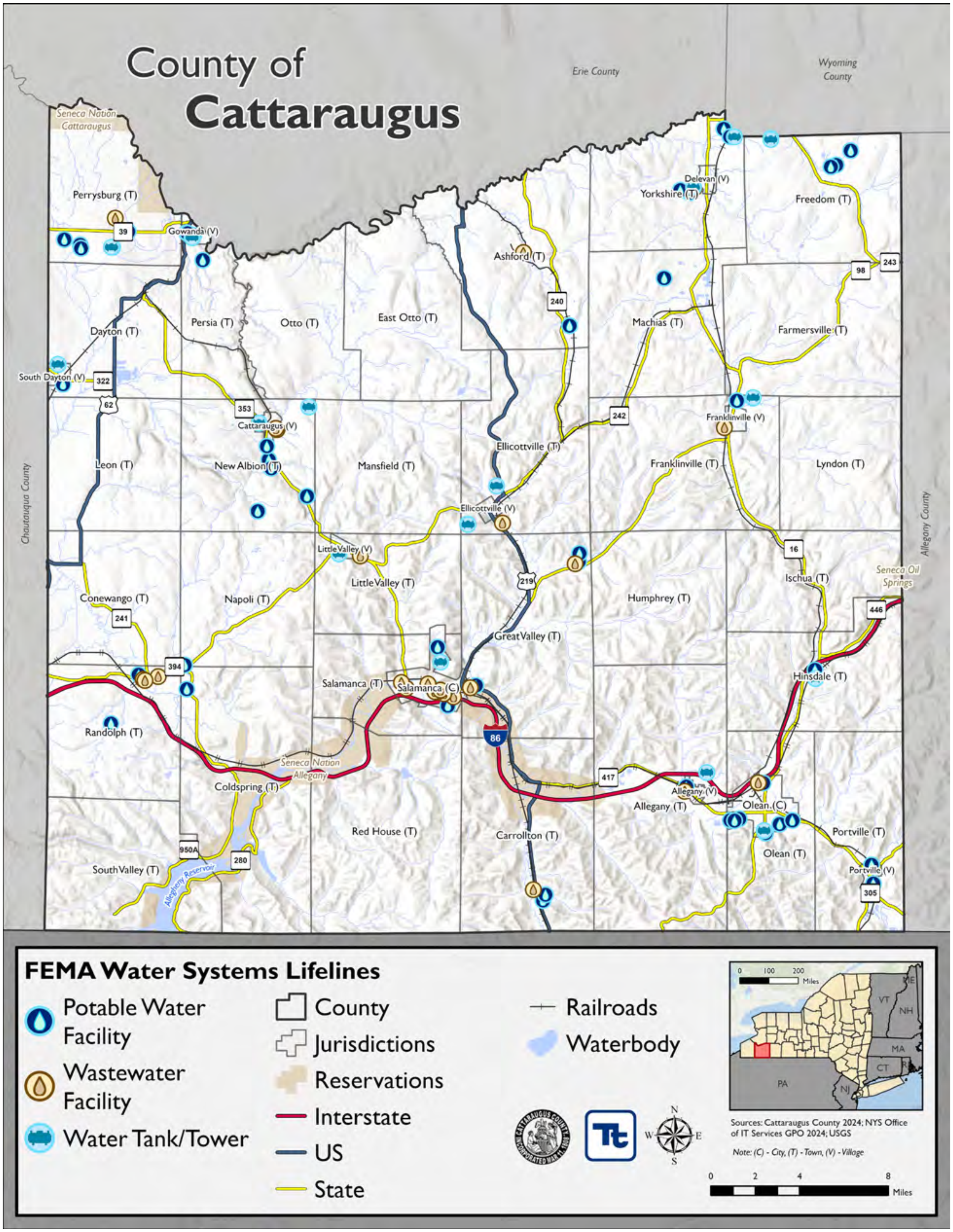


Figure 3-21. Cattaraugus County Water Authority Service Area

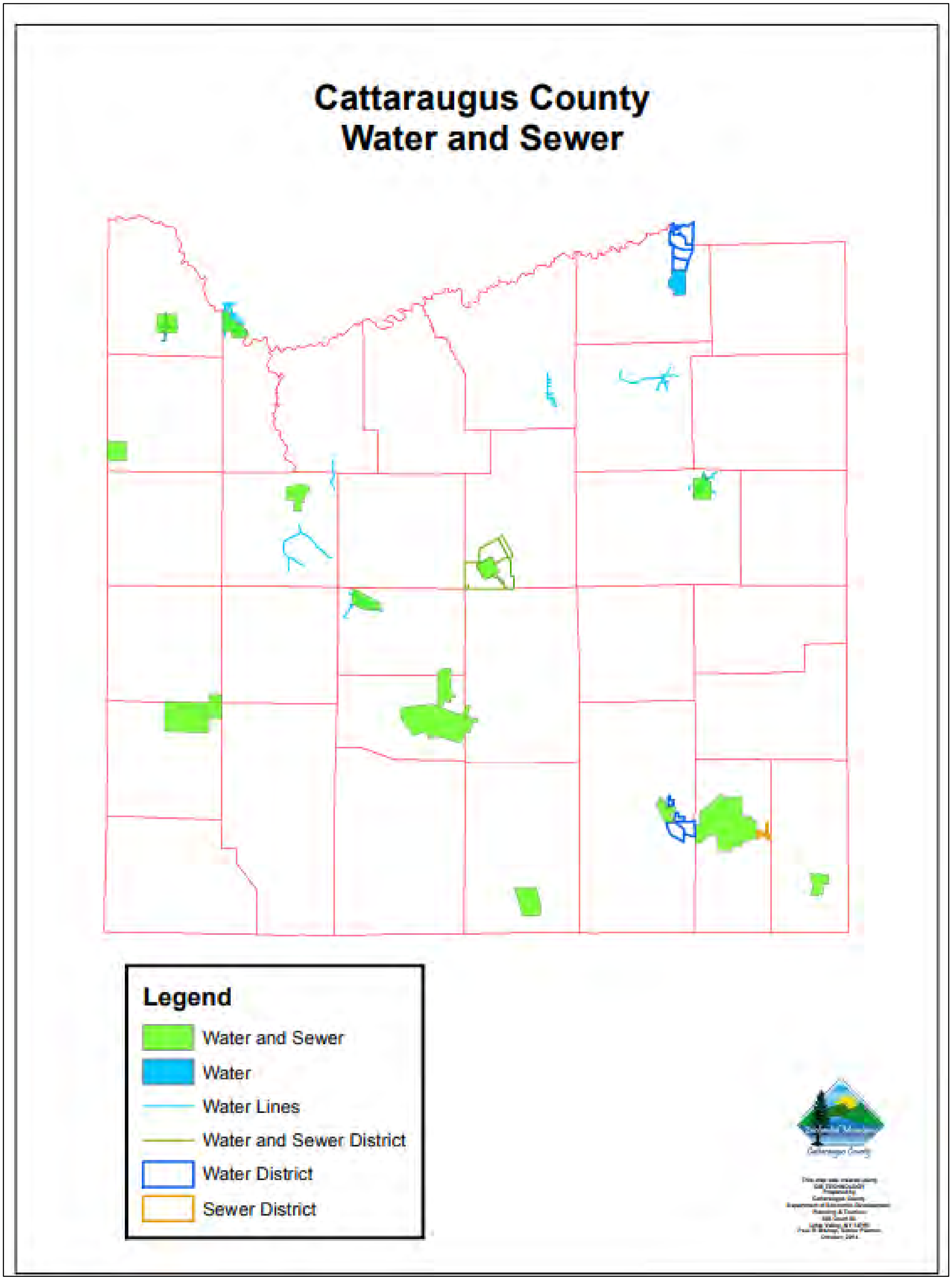
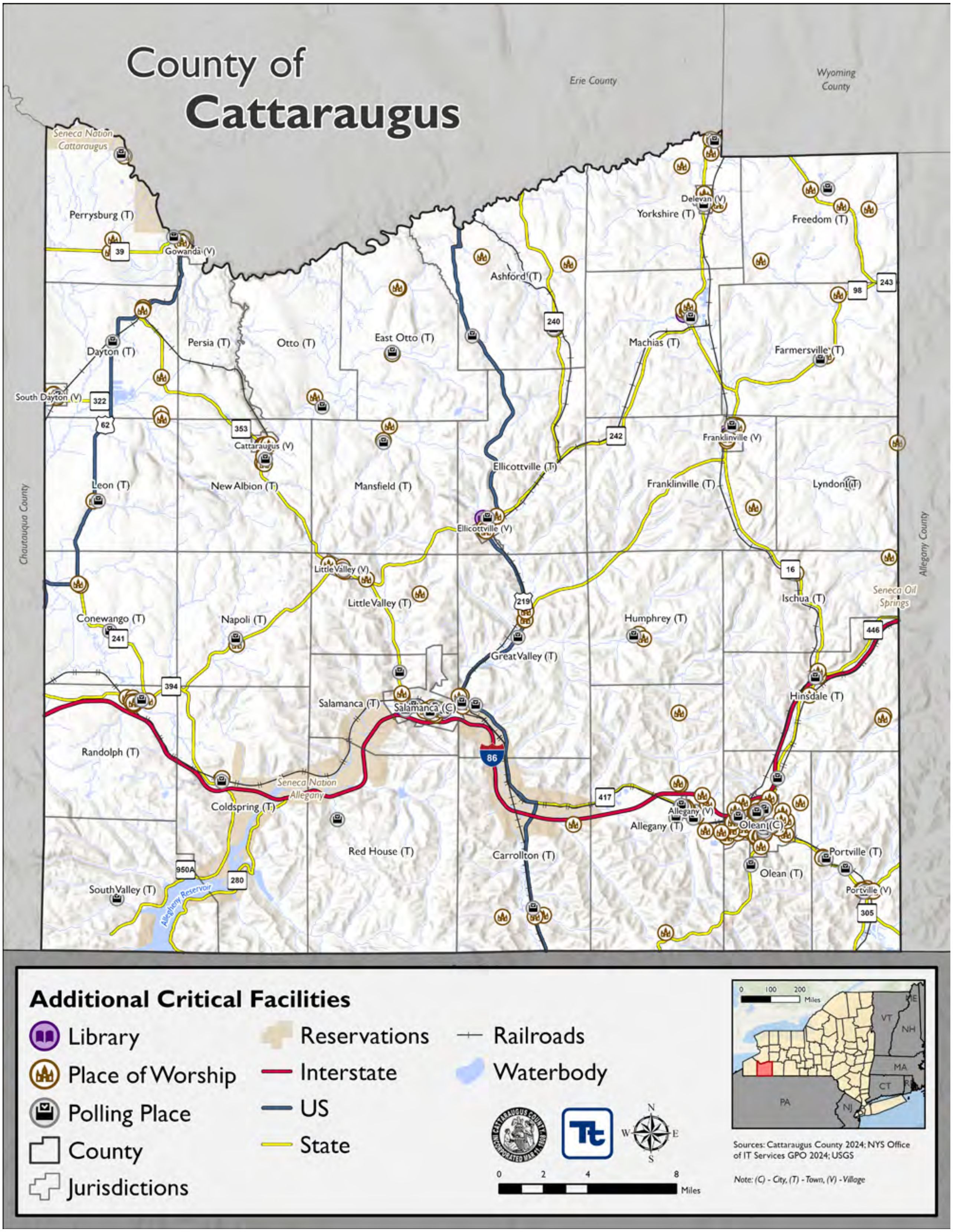


Figure 3-22. Other Critical Facilities in Cattaraugus County



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:
  - Extent—The potential severity of each hazard
  - Location—Geographic area most likely to be affected by the hazard
  - Previous occurrences and losses
  - Impacts of climate change
  - Probability of future hazard events
- **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.

The Cattaraugus County risk assessment was updated using the following best-available information:

- The building stock inventory was updated using 2024 tax assessor and parcel data provided by Cattaraugus County GIS and 2024 RS Means cost adjustment values.
- 2020 Decennial Census Population data and 2018–2022 American Community Survey 5-year Population Estimates were utilized.
- Critical facilities were updated and reviewed by Cattaraugus County.
- Lifelines were identified in the critical facility inventory to align with FEMA's community lifeline definition.
- FEMA's Hazus program was used to estimate potential impacts from the flood and wind hazards.
- Best-available hazard data were used, as described in this section.

4.1 ASSET INVENTORIES

Cattaraugus County assets were identified to assess potential vulnerability and impacts associated with the hazards of concern. For the HMP update, Cattaraugus County assessed vulnerability and potential hazard impacts for the following types of assets: population, buildings, critical facilities, community lifelines, the environment, and new development. Some assets may be more susceptible to impacts because of their physical characteristics or socio-economic uses. Each asset type is described below. To protect individual privacy and the security of critical facilities, information on properties assessed is presented in aggregate, without details about specific individual personal or public properties.

4.1.1 Population

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

Statistics from the 2020 Decennial Census Population estimate and 2018–2022 American Community Survey (ACS) 5-year estimate were used to estimate the vulnerability of and potential impacts on the County's population. To determine population statistics for villages and towns, village population totals were subtracted from the total town population. Where villages were split between towns, the percentage of the geographic area of the village within each town was calculated and applied to the total population of the village to estimate the population that would be subtracted from each respective town. Population counts at the jurisdictional level were averaged among the residential structures in the County to estimate the population at the structure level. This estimate provides a more precise distribution of population across the County compared to only using the 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.

FEMA's Hazus program was used to model estimated potential losses to flood, seismic, and wind hazards, as discussed further later in this section. Hazus contains 2020 U.S. Census data and was used to estimate sheltering and injuries as part of the hazard analysis.

As discussed in Chapter 3, County Profile, research has shown that some populations are at greater risk from hazard events because of decreased resources or physical abilities. Vulnerable populations in Cattaraugus County included in the risk assessment are children, the elderly, populations below the poverty level, non-English speaking individuals, and persons institutionalized with a disability.

4.1.2 Buildings

A custom general building stock was created countywide in 2020. For this plan, the general building stock was updated using 2024 parcel tax assessor information provided by Cattaraugus County GIS. Attributes provided in the associated files were used to further define each structure, such as year built, number of stories, basement type, occupancy class, and square footage. The centroid of each building footprint was used to estimate the building location. Structural and content replacement cost values (RCV) were calculated for each building using the available assessor data, the building footprint, and RS Means 2024 values.

The analysis used a location factor associated by location zip-code, which produces location factors for residential and non-residential occupancy classes, respectively, as shown in Table 4-1.

Table 4-1. RCV Regional Location Factor

Zip Code	Residential	Non-Residential
140xx	1.06	1.04
141xx	1.06	1.04
147xx	0.95	0.97

RCV is the current cost of returning an asset to its pre-damaged condition using present-day cost of labor and materials. Total RCV consists of both the structural cost to replace a building and the estimate value of contents of a building. The occupancy classes available in Hazus were condensed into the categories of residential, commercial, industrial, agricultural, religious, governmental, and educational to facilitate analysis and presentation of results. Residential loss estimates addressed both multi-family and single-family dwellings.

4.1.3 Critical Facilities and Community Lifelines

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

A critical facility inventory, which includes essential facilities, utilities, transportation features, and user-defined facilities, was created by Cattaraugus 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 Environment and Land Use

National land use land cover data created by the U.S. Geological Survey (USGS) in 2021 was used to assess land use characteristics of the County. This dataset was converted from a raster to a vector polygon, which informed spatial areas of 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

New development in the planning area was defined as development that occurred over the last five years and development that is expected to occur over the next five years. Each jurisdiction was asked to provide a list by address of major development that has taken place within these timeframes. These results are presented as a table in each annex in Volume II.

4.2 METHODOLOGY

Cattaraugus 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 4-2 summarizes the type of analysis conducted by hazard of concern.

Table 4-2. Summary of Risk Assessment Analyses

Hazard	Population	General Building Stock	Critical Facilities
Dam Failure	Q	Q	Q
Flood	V, H	V, H	V, H
Landslide	V	V	V
Pandemic	Q	Q	Q
Severe Storm	H	H	H
Severe Winter Storm	Q	Q	Q
Utility Failure	Q	Q	Q
Wildfire	V	V	V

Notes: 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, which have been developed by hazard and information technology experts, to provide defensible damage and loss estimates. These methodologies are accepted by FEMA and provide a consistent framework for assessing risk across a variety of hazards. The GIS framework also supports the evaluation of hazards and assessment of inventory and loss estimates for these hazards.

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

In general, modeled losses were estimated in the program using depth grids for the flood analysis and probabilistic analyses were performed to develop expected or estimated distribution of losses (mean return period losses) for hurricane wind and seismic hazards. The probabilistic model generates estimated damages and losses for specified return periods (e.g., 100- and 500-year). Table 4-3 displays the levels of analysis that can be conducted using the Hazus software.

Table 4-3. 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 and Levee Failure

All of Cattaraugus County is at risk from the impacts of dam and levee failure events. A qualitative analysis was conducted to assess the County’s vulnerability to this hazard of concern.

Flood

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

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

- Q3 data from FEMA for Cattaraugus County dated from the 1970s/1980s
- The 1 percent annual chance flood depth grid generated using the Q3 FEMA data and 1-meter Digital Elevation Model (DEM) from the New York State Geographic Information System Department (NYS GIS)

The resulting depth grid was integrated into ESRI ArcGIS Pro for an exposure analysis and the HAZUS v6.1 riverine flood model for a loss analysis. This analysis used the Q3 flood boundary, updated general building stock inventory, identified new development, updated critical facility inventory, updated population data using the American Community Survey 5-year Population Estimates (2018–2022), and the 2020 U.S. Census population data to estimate exposure and losses caused by the 1 percent annual chance flood event. Assets (population, building stock, critical facilities, new development) with their centroid in the floodplain were totaled to estimate the numbers and values exposed to a flooding event. To estimate potential losses, a Level 2 HAZUS v6.1 riverine flood analysis was performed for the 1 percent annual chance flood event. The updated building and critical facility inventories were incorporated into HAZUS. HAZUS calculated the estimated potential losses to the population (sheltering needs) using the 2020 U.S. Census population data and potential damages to the general building stock and critical facility inventories based on the depth grid generated and the default HAZUS damage functions in the flood model.

Landslide

To assess the vulnerability of the County to landslide events and its associated impacts, a quantitative assessment was conducted using ESRI ArcPro and a landslide layer that was created using the 2017 DEM from NYS GIS. The ArcGIS slope tool was used to calculate the degrees of the slopes in the DEM. According to the County, areas where slopes are greater than or equal to 25 percent are susceptible to landslide events. Therefore, areas where the slope angles were equal to or greater than 25 percent were converted to degrees (e.g., 25 percent is equal to

14 degrees). Degrees that are equal to or greater than 14 were converted to vectors, which created the final landslide hazard layer. To estimate potential exposure to landslide hazard areas, assets (population, building stock, critical facilities, new development) with their centroid in the hazard areas were totaled to estimate the numbers and values exposed to the landslide hazard boundary.

Pandemic

All of Cattaraugus County is at risk from the impacts of pandemic events. A qualitative review was conducted to assess the County's vulnerability to this hazard of concern.

Severe Storm

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

Severe Winter Storm

All of Cattaraugus County is exposed and vulnerable to the winter storm hazard. In general, structural impacts include damage to roofs and building frames rather than building content. Current modeling tools are not available to estimate specific losses for this hazard. A qualitative analysis was conducted to assess the County's vulnerability to this hazard of concern.

Utility Failure

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

Wildfire

The Wildland-Urban Interface (Interface and Intermix) obtained through the SILVIS Laboratory, Department of Forest Ecology and Management, University of Wisconsin – Madison, was referenced to delineate wildfire hazard areas. The University of Wisconsin – Madison wildland fire hazard areas are based on the 2020 Census and 2019 National Land Cover Dataset and the Protected Areas Database. For this risk assessment, the high-, medium-, and low-density interface areas were combined and used as the "Interface" hazard area, and the high, medium-, and low-density intermix areas were combined and used as the "Intermix" hazard areas.

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

4.3 RATING PROBABILITY OF OCCURRENCE

Based on records of previous hazard events and consideration of potential future changes that could affect the frequency of future events, the risk assessment for each hazard assigns a rating for the probability of occurrence of that hazard in the future. These ratings were assigned as follows:

- Unlikely—not likely to occur or less than 1 percent annual chance of occurring
- Rare—between 1 and 10 percent annual chance of occurring
- Occasional—between 10 and 100 percent annual chance of occurring
- Frequent—100 percent chance occurring; occurs multiple times a year

4.4 DATA SOURCE SUMMARY

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

Table 4-4. Risk Assessment Data Documentation

Data	Source	Date	Format
Population data	U.S. Census Bureau; American Community Survey 5-Year Estimates	2020; 2018–2022	Digital (GIS) format
Building Inventory	Cattaraugus County GIS, Tetra Tech	2024	Digital (GIS) format
Wildfire Hazard Data	SILVIS Lab, Dept of Forest & Wildlife Ecology, University of Wisconsin-Madison	2020	Digital (GIS) format
Land Use	NLCD	2021	Digital (GIS) format
Critical Facilities and Lifelines	Cattaraugus County	2024	Digital (GIS) format
Q3 Flood Mapping	FEMA	1970/1980	Digital (GIS) format
1-Meter Digital Elevation Model	NYS GIS	2017	TIFF
Landslide Hazard Data	NYS GIS	2017	Digital (GIS) format
Rail Network	Cattaraugus County	2024	Digital (GIS) format
Road Network	Cattaraugus County	2024	Digital (GIS) format
New Development Data	-	-	Digital (GIS) Format

Notes:
FEMA - Federal Emergency Management Agency
GIS - Geographic Information System
NLCD - National Land Cover Database
NYS - New York State

4.5 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, Cattaraugus 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. The County acknowledges significant impacts may occur to critical facilities and infrastructure as a result of these hazard events causing great economic loss. However, monetized damage estimates to critical facilities and infrastructure, and economic impacts were not quantified and require more detailed loss analyses. In addition, economic impacts to industry such as tourism and the real estate market were not analyzed.

4.6 CONSIDERATIONS FOR MITIGATION AND NEXT STEPS

The following items are to be discussed for considerations 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 RS Means values.
  - Utilize updated and current demographic data.
- Dam and Levee Failure
  - Identify available dam inundation hazard boundary data for high and very high hazard dams to incorporate a quantitative analysis.
- Flood
  - The general building stock inventory can be updated to include attributes regarding first floor elevation and foundation type (basement, slab on grade, etc.) to enhance loss estimates.
  - Conduct a HAZUS loss analysis for more frequent flood events (e.g., 10- and 50-year flood events).
  - Conduct a repetitive loss area analysis.
  - Continue to expand and update urban flood areas to further inform mitigation.
  - As more current FEMA floodplain data become available (i.e., DFIRMs), update the vulnerability analysis and generate a more detailed flood depth grid that can be integrated into the current HAZUS version.
- Landslide
  - A pilot study conducted in Schenectady County, NY (Landslide Susceptibility – A Pilot Study of Schenectady County, NY) provided a detailed methodology for delineating high-risk landslide areas. This study looked at a variety of environmental characteristics, including slope and soil conditions, to determine areas at risk from landslide. To coincide with the methodology of that study, the generated

slopes were categorized into five classes: 0 to 2 percent; 3 to 7 percent; 8 to 15 percent; 16 to 25 percent; greater than 25 percent. Should the County determine the need for a more detailed assessment of risk, it could determine steep slope by other percentage categorizations. Additional environmental and soil characteristics used in the Schenectady County plan can be collected and used to follow the methodology used to further delineate the County's most at-risk areas.

- Severe Storm
  - The general building stock inventory can be updated to include attributes regarding protection against strong winds, such as hurricane straps, to enhance loss estimates.
  - Integrate evacuation route data that is currently being developed.
- Severe Winter Storm
  - If available for the region, obtain average snowfall distributions to determine if various areas in the County have historically received higher snowfalls and might continue to be more susceptible to higher snowfalls and snow loads on the building stock and critical facilities and infrastructure.
- Wildfire
  - General building stock inventory can be updated to include attributes such as roofing material, fire detection equipment, or distance to fuels as another measure of vulnerability.

5. IDENTIFICATION OF HAZARDS OF CONCERN

To provide a strong foundation for mitigation actions in this plan, Cattaraugus 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:

> ***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.

- Input from all Planning Partners
- Review of the New York State HMP
- Review of the 2020 Cattaraugus 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.

Table 5-1 documents the process of identifying the hazards of concern for further profiling and evaluation.

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

Hazard	May Occur in the County?	Poses Significant Threat to the County?	Why was this determination made?	Sources
Avalanche	No	No	The 2023 New York State HMP identifies avalanche as a hazard of concern. Avalanche was identified as a hazard in the New York State HMP, and there have been occurrences in the state; however, there were no occurrences in Cattaraugus County. The topography and climate of Cattaraugus 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 New York State HMP identifies coastal hazards as a hazard of concern for New York State. Coastal hazards can impact all the state's coastal counties along Lake Erie and the Niagara River, Lake Ontario and the St. Lawrence River, Atlantic Ocean and Long Island Sound, Hudson River south of the federal dam in Troy, the East River, the Harlem River, the Kill van Kull, and Arthur Kill, and all connecting waterbodies, bays, harbors, shallows, and wetlands. Coastal hazards may also impact inland counties and communities. Cattaraugus County does not have coastline. The Steering Committee and Planning Partnership did not identify coastal hazards as a hazard of 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. According to the NYSDEC, there are 112 dams within Cattaraugus County, as shown in Chapter 3, Chapter 6. Of these 112 dams in Cattaraugus County: 85 low hazard, 14 intermediate hazard, 12 high hazard, and 1 negligible or no hazard classification code (NYSDEC 2022). Dam failure was given an individual hazard profile, paired with levee failure.	NYS DHSES NYSDEC NYS GIS Input from Steering Committee and Planning Partnership
Drought	Yes	Yes	The New York State HMP identifies drought as a hazard of concern for the state. Cattaraugus County has been impacted by several drought events that have occurred in New York State. Agriculture is a substantial industry in Cattaraugus County. Drought conditions would severely impact the County's economy. In 2016, there were three occurrences of drought in Cattaraugus County according to NOAA's NCEI Storm Events Database, with the one occurrence taking place in July, August, and September. Cattaraugus County was included in six drought-related U.S. Department of Agriculture (USDA) disaster declarations: S4023—2016 Drought S4031—2016 Drought	NYS DHSES FEMA USDA NOAA-NCEI NRCC Input from Steering Committee and Planning Partnership

Hazard	May Occur in the County?	Poses Significant Threat to the County?	Why was this determination made?	Sources
			S4037—2016 Drought S5357—2022 Drought S5653 —2023 Drought The Steering Committee and Planning Partnership has identified drought as a hazard of concern for Cattaraugus County.	
Earthquake	Yes	Yes	The 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); Cattaraugus County was not included in this declaration. From 2015 to 2024, there have been no significant earthquakes with epicenters in Cattaraugus County. Based on input from the Steering Committee and Planning Partnership, earthquake was not identified as a hazard of concern for Cattaraugus 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	Please see Severe Storm Profile	
Flood (riverine, lakeshore, ice jam, urban flooding, and flash flooding)	Yes	Yes	The New York State HMP identifies flooding as a hazard of concern for New York State. Between 1956 and 2024, Cattaraugus County was included in eight flood-related declarations. DR-233; October 30, 1967; New York Severe Storms, Flooding DR-1095; January 19–30, 1996; New York Severe Storms and Flooding DR-1233; June 25–July 10, 1998; New York Severe Storms and Flooding DR-1486; July 21–August 13, 2003; New York Severe Storms, Tornadoes and Flooding DR-1534; May 13–June 17, 2004; New York Severe Storms and Flooding DR-1564; August 13–September 16, 2004; New York Severe Storms and Flooding DR-1857; August 8–10, 2009; Severe Storms and Flooding in New York EM-4180; May 13–22, 2014; Severe Storms and Flooding in New York Based on the history of flooding and its impacts on Cattaraugus County and input from the Steering Committee and Planning Partnership, flooding has been identified as a hazard of concern for the County.	NYS DHSES NOAA-NCEI USACE CRREL Ice Jam Database FEMA Input from Steering Committee and Planning Partnership
Hail	Yes	Yes	Please see Severe Storm Profile	
Hurricane	Yes	No	Please see Severe Storm Profile	

Hazard	May Occur in the County?	Poses Significant Threat to the County?	Why was this determination made?	Sources
Ice Jams	Yes	Yes	Please see Flood Profile	
Ice Storm	Yes	Yes	Please see Severe Winter Storm Profile	
Land Subsidence	Yes	No	The 2023 New York State HMP does not identify land subsidence as a hazard of concern. The Steering Committee and Planning Partnership did not identify land subsidence as a hazard of concern for Cattaraugus County.	NYS DHSES Input from Steering Committee and Planning Partnership USGS
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 Cattaraugus County. Based on previous occurrences and input from the Steering Committee and Planning Partnership, the landslide hazard was identified as a hazard of concern for Cattaraugus County.	NYS DHSES NOAA NCEI FEMA Input from Steering Committee and Planning Partnership
Levee Failure	Yes	Yes	The 2023 New York State HMP does not identify levee failure as a hazard of concern for New York State, though it is included in the Flood hazard profile. According to the NYSDEC, seven accredited levee systems within Cattaraugus County are made up of 111 structures encompassing 15 miles, as shown in Chapter 3, Chapter 6, and Appendix M (USACE 2022). Levee failure was given an individual hazard profile, paired with dam failure.	NYS DHSES USACE Input from Steering Committee and Planning Partnership
Lightning	Yes	Yes	Please see Severe Storm Profile	
Pandemic	Yes	Yes	The 2023 New York State HMP does not identify pandemic as a hazard of concern for New York State. Cattaraugus County was included in three pandemic-related disaster declarations: EM-3155; May 22–November 1, 2000; New York Virus Threat EM-3434; January 20, 2020–May 11, 2023; New York COVID-19 DR-4480; January 20, 2020–May 11, 2023; New York COVID-19 Pandemic The Steering Committee and Planning Partnership identified pandemic as a hazard of concern for Cattaraugus County.	NYS DHSES FEMA Input from Steering Committee and Planning Partnership
Severe Storm (wind, extreme temperature,	Yes	Yes	The New York State HMP identifies severe storm as a hazard of concern for New York State; however, for the state HMP, the hazards were profiled in individual sections coastal hazards,	NYS DHSES FEMA NOAA-NCEI

Hazard	May Occur in the County?	Poses Significant Threat to the County?	Why was this determination made?	Sources
thunderstorms, hail, lightning, hurricanes, and tornadoes)			hail, hurricane, lightning, tornado, and high winds. For the Cattaraugus County HMP, the hazards were combined into one profile. Between 1954 and 2024, Cattaraugus County was included in ten severe storm-related declarations: DR-338; June 23, 1972; New York Tropical Storm Agnes DR-1233; June 25–July 10, 1998; New York Severe Storms and Flooding DR-1335; May 3–August 12, 2000; New York Severe Storms DR-1486; July 21–August 13, 2003; New York Severe Storms, Tornadoes and Flooding DR-1534; May 13–June 17, 2004; New York Severe Storms and Flooding DR-1564; August 13–September 16, 2004; New York Severe Storms and Flooding EM-3262; August 29–October 1, 2005; New York Hurricane Katrina Evacuation DR-1857; August 8-10, 2009; Severe Storms and Flooding in New York EM-3351; October 27–November 8, 2012; Hurricane Sandy in New York EM-4180; May 13–22, 2014; Severe Storms and Flooding in New York Based on previous occurrences and input from the Steering Committee and Planning Partnership, severe storm is identified as a hazard of concern for Cattaraugus County.	SPC Input from Steering Committee and Planning Partnership
Severe Winter Storm (heavy snow, blizzards, ice storms)	Yes	Yes	The 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, Cattaraugus County experienced two ice storm events with losses of $47,000 and 12 snowstorm events with losses of over $11 million. Cattaraugus County was included in nine severe winter storm-related disaster declarations: DR-494; March 19, 1976; New York Ice Storm, Severe Storms, Flooding EM-3027; January 29, 1977; New York Snowstorms DR-527; February 5, 1977; New York Snowstorms EM-3107; March 13–16, 1993; New York Severe Blizzard EM-3136; January 1–15, 1999; New York Winter Storm EM-3157; November 19–21, 2000; New York Snowstorm EM-3170; December 24–29, 2001; New York Snowstorm EM-4204; November 17–26, 2014; New York Severe Winter Storm, Snowstorm, and Flooding EM-3589; November 18–21, 2022; New York Severe Winter Storm and Snowstorm Based on previous occurrences and input from the Steering Committee and Planning Partnership, severe winter storm is identified as a hazard of concern for Cattaraugus County.	NYS DHSES FEMA NOAA-NCEI Input from Steering Committee and Planning Partnership
Snowstorm	Yes	Yes	Please see Severe Winter Storm	

Hazard	May Occur in the County?	Poses Significant Threat to the County?	Why was this determination made?	Sources
Tornado	Yes	Yes	Please see Severe Storm	
Utility Failure	Yes	Yes	The 2023 New York State HMP does not identify utility failure as a hazard of concern for New York State. Cattaraugus County experiences utility failures (generally power outages) several times each year. These failures are usually due to severe storms or severe winter storms that affect the County. Cattaraugus County was included in one utility failure-related disaster declaration: EM-3186; August 14–16, 2003; New York Power Outage. The Steering Committee and Planning Partnership consider utility failure its own hazard but understand it may also be a cascading impact of severe storm, severe winter storm, and flooding events.	NYS DHSES NOAA NCEI Input from Steering Committee and Planning Partnership
Wildfire	Yes	Yes	The New York State HMP identifies wildfire as a hazard of concern for New York State. Cattaraugus County was not included in any FEMA wildfire-related disaster declarations. Wildfires have occurred within Cattaraugus County. The County's agriculture industry could be severely impacted by a large wildfire. Based on previous occurrences and input from the Steering Committee and Planning Partnership, severe winter storm is identified as a hazard of concern for Cattaraugus County.	NYS DHSES FEMA Input from Steering Committee and Planning Partnership
Wind	Yes	Yes	Please see Severe Storm	

CRREL *Cold Regions Research and Engineering Laboratory*
DR *Presidential Disaster Declaration Number*
EM *Presidential Disaster Emergency Number*
FEMA *Federal Emergency Management Agency*
NCEI *National Centers for Environmental Information*
NOAA *National Oceanic and Atmospheric 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*
New York State HMP *New York State Hazard Mitigation Plan*
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 and Levee Failure
- Flood
- Landslide
- Pandemic
- Severe Storm
- Severe Winter Storm
- Utility Failure
- Wildfire

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

5.1 HAZARD GROUPINGS

The Steering Committee approved use of the following hazard event groupings:

- The dam and levee failure hazard profile addresses dam and levee failures that may impact Cattaraugus County.
- The flood hazard includes riverine flooding, flash flooding, stormwater/urban flooding, and ice jam flooding. Inclusion of the various forms of flooding under a general Flood hazard is consistent with that used in FEMA's Multi-Hazard Identification and Risk Assessment guidance and the 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 pandemic hazard exists when there are more cases of a particular disease than expected in an area, or among a specific group of people, over a particular period of time.
- The severe storm hazard includes thunderstorms, lightning, hail, high winds, tornadoes, and tropical cyclones.
- The severe winter storm hazard includes heavy snow, sleet, blizzards, and ice storms.
- The utility failure hazard focuses on the disruption or loss of a public service which includes, but is not limited to electrical service, potable water, and natural gas caused by disruption of power transmission.
- The wildfire hazard can be defined as any non-structural fire that occurs in the wildland. Wildfires result in the disturbance of forest and brush, the destruction of real estate and personal property, and have secondary impacts on other hazards, such as flooding, by removing vegetation and disturbing watersheds.

These groupings are the same as those provided by FEMA (*FEMA 386-2 Understanding Your Risks, Identifying Hazards and Estimating Losses*; *Multi-Hazard Identification and Risk Assessment–The Cornerstone of the National Mitigation Strategy*; *Local Mitigation Planning Handbook*) and take into consideration the hazard grouping in the New York State HMP.

6. DAM AND LEVEE FAILURE

6.1 HAZARD PROFILE

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

6.1.1 Hazard Description

Dam Failure

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 these stated functions (Association of State Dam Safety Officials n.d.).

Water stored behind a dam represents potential energy that can endanger life and property located downstream. The risks that are associated with damns must be minimized at all times and maintained properly, including safety inspections, technical review of a proposed new dam, monitoring and enforcement of dam safety criteria, and emergency preparedness which is tracked by New York State Department of Environmental Conservation (NYSDEC) (NYSDEC n.d.).

Man-made dams can be classified according to the 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, the purpose of the dam. Materials used for the construction of dams include earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, miscellaneous materials (plastic or rubber), and any combination of these materials (Association of State Dam Safety Officials n.d.). Dams are built for power production, agriculture, water supply, recreation, and flood protection. Dam failure is any malfunction or abnormality outside of the design that adversely affects a dam's primary function of impounding water and potentially leads to a sudden, rapid, and uncontrolled release of water (USSD 2023).

More than a third of the country's dams are 50 or more years old. Approximately 15,000 of those dams pose a significant hazard to life and property if failure occurs. About 2,000 unsafe dams are dispersed throughout the United States in almost every state.

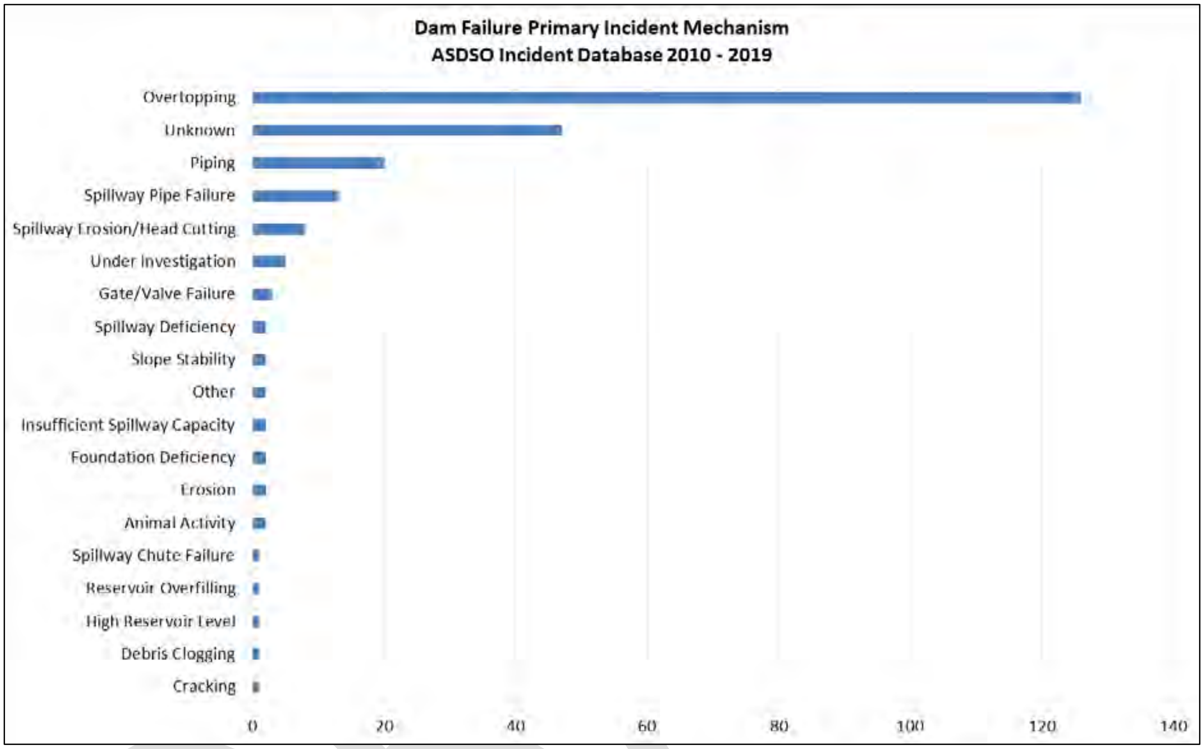
Dams typically fail when spillway capacity is inadequate and excess flow overtops the dam or when internal erosion (piping) through the dam or foundation occurs. Complete failure occurs if internal erosion or overtopping results in a complete structural breach, releasing a high-velocity wall of debris-filled water that rushes downstream, damaging or destroying anything in its path (FEMA 2016).

Figure 6-1 visualizes the primary causes of dam failures nationally. Dam failures can result from one or a combination of the following (Association of State Dam Safety Officials n.d.):

- Overtopping caused by floods that exceed the 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
- Piping and internal erosion of soil in embankment dams
- Inadequate maintenance and upkeep

Figure 6-1. Dam Failure Causes



Source: Association of State Dam Safety Officials 2023

Regulatory Oversight of Dams

The potential for catastrophic flooding caused by dam failures led to the passage of the National Dam Safety Act (Public Law 92-367). For 30 years, the National Dam Safety Program (NDSP) has protected Americans from dam failure. NDSP is a partnership among the states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchase of needed equipment. FEMA has also expanded existing training programs and initiated new training programs. Grant assistance from FEMA provides support for the improvement of dam safety programs that regulate most dams in the United States (FEMA 2023).

The State of New York has a comprehensive dam safety program through which three governmental authorities regulate dam safety throughout the state:

- NYSDEC – Environmental Conservation Law (ECL) Article 15, Part 673
- Federal Energy Regulatory Commission (FERC) – 18 *Code of Federal Regulations* (CFR) 12.22-24
- U.S. Army Corps of Engineers (USACE) – EP 1110-2-13, Dam Safety Preparedness

Dam safety emergency action plans (EAP) are formal dam failure procedures written by the dam owner/operator. EAPs are site-specific plans and relate only to the facility's procedures to prevent/mitigate the 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 FERC, and NYSDEC regulates dam safety and EAPs for all dams in the State of New York (USACE 2014).

New York State Department of Environmental Conservation

The New York State Department of Environmental Conservation's (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 USACE and are operated and maintained by NYSDEC (in some cases with local municipal partners).

The state generally inspects high-hazard (Class C) dams every two years and moderate-hazard (Class B) 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 n.d.).

U.S. Army Corps of Engineers Dam Safety Program

USACE is responsible for safety inspections of some federal and non-federal dams in the United States that meet 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 the design, construction, operation, and maintenance of dams. USACE has also developed guidelines for inspection and evaluation of dam safety (USACE 2014).

Federal Energy Regulatory Commission Dam Safety Program

The FERC has the largest dam safety program in the United States. FERC cooperates with many federal and state agencies to ensure and promote dam safety and, more recently, homeland security. FERC staff inspect hydroelectric projects on an unscheduled basis to investigate the following (FERC 2023):

- 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 consulting engineer, approved by FERC, must inspect and evaluate projects with dams higher than 32.8 feet (10 meters) or with a total storage capacity of more than 2,000 acre-feet (FERC 2023).

FERC monitors and evaluates seismic research in geographic areas where seismic activity is a concern. This information is applied to investigate and analyze structures of hydroelectric projects within these areas. FERC staff also evaluate the effects of potential and actual large floods on the safety of dams. FERC staff visit dams and licensed projects during and after floods, assess the extent 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 2023).

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 2023).

Levee Failure

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

A levee breach occurs when part of a levee gives way, creating an opening through which floodwaters may pass. A breach may occur gradually or suddenly. The most dangerous breaches happen quickly during periods of high water. Earthen levees can be damaged in several ways. Strong river currents and waves can erode the surface. Trees growing on a levee can blow over, leaving a hole where the root wad and soil used to be. Burrowing animals can create holes that enable water to pass through a levee. If severe enough, any of these situations can lead to a zone of weakness that could cause a levee breach. In seismically active areas, earthquakes and ground shaking can cause a loss of soil strength, weakening a levee and possibly resulting in failure. Seismic activity can also cause levees to slide or slump, both of which can lead to failure (FEMA 2018).

6.1.2 Location

Dam Failure

According to New York State data, 112 dams are present throughout Cattaraugus County. Most of these dams pose little risk; however, there are 12 high hazard potential dams in the County. Table 6-1 lists the high hazard dams located in Cattaraugus County. The location of all dams in the County can be seen in Figure 6-2. In addition, the Cuba Lake Spillway Dam (an intermediate hazard potential dam) and Cuba Lake Dam (a high hazard potential dam) in neighboring Allegany County; the Springville Dam (a high hazard potential dam) and Mohr Dam (a low hazard potential dam) in Erie County; and the Conewango Creek Site 6 Dam (an intermediate hazard potential dam) in Chautauqua County could impact Cattaraugus County.

Due to the lack of available spatial exposure data within Cattaraugus County, the inundation areas for dams within the County is assumed to be within the Special Flood Hazard Area.

Table 6-1. High Hazard Potential Dams in Cattaraugus County

Dam Name	Municipality	Classification
Conewango Creek Site 1 Dam	Randolph (T)	High Hazard
Conewango Creek Site 16 Dam	Napoli (T)	High Hazard
Conewango Creek Site 16a Dam	Conewango (T)	High Hazard
Conewango Creek Site 19 Dam	Randolph (T)	High Hazard
Harwood Lake Dam	Farmersville (T)	High Hazard
Holimont Upper Reservoir Dam	Mansfield (T)	High Hazard

Dam Name	Municipality	Classification
Ischua Creek Watershed Dam #1	Machias (T)	High Hazard
Ischua Creek Watershed Dam #2	Farmersville (T)	High Hazard
Ischua Creek Watershed Dam #4	Franklinville (T)	High Hazard
Ischua Creek Watershed Dam #5	Lyndon (T)	High Hazard
Ischua Creek Watershed Dam #6a	Franklinville (T)	High Hazard
Tannenbaum Reservoir Dam	Ellicottville (T)	High Hazard

Source: USACE 2023

The USACE National Inventory of Dams provides the most recent dates of inspection of the following Cattaraugus County dams in Table 6-2:

Table 6-2. Recent Dam Inspection Dates

Recent Dam Inspection Dates			
Dam Name	Inspection Date	Dam Name	Inspection Date
Alpine Heights Pond Dam	April 26, 2013	Ischua Creek Watershed Dam #6a	November 20, 2020
Bentley Wildlife Marsh Dam	June 14, 2001	James Hughey Dam	May 13, 2009
Camp Chautauqua Pond Dam	October 25, 2017	Kapic Pond Dam	October 25, 2017
Camp Lakeland Pond Dam	October 6, 2011	Lime Lake Outlet Dam	July 25, 2019
Cattaraugus County Sportsmans Dam #1	November 10, 1987	Lyle Harwood Recreational Pond Dam	August 3, 1977
Conewango Creek Site 1 Dam	December 11, 2020	Lyle Underwood W L Pond #2 Dam & Dike	July 21, 1980
Conewango Creek Site 13 Dam	May 9, 2018	Monte Shields Farm Pond Dam	August 24, 1977
Conewango Creek Site 16 Dam	May 9, 2018	NYS Atomic Development Dam #1	October 15, 2015
Conewango Creek Site 16a Dam	June 9, 2018	NYS Atomic Development Dam #2	October 15, 2015
Conewango Creek Site 19 Dam	November 13, 2020	Quaker Run Dam	October 27, 2016
Edgar Ploetz Recreational Pond Dam	October 25, 2017	Rainbow Lake Dam	July 11, 2017
Efner Davis Pond Dam	July 25, 2019	Red House Lake Dam	November 20, 2019
H Tigler Wildlife Dam	November 10, 1987	Richard Weishan Pond Dam	July 11, 2017
Harwood Lake Dam	May 20, 2020	Rotary Lake Dam	July 25, 2019
Holimont Upper Reservoir Dam	October 31, 2019	Science Lake Dam	October 4, 2011
Ischua Creek Watershed Dam #1	October 22, 2020	Stuart Klahn Dam	November 12, 1987
Ischua Creek Watershed Dam #2	October 22, 2020	Sunset Saddle Dam	October 26, 2017
Ischua Creek Watershed Dam #3	May 10, 2018	Tannenbaum Reservoir Dam	October 31, 2019
Ischua Creek Watershed Dam #4	November 13, 2020	Vee Pond Dam	October 18, 2007
Ischua Creek Watershed Dam #5	May 20, 2020	William O Nannen Pond Dam	October 26, 2017

Source: USACE 2023

Levee Failure

There are seven accredited levee systems within Cattaraugus County, made up of 111 structures encompassing 15 miles. These levees are operated and maintained by the New York State Department of Environmental Conservation. Failure of these levees could result in flooding of these jurisdictions. The location of these levee systems is displayed in Figure 6-3 through Figure 6-5.

The Left Bank Olean Creek levee system is located on Olean Creek and the Allegheny River in the Town of Olean. The system consists of 4.09 miles of levee embankment. A flood in the area behind the levee could impact approximately 5,083 people, 2,364 commercial and residential structures and cause an estimated $1.04 billion in possible flood-related damages (USACE n.d.).

The Right Bank Olean Creek levee is accredited and is maintained by the NYSDEC. The Olean Creek system consists of approximately 2.39 miles of levee embankment along the Olean Creek. A flood in the area behind the levee could impact nearly 1,953 people and 774 commercial and residential structures and cause an estimated $280 million in possible flood-related damages (USACE n.d.).

The North of Dodge Creek levee system is located on the right bank of Dodge Creek and the right bank of the Allegheny River in the Town of Portville. The system consists of 2.4 miles of levee embankment. A flood in the area behind the levee could impact approximately 513 people and 255 commercial and residential structures and cause an estimated $80 million in possible flood-related damages (USACE n.d.).

The South of Dodge Creek levee system is located on the banks of the Oswayo Creek, the Allegheny River, and the south bank of the Dodge Creek in the Town of Portville. The system consists of approximately 2 miles of levee embankment. A flood in the area behind the levee could impact approximately 499 people and 275 commercial and residential structures and cause an estimated $136 million in possible flood-related damages (USACE n.d.).

The Left Bank Allegheny River levee system is located on the left bank of the Allegheny River in the Town of Salamanca. The system consists of approximately 0.5 miles of levee embankment on the left bank of the Allegheny River. A flood in the area behind the levee could impact approximately 71 people and 29 commercial and residential structures and cause an estimated $20.6 million in flood-related damages (USACE n.d.).

The Right Bank Allegheny River levee system is located on the left bank of the Allegheny River in the Town of Salamanca. It consists of approximately .73 miles of levee embankment on the left bank of the Allegheny River. A flood in the area behind the levee could impact approximately 61 people and 30 commercial and residential structures and cause an estimated $9.58 million in flood-related damages (USACE n.d.).

The Right Bank West Salamanca levee system is located on the left bank of the Allegheny River in the Town of Salamanca. The system consists of approximately 0.88 miles of levee embankment on the left bank of the Allegheny River. A flood in the area behind the level could impact approximately 177 people and 92 commercial and residential structures and cause an estimated $18.5 million in flood-related damages (USACE n.d.).

Figure 6-2. Dams Located in Cattaraugus County

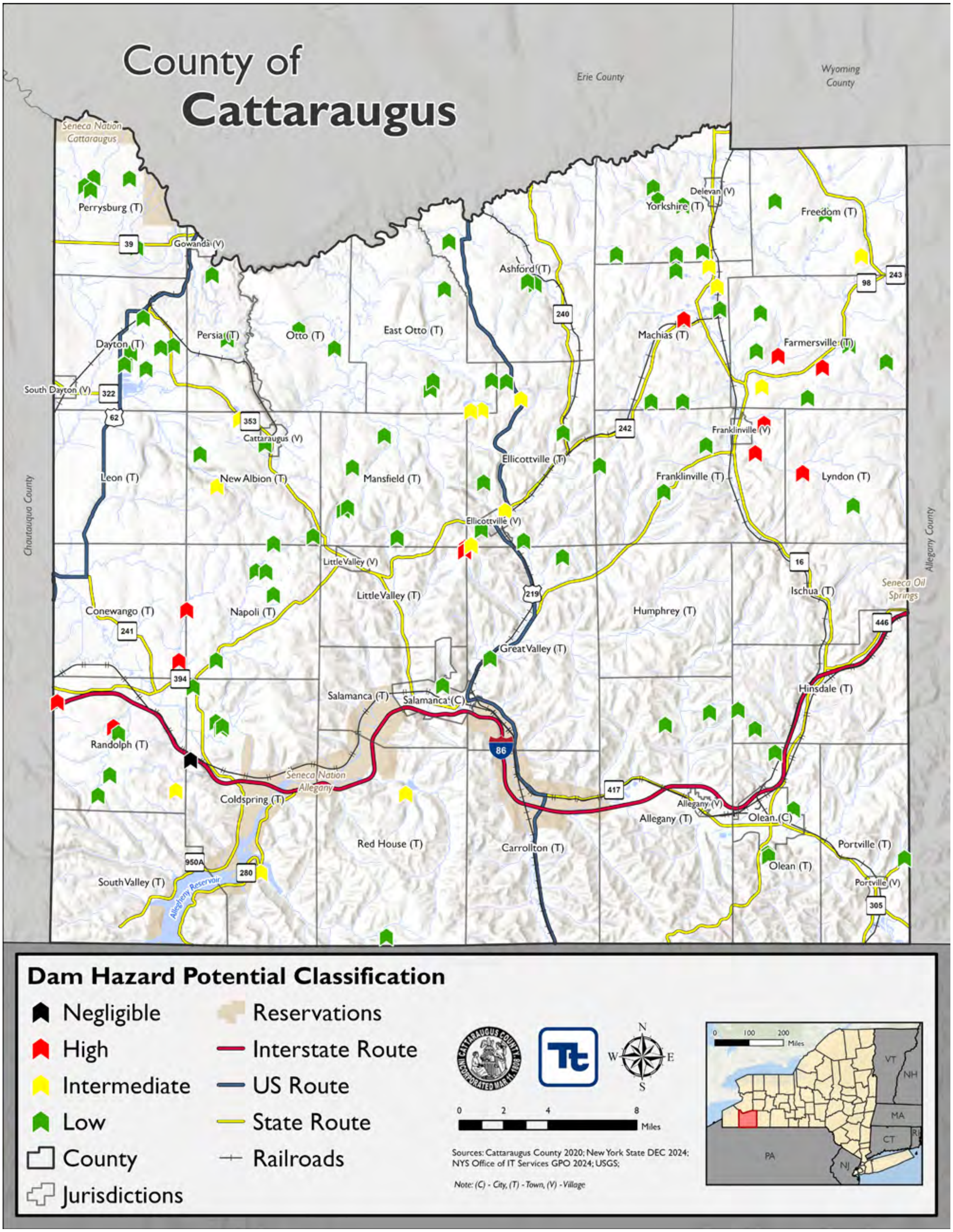
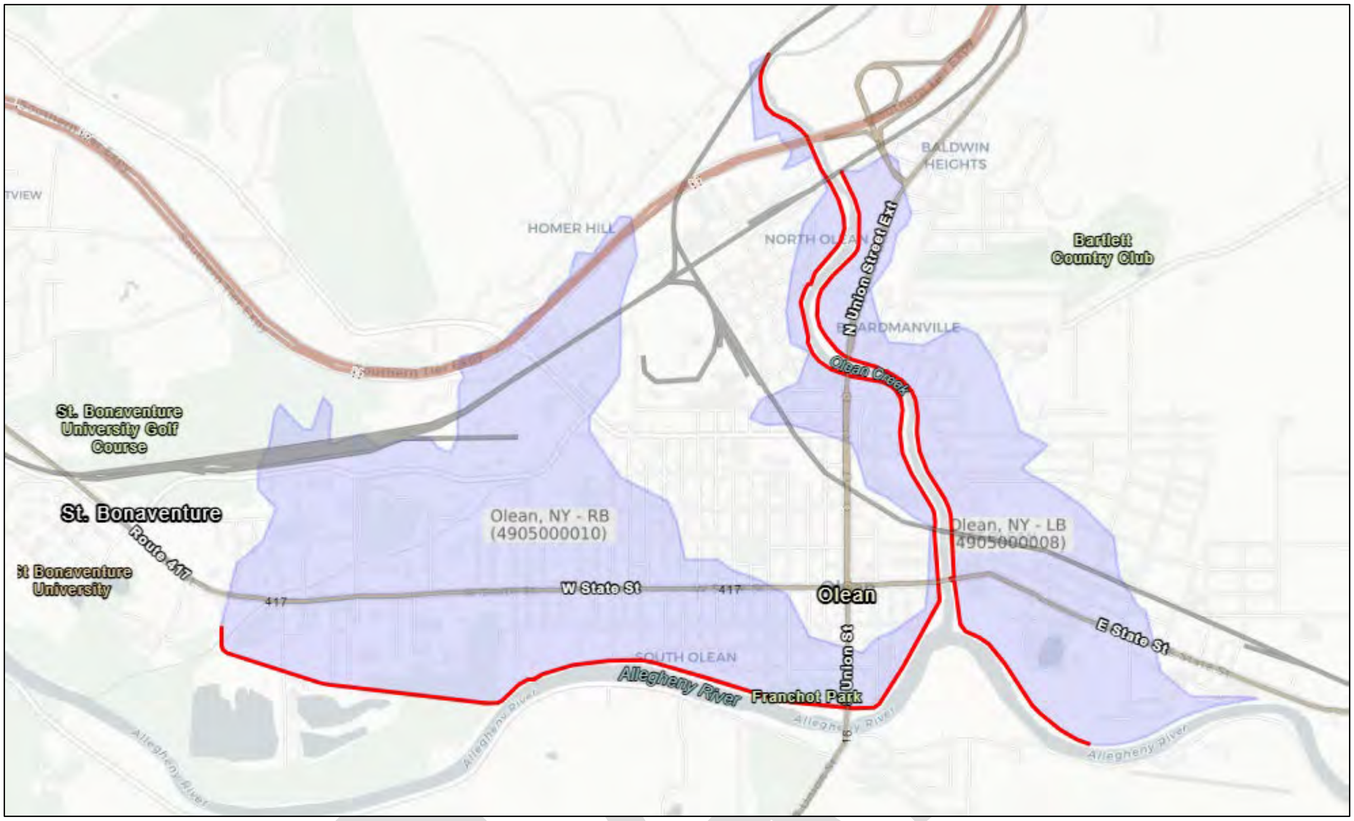


Figure 6-3. Left and Right Bank Olean Levee System

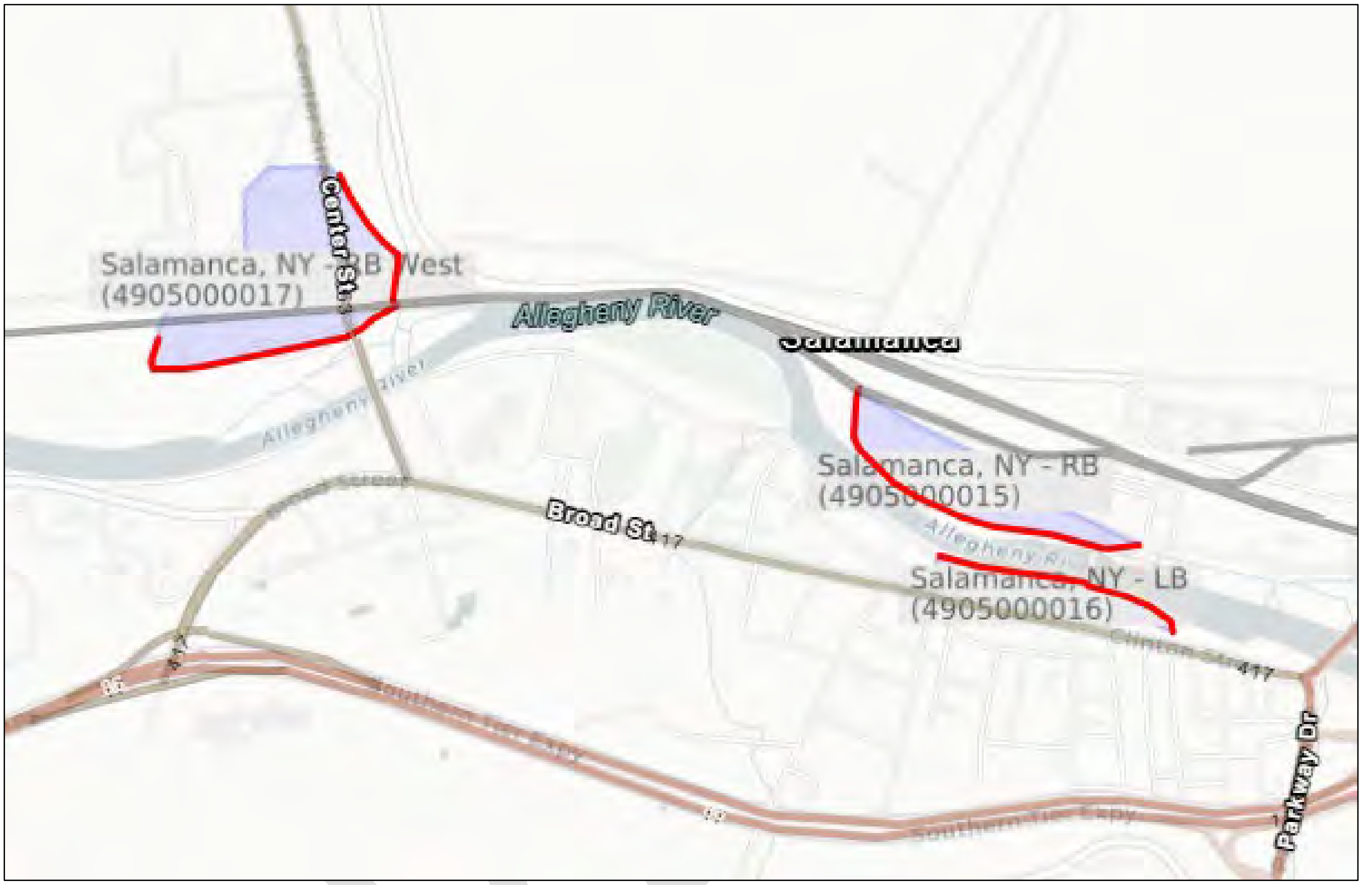


Source: USACE n.d.

Figure 6-4. North and South of Dodge Creek Levee System

Source: USACE n.d.

Figure 6-5. Left Bank and Right Bank Allegheny Levee System and Right Bank West Salamanca Levee System



Source: USACE n.d.

6.1.3 Extent

Dam Failure

Dam failures can occur suddenly, without warning, and under normal operating conditions—referred to as a "sunny-day" failure. Dam failures may also occur during a large storm 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. New York has undergone significant property damage including damage or loss of dams, bridges, roads, and buildings as a result of storm events and dam failures.

According to the NYSDEC Division of Water Bureau of Flood Protection and Dam Safety, the hazard classification of a dam is assigned according to the potential impacts of a dam failure under 6 New York Codes Rules and Regulations (NYCRR) Part 673.3 (N.Y. Comp. Codes R. & Regs. Tit. 6 § 673.3 - General provisions n.d.). Dams are classified in terms of potential for downstream damage if the dam were to fail. These hazard classifications are identified and defined below (NYSDEC n.d.):

- *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 misoperation 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, and minor railroads; interrupt the use of relatively important public utilities; and/or cause significant economic loss or serious environmental damage. Failure or misoperation would result in no probable loss of human life but may cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns. Dams classified as intermediate hazard 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 a dam that was planned but never constructed. Class "D" dams are defunct dams posing negligible or no hazard. NYSDEC may retain pertinent records regarding such dams.

Levee Failure

In the event of a levee failure, floodwaters may ultimately inundate the protected area landward of the levee. The extent of inundation depends on the flooding intensity—failure of a levee during a 1 percent annual chance flood will inundate the approximate 100-year floodplain previously protected by the levee. The structures closest to the levee overtopping or breach location will suffer the most damage from the initial embankment failure flood wave, and other buildings landward of the breach area will be damaged by inundation (FEMA 2020).

Levees require maintenance to continue to provide the level of protection they were designed and built to offer. The responsibility for conducting routine maintenance and inspections belongs to a variety of coordinating entities including local, state, and federal government and private landowners. Well-maintained levees may obtain certification through independent inspections. However, levee owners must maintain the levee and pay for an independent inspection in order to be certified for maintaining flood protection. Not surprisingly, uncertified levees have a higher risk of failure. In addition, insurance rates may increase for properties located in the inundation area of uncertified levees as identified on FEMA Flood Insurance Rate Maps (FIRM) because FEMA notes that the structures are not certified to protect from a 1 percent annual chance flood event (FEMA 2020).

Like dam failures, warning time depends on the cause of the failure. Despite warnings regarding the structural integrity of the system, a levee failure caused by structural failure can be sudden and perhaps with little to no warning. If heavy rains are impacting a levee system, communities located in the immediate danger zone can be evacuated before a failure occurs. If the levee failure is caused by overtopping, the community may or may not be able to recognize the impending failure and evacuate. If a levee failure occurs suddenly, evacuation may not be possible.

The classification of a levee is dependent on several factors such as the risk assessments, design deviations, policy issues, and life safety. The United States Army Corp of Engineers (USACE) classifies levees to help prioritize its resources and does not define risk (USACE 2021).

- **Very Low:** Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in very low risk.

- **Low:** Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in low risk.
- **Moderate:** Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in moderate risk.
- **High:** Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in high risk.
- **Very High:** Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in very high risk.

6.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Between 1954 and 2024, Cattaraugus County was not included in any major disaster (DR) or emergency (EM) declarations for dam and levee failure-related events (FEMA 2024).

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in contiguous counties. Between 2018 and 2024, Cattaraugus County was not included in any USDA dam failure-related agricultural disaster declarations (USDA 2024).

Previous Events

There are no known dam and levee failure hazard events which that impacted Cattaraugus County between 2018 and 2024. For events prior to 2018, refer to the 2020 Cattaraugus County HMP (Stanford University 2023, Association of State Dam Safety Officials 2024).

6.1.5 Probability of Future Occurrences

Information on previous dam and levee failure occurrences in the County was used to calculate the probability of future occurrence of such events. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. In Chapter 14, the identified hazards of concern for Cattaraugus County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Steering Committee, the probability of occurrence for dam and levee failure in the County is considered “occasional.”

Dam and levee failure events are infrequent and usually coincide with events that cause them, such as earthquakes, landslides, and excessive rainfall and snowmelt. As noted, dam failures typically occur in the State of New York because of heavy rains or other precipitation. There is a “residual risk” associated with dams. Residual risk is the risk that remains after all mitigation actions and risk reductions actions have been completed. However, regarding dams, FEMA defines it as the risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address this risk (FEMA 2018).

No dam failure events have been recorded in Cattaraugus County.

Climate Change Projections

Climate change affects the State of New York's residents and resources. 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 warming is projected to be the greatest in the northern regions of the state, and projections suggest each season will experience a comparable amount of warming in the future relative to the baseline period. Annual average precipitation is projected to decrease in the low estimate but increase in the middle range and high estimate 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).

Climate change can impact stored water systems as increased rainfall accumulations can cause dams to overtop. Dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Increased precipitation may result in overtopping, as the hydrographs are based off historical events (USBR 2003). The overtopping of a dam can lead to areas downstream to become inundated with flood waters that would otherwise be safely stored.

Warming atmospheric temperatures influence ocean temperatures. With the projected increase in temperature, it is anticipated that ocean waters will increase as well due to thermal expansion, which is where ocean temperatures rise, and water expands. Additionally, this is causing ice sheets and glaciers to melt, further increasing the level of the ocean's waters. Sea level rise can impact the amount of water in the County lakes and rivers, impacting not only bordering communities but inland communities as well (NASA n.d.).

In Cattaraugus County, and the southern tier region, temperatures are estimated to increase by 3.6ºF to 7.4ºF by the 2050s, 5ºF to 12.2ºF by the 2080s, and 5.5ºF to 14.1ºF by 2100, relative to the 1981–2010 base period. Precipitation totals are estimated increase by 0 to 12 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).

6.1.6 Cascading Impacts on Other Hazards

Dam or levee failure can cause severe downstream flooding, depending on the magnitude of the failure. Other potential secondary hazards of dam or levee failure are landslides around the reservoir perimeter, bank erosion on the rivers, and destruction of downstream habitat. Dam or levee failures can occur because of structural failures, such as progressive erosion of an embankment or overtopping and breaching by a severe flood (FEMA 2013).

Levee failures can also cause secondary hazards, including severe downstream landslides, bank erosion, and destruction of habitat. Environmental incidents may ensue due to hazardous materials released when floodwaters infiltrate facilities that store these types of materials.

6.2 VULNERABILITY AND IMPACT ASSESSMENT

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The dam failure hazard is of significance to Cattaraugus County because 40 dams are present across Cattaraugus County, 12 of which are classified as high hazard by USACE. Dam failure events are frequently associated with other natural hazard events such as earthquakes, landslides, or severe storms, which limits their predictability and compounds the hazard.

6.2.1 Life, Health, and Safety

Dam failure can cause, in the most extreme case, loss of life and extensive property damage, or in the least extreme case, no loss of life or significant property damage. Dam failure can cause persons to become displaced if flooding of structures occurs. Dam failure may mimic flood events, depending on the size of the dam reservoir and breach.

The impact of dam and levee failure on life, health, and safety is dependent on several factors such as the class of dam/levee, the area that the dam/levee is protecting, the location of the dam/levee, and the proximity of structures, infrastructure, and critical facilities to the dam or levee structure. The level of impact that a failure would have can be predicted based upon the hazard potential classification as rated by the United States Army Corps of Engineers (USACE n.d.). Table 6-3 outlines the recommended hazard classifications.

Table 6-3. United States Army Corps of Engineers Hazard Potential Classification

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

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

Source: USACE n.d.

Overall Population

Dam failure impacts depend on several factors including severity of the event and whether warning time is possible. The population living in or near the inundation areas are considered exposed to the hazard. However, exposure should not be limited only to those who reside within a defined hazard zone, but everyone who may be affected by a hazard event (e.g., people are at risk while traveling in flooded areas, or their access to emergency services is compromised during an event); the degree of that impact varies and is not strictly measurable.

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

Socially Vulnerable Population

Research has shown that some populations, while they may not have more hazard exposure, may experience exacerbated impacts and prolonged recovery if/when impacted. This is due to many factors, including their physical and financial ability to react or respond during a hazard. Of the population exposed, the most vulnerable include the economically disadvantaged and the population over age 65. Economically disadvantaged populations may be more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on net economic impacts on their families. The population over age 65 is also more vulnerable because they are more likely to seek or need medical attention that may not be available due to isolation during a flood event, and they may have more difficulty evacuating.

As shown in Table 6-4, the City of Orleans has the highest population over 65 (2,469), the largest population under 5 (846), the greatest non-English speaking population (54), the highest population of disabled persons (2,539), and the largest number individuals living in poverty (3,266). The Town of Redhouse has the lowest population over 65 (7), the lowest population under 5 (1), the fewest number of disabled persons (2), and the lowest population living in poverty (2). Of the 43 local jurisdictions in the County, 27 have no (0) non-English speaking persons living within the jurisdiction.

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.

According to 2022 Point-in-Time-Data from ALICE, 29 percent of the 32,016 households in Cattaraugus County are ALICE households (compared to the state average of 31 percent). The median household income in Cattaraugus County is $50,508, with a labor force participation rate of 56 percent. Cattaraugus County has a lower-than-average household income compared to the state average of $79,557 and has a higher-than-average poverty rate at 19 percent (compared to the state average of 15 percent). See Table 6-5 for ALICE data by jurisdiction.

Table 6-4. Cattaraugus County Socially Vulnerable Populations by Municipality

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	American Community Survey 5-year Population Estimates (2022)									
			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
Allegany (T)	5,949	7.9%	1,183	19.9%	213	3.6%	19	0.3%	667	11.2%	640	10.8%
Allegany (V)	1,544	2.0%	401	26.0%	65	4.2%	19	1.2%	214	13.9%	313	20.3%
Ashford (T)	1,961	2.6%	468	23.9%	78	4.0%	0	0.0%	366	18.7%	107	5.5%
Carrollton (T)	1,207	1.6%	268	22.2%	57	4.7%	7	0.6%	197	16.3%	150	12.4%
Cattaraugus (V)	960	1.3%	167	17.4%	49	5.1%	31	3.2%	188	19.6%	181	18.9%
Coldspring (T)	658	0.9%	102	15.5%	17	2.6%	0	0.0%	130	19.8%	85	12.9%
Conewango (T)	1,785	2.4%	220	12.3%	352	19.7%	31	1.7%	161	9.0%	861	48.2%
Dayton (T)	1,149	1.5%	329	28.6%	46	4.0%	0	0.0%	184	16.0%	144	12.5%
Delevan (V)	1,043	1.4%	234	22.4%	62	5.9%	0	0.0%	269	25.8%	215	20.6%
East Otto (T)	974	1.3%	142	14.6%	46	4.7%	9	0.9%	145	14.9%	99	10.2%
Ellicottville (T)	1,059	1.4%	351	33.1%	14	1.3%	0	0.0%	77	7.3%	127	12.0%
Ellicottville (V)	256	0.3%	117	45.7%	40	15.6%	0	0.0%	39	15.2%	13	5.1%
Farmersville (T)	1,073	1.4%	322	30.0%	116	10.8%	0	0.0%	218	20.3%	277	25.8%
Franklinville (T)	1,150	1.5%	314	27.3%	21	1.8%	26	2.3%	135	11.7%	83	7.2%
Franklinville (V)	1,652	2.2%	273	16.5%	128	7.7%	0	0.0%	304	18.4%	274	16.6%
Freedom (T)	2,261	3.0%	393	17.4%	119	5.3%	0	0.0%	301	13.3%	243	10.7%
Gowanda (V)	1,834	2.4%	337	18.4%	256	14.0%	24	1.3%	409	22.3%	215	11.7%
Great Valley (T)	1,991	2.6%	419	21.0%	78	3.9%	12	0.6%	274	13.8%	56	2.8%
Hinsdale (T)	2,113	2.8%	448	21.2%	139	6.6%	0	0.0%	493	23.3%	308	14.6%
Humphrey (T)	703	0.9%	78	11.1%	8	1.1%	0	0.0%	60	8.5%	105	14.9%
Ischua (T)	736	1.0%	215	29.2%	5	0.7%	0	0.0%	162	22.0%	154	20.9%
Leon (T)	1,244	1.6%	137	11.0%	177	14.2%	50	4.0%	192	15.4%	192	15.4%
Little Valley (T)	617	0.8%	144	23.3%	3	0.5%	0	0.0%	255	41.3%	37	6.0%
Little Valley (V)	1,058	1.4%	171	16.2%	40	3.8%	0	0.0%	195	18.4%	295	27.9%

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	American Community Survey 5-year Population Estimates (2022)									
			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
Lyndon (T)	685	0.9%	156	22.8%	26	3.8%	0	0.0%	124	18.1%	119	17.4%
Machias (T)	2,310	3.1%	566	24.5%	77	3.3%	0	0.0%	348	15.1%	393	17.0%
Mansfield (T)	843	1.1%	127	15.1%	35	4.2%	0	0.0%	80	9.5%	36	4.3%
Napoli (T)	1,171	1.5%	241	20.6%	127	10.8%	0	0.0%	192	16.4%	169	14.4%
New Albion (T)	1,021	1.3%	160	15.7%	64	6.3%	31	3.0%	89	8.7%	108	10.6%
Olean (C)	13,937	18.4%	2,469	17.7%	846	6.1%	54	0.4%	2,539	18.2%	3,266	23.4%
Olean (T)	1,881	2.5%	491	26.1%	55	2.9%	0	0.0%	322	17.1%	262	13.9%
Otto (T)	777	1.0%	230	29.6%	11	1.4%	7	0.9%	159	20.5%	49	6.3%
Perrysburg (T)	1,518	2.0%	498	32.8%	42	2.8%	0	0.0%	430	28.3%	314	20.7%
Persia (T)	596	0.8%	143	24.0%	66	11.1%	9	1.5%	101	16.9%	66	11.1%
Portville (T)	2,612	3.5%	656	25.1%	136	5.2%	0	0.0%	269	10.3%	238	9.1%
Portville (V)	892	1.2%	156	17.5%	15	1.7%	0	0.0%	154	17.3%	86	9.6%
Randolph (T)	2,469	3.3%	476	19.3%	84	3.4%	0	0.0%	294	11.9%	222	9.0%
Red House (T)	27	<0.1%	7	25.9%	1	3.7%	0	0.0%	2	7.4%	2	7.4%
Salamanca (C)	5,929	7.8%	936	15.8%	381	6.4%	57	1.0%	1,092	18.4%	1,492	25.2%
Salamanca (T)	470	0.6%	131	27.9%	9	1.9%	2	0.4%	75	16.0%	84	17.9%
South Dayton (V)	541	0.7%	244	45.1%	20	3.7%	0	0.0%	94	17.4%	166	30.7%
South Valley (T)	250	0.3%	115	46.0%	18	7.2%	0	0.0%	55	22.0%	78	31.2%
Yorkshire (T)	2,784	3.7%	530	19.0%	157	5.6%	0	0.0%	581	20.9%	612	22.0%
Cattaraugus County	**75,690**	**100.0%**	**15,565**	**20.6%**	**4,299**	**5.7%**	**388**	**0.5%**	**12,635**	**16.7%**	**12,936**	**17.1%**

Source: U.S. Census Bureau 2020; U.S. Census Bureau ACS 2023

Note: Allegany (V) is 100% within Allegany (T); Cattaraugus (V) is 100% within New Albion (T); Delevan (V) is 100% within Yorkshire (T); Ellicottville (V) is 100% within Ellicottville (T); Franklinville (V) is 100% within Franklinville (T); Little Valley (V) is 100% within Little Valley (T); Portville (V) is 100% within Portville (T); South Dayton (V) is 100% within Dayton (T). Subtracted village totals from town to assign correct town totals.

2.36 persons per household. This number was used to calculate the Non-English-speaking population.

Table 6-5. Cattaraugus County ALICE Data

Name	Total Households	% Below ALICE Threshold
Allegany (T)	2,676	39
Allegany (V)	-	-
Ashford (T)	879	30
Carrollton (T)	527	44
Cattaraugus (V)	-	-
Coldspring (T)	286	44
Conewango (T)	561	55
Dayton (T)	691	39
Delevan (V)	-	-
East Otto (T)	451	36
Ellicottville (T)	586	41
Ellicottville (V)	-	-
Farmersville (T)	480	61
Franklinville (T)	1,129	42
Franklinville (V)	-	-
Freedom (T)	939	32
Gowanda (V)	-	-
Great Valley (T)	806	40
Hinsdale (T)	939	46
Humphrey (T)	296	25
Ischua (T)	310	45
Leon (T)	354	33
Little Valley (T)	671	43
Little Valley (V)	-	-
Lyndon (T)	303	41
Machias (T)	925	44
Mansfield (T)	287	36
Napoli (T)	493	36
New Albion (T)	847	39
Olean (C)	6,142	54
Olean (T)	898	33
Otto (T)	353	40
Perrysburg (T)	694	38
Persia (T)	930	44
Portville (T)	1,405	40
Portville (V)	-	-
Randolph (T)	888	37
Red House (T)	-	-

Name	Total Households	% Below ALICE Threshold
Salamanca (C)	2,420	60
Salamanca (T)	244	53
South Dayton (V)	-	-
South Valley (T)	150	45
Yorkshire (T)	1,663	51
Cattaraugus County (Total)	32,016	29

Source: United For ALICE 2024
Note: Totals for the Town of Red House or the Villages of Alleghany, Cattaraugus, Delevan, Ellicottville, Franklinville, Gowanda, Little Valley, Portville, and South Dayton were unavailable.

6.2.2 General Building Stock

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

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

6.2.3 Community Lifelines and Other Critical Facilities

Dam and levees failures may also impact critical facilities and infrastructure located in the downstream inundation zone. Consequentially, dam and levees failures can cut evacuation routes, limit emergency access, and/or create isolation issues. Emergency response would be hindered due to the loss of transportation routes as well as some protective-function facilities located in the inundation zone. Recovery time to restore many critical functions after an event may be lengthy, as wastewater, potable water, and other community facilities are located in the dam and levee inundation zones. Dam and levees failures can cause severe downstream flooding and may transport large volumes of sediment and debris, depending on the magnitude of the event. Further, utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

6.2.4 Economy

Severe flooding that follows an event like a dam failure can cause extensive damage to public utilities and disruptions to delivery of services. Loss of power and communications may occur and drinking water and wastewater treatment facilities can become temporarily out of operation. Debris from surrounding buildings can accumulate should the dam mimic major flood events, such as the 1 percent annual chance flood event that is discussed in Chapter 7 (Flood).

Dam and levee failure events can significantly impact the local and regional economy. Similar to flooding, losses include, but are not limited to, damages to buildings and infrastructure, agricultural losses, business interruption and impacts on tax base. Loss of power and communications may occur and drinking water and wastewater treatment facilities may be temporarily out of operation.

6.2.5 Natural, Historic, and Cultural Resources

Natural

The environment is vulnerable to several risks in the event of a dam or levee failure. Water releases from dams or levees usually contain very little suspended sediment; this 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 many 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 and levee failures can often result in the release of hazardous materials, either swept up in floodwaters or in sediment that is contained behind the dam as is often the case in areas that have had mining activities take place upstream. 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.

Dam and levee failures may result in significant water quality and debris disposal issues. Flood waters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooding waterway. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals get added to flood waters. Water supplies and wastewater treatment could be off-line for weeks. After the flood waters subside, contaminated and flood damaged building materials and contents must be disposed of properly.

Historic

Dam and levee failures may impact historic resources by the resulting flood waters. 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 or levee failure. The loss of these resources is all the more painful as residents rely on the presence of these resources to reinforce connections with neighbors and the larger community, and to seek comfort in the aftermath of a disaster.

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 or levee failure creates the largest risk to these resources. Similar to historic resources, residents may rely on the presence of cultural resources to reinforce connections with neighbors and the larger community, and to seek comfort in the aftermath of a disaster.

6.3 FUTURE CHANGES THAT MAY AFFECT RISK

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The following sections examine potential conditions that may affect hazard vulnerability.

6.3.1 Potential or Planned Development

As discussed and illustrated in Chapter 3 (County Profile), areas targeted for future growth and development have been identified across the County.

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

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

6.3.2 Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 4 percent since 2010. Population projections from Cornell University reveal the County's population is anticipated to continue decreasing. The population is projected to decline to 73,254 persons in 2030 and to 70,468 by 2040 (Cornell University 2018). Despite having a decrease in population, any changes in the density of population can impact the number of persons exposed to the probable maximum flood inundation hazard areas. Higher density can not only create issues for local residents during evacuation of a dam failure event but can also have an effect on commuters who travel into and out of the County for work. Refer to Chapter 3 (County Profile) for more information about population trends in the County.

6.3.3 Climate Change

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

6.3.4 Change of Vulnerability Since 2020 Cattaraugus County HMP

Overall, Cattaraugus County remains potentially vulnerable to the dam and levee failure hazard. To estimate losses to these elements in the future, dam and levee inundation areas and depths of flooding may be used to analyze exposure and generate depth grids. Hazus could be implemented to estimate potential losses for Cattaraugus County. In addition, inspections of dams may also inform the status of each and maintenance and mitigation measure that may be needed.

7. FLOOD

7.1 HAZARD PROFILE

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

7.1.1 Hazard Description

Floods are one of the most common natural hazards in the U.S. Floods can develop slowly over a period of days or develop quickly, with disastrous effects that can be local (impacting a neighborhood or community) or regional (affecting entire river basins, coastlines and multiple counties or states) (FEMA 2007). As defined in the New York State HMP, flooding is a general and temporary condition of partial or complete inundation on normally dry land as a result of the following (NYS DHSES 2023):

- 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
- Coastal flooding
- Urban flooding

For the purpose of this HMP and as deemed appropriate by the Cattaraugus County Steering Committee, riverine, flash flooding, stormwater/urban flooding, and ice jam will be discussed in this section. Dam and levee failure are discussed in Chapter 6 (Dam and Levee Failure).

Riverine Flooding

Riverine floods are the most common flood type. They occur along a channel and include overbank and flash flooding. Channels are defined, ground features that carry water through and out of a watershed. They may be called rivers, creeks, streams, or ditches. When a channel receives too much water, the excess water flows over its banks and inundates low-lying areas**Invalid source specified.**.

Flash Flooding

Flash floods are defined by the National Weather Service (NWS) as, "a flood caused by heavy or excessive rainfall in a short period of time, generally less than 6 hours. Flash floods are usually characterized by raging torrents after heavy rains that rip through riverbeds, urban streets, or mountain canyons sweeping everything before them. They can occur within minutes or a few hours of excessive rainfall. They can also occur even if no rain has fallen; for instance, after a levee or dam has failed, or after a sudden release of water by a debris or ice jam" (NWS 2009).

Stormwater/Urban Flooding

Stormwater/urban flooding described below is due to local drainage issues and high groundwater levels. Locally, heavy precipitation may produce flooding in areas other than delineated floodplains or along recognizable channels. If local conditions cannot accommodate intense precipitation through a combination of infiltration and surface runoff, water may accumulate and cause flooding problems. During winter and spring, frozen ground and snow accumulations may contribute to inadequate drainage and localized ponding. 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. Shallow street flooding can occur unless channels have been improved to account for increased flows**Invalid source specified.**.

High groundwater levels can be a concern and cause problems even where there is no surface flooding. Basements are susceptible to high groundwater levels. Seasonally high groundwater is common in many areas, while elsewhere high groundwater occurs only after a long period of above-average precipitation**Invalid source specified.**.

Heavy rainfall that overwhelms a developed area's stormwater infrastructure causing flooding is commonly referred to as urban flooding. Urban flooding can be worsened by aging and inadequate infrastructure and over development of land. The growing number of extreme rainfall events that produce intense precipitation are resulting in increased urban flooding (Center for Disaster Resilience 2016). While riverine and lakeshore flooding is mapped and studied by FEMA, urban flooding is not.

Urban flooding is the flooding of streets, underpasses, low-lying areas, or storm drains (NWS 2009). Urban development and inadequate drainage systems can increase precipitation runoff, elevating the risk for flooding. Drainage systems remove surface water by channeling water away from developed areas as quickly as possible to prevent localized flooding on streets and other urban areas. 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).

Ice Jam Flooding

Ice Jams at a Glance

- Freeze-up jams occur when floating ice may slow or stop due to a change in water slope as it reaches an obstruction to movement.
- Break-up jams occur during periods of thaw, generally in late winter and early spring.

An ice jam occurs when pieces of floating ice are carried with a stream's current and accumulate behind any obstruction to the stream flow. Obstructions may include river bends, mouths of tributaries, points where the river slope decreases, as well as dams and bridges. The water held back by this obstruction can cause flooding upstream, and if the obstruction suddenly breaks, flash flooding can occur as well. The formation of ice jams depends on the weather and physical condition of the river and stream channels. They are most likely to occur where the channel slope naturally decreases, in culverts, and along shallows where channels may freeze solid. Ice jams and resulting floods can occur at 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 (NYS DHSES 2023).

7.1.2 Location

Nearly all areas in Cattaraugus County could experience a flash flooding event. This depends on the intensity and duration of rainfall, the steepness of the watershed, the number of impervious surfaces within the watershed, and vegetation. Flooding potential is influenced by climatology, meteorology, and topography (elevations, latitude, and water bodies and waterways). Flooding potential for each type of flooding that affects Cattaraugus County is described in the subsections below.

Riverine Flooding

Flooding in Cattaraugus County is often the direct result of thunderstorms, heavy rains, tropical storms, and hurricanes. Floods can happen almost anywhere in the County, although they do tend to occur in and around areas near existing bodies of water, such as rivers and streams.

In the Town of Allegany, heavy winter or spring rainfall is augmented by melting snow. Flooding occurs along the Allegheny River (FIA FIS 1978). In the Village of Allegany, low-lying areas are subject to periodic flooding caused by the overflow of the Allegheny River and Five Mile Creek due to heavy rainfall with melting snow (FEMA FIS 1991). In the Town of Cold Spring, the Village of East Randolph, the Village of Limestone, the Village of Little Valley, the Village of Randolph, and the Town of Hinsdale, steep terrain contributes to flash flooding during heavy rain events (FIA FIS 1977a, 1977b, 1978d, 1978g). Flooding in the Town of Ellicottville is most likely to occur in the late winter or early spring months when melting snow may combine with intense rainfall to produce increased runoff at Great Valley Creek (FEMA FIS 2000). In the Village of Ellicottville, flooding usually occurs along Plum Creek, Elk Creek, and Great Valley Creek as a result of heavy rainfall combined with snowmelt (FEMA FIS 1994). Flooding in the Town and Village of Franklinville and the Village of Limestone has occurred as a result of heavy rainfall combined with snowmelt as well as ice jams (FIA FIS 1978a, 1978b, 1977). Flooding occurs on Clear Creek in the Town of Freedom, though data on frequency is limited (FEMA FIS 1991).

Due to the steep terrain of their watershed, Wrights Creek and Forks Creek in the Town of Great Valley are subject to flash flooding. Great Valley Creek has a large watershed and experiences flooding concurrent with the northern Allegheny River Basin (FIA FIS 1978c). Due to steep terrain in the surrounding area, the City of Salamanca is subject to flash flooding during heavy rain combined with snowmelt. Similarly, the Town of Salamanca also experiences flash flooding due to the steep terrain along Little Valley Creek, Dublin Creek, and Whig Street Creek. Flooding problems also result from backwater conditions on the Allegheny River, which can occur independently of flooding on Little Valley Creek (FIA FIS 1979).

The Town of Ischua experiences flooding on Olean Creek and Ischua Creek as a result of heavy rains and snow melt (FIA FIS 1978e). The City of Olean has low-lying areas that are subject to periodic flooding caused by overflow of the Allegheny River, Olean Creek, Kings Brook, and Two-mile Creek as a result of heavy rains, usually accompanied by snow melt (FIA FIS 1978f). The Town of Portville experiences flooding as a result of heavy rains and snowmelt (FEMA 1983).

The Village of South Dayton is subject to flooding when rain falls on frozen ground or heavy rainfall events during the warm season. Flooding is aggravated by the reduction of channel capacities due to erosion and sedimentation to the point that existing channels are inadequate to remove heavy runoff in a reasonable period. In the eastern part of the village, poor drainage near the tributaries to Slab City Creek causes some flooding (FIA FIS 1977).

Floodplain

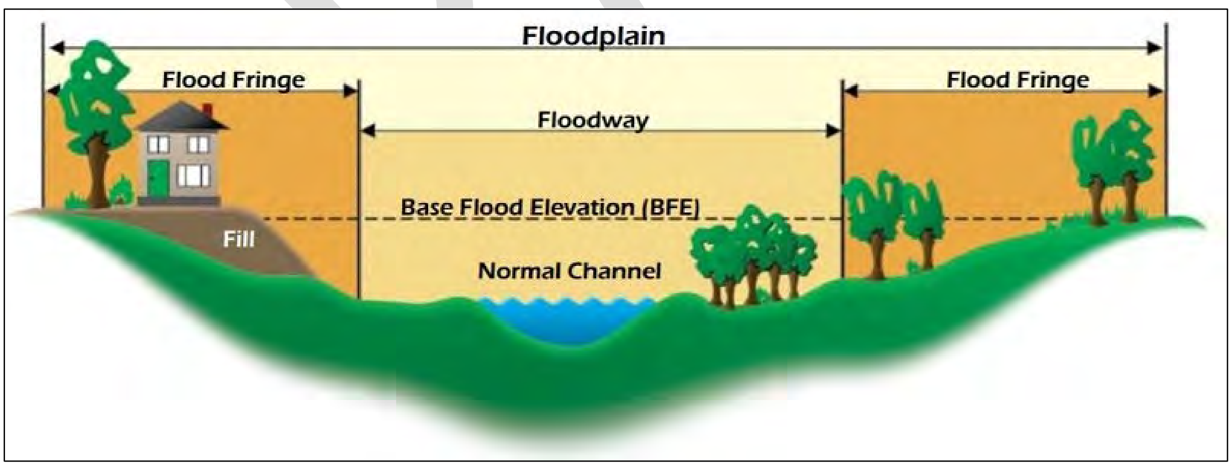
A floodplain is defined as the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that becomes inundated with water during a flood. In Cattaraugus County, floodplains line the rivers and streams of the County. The boundaries of the floodplains are altered as a result of changes in land use, the amount of impervious surface, placement of obstructing structures in floodways, changes in precipitation and runoff patterns, improvements in technology for measuring topographic features, and utilization of different hydrologic modeling techniques. Figure 7-1 depicts the flood hazard area, the flood fringe, and the floodway areas of a floodplain.

The floodplain describes the area inundated by the "100-year" flood, or a flood that has a 1 percent chance in any given year of being equaled or exceeded. The 1 percent annual chance flood is also referred to as the base flood or 100-year flood. A 100-year floodplain is not a flood that will occur once every 100 years; the designation indicates a flood that has a 1 percent chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once in a relatively short period of time. Similarly, the moderate flood hazard area (500-year floodplain) will not occur every 500 years but is an event with a 0.2 percent chance of being equaled or exceeded each year. The 1 percent annual chance floodplain establishes the area that has flood insurance and floodplain management requirements (FEMA 2020). Additional definitions relating to flood maps can be seen in Table 7-1.

A floodplain is made up of the following components **Invalid source specified.**:

- *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.
- *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.

Figure 7-1. Characteristics of a Floodplain



Source: FEMA 2022

In Cattaraugus County, floodplains line the rivers, streams, and lakes of the County. The boundaries of the floodplains can be altered because of changes in land use, the amount of impervious surface, placement of obstructing structures in floodways, changes in precipitation and runoff patterns, improvements in technology for measuring topographic features, and utilization of different hydrologic modeling techniques**Invalid source specified.**.

Floodplain mapping is based on riverine and coastal flooding conditions. 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 many areas in the region. As a result, the public may also underestimate risk.

In FEMA maps, floodplains areas are identified as Special Flood Hazard Area (SFHA). SFHAs are defined as the area that will be inundated by the flood event that has a 1 percent chance of being equaled to or exceeded in any given year. It should be noted that areas located 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.

Table 7-1. 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 base flood and the 0.2 percent-annual-chance (or 500-year) 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, are labeled.

Sources: FEMA 2020

Locations of flood zones in Cattaraugus County as depicted on the FEMA preliminary Digital Flood Insurance Rate Map (DFIRM) are illustrated in Figure 7-2 and the total land area in the floodplain, exclusive of waterbodies, is summarized in Table 7-2. Refer to Volume II for a map of each jurisdiction depicting the floodplains.

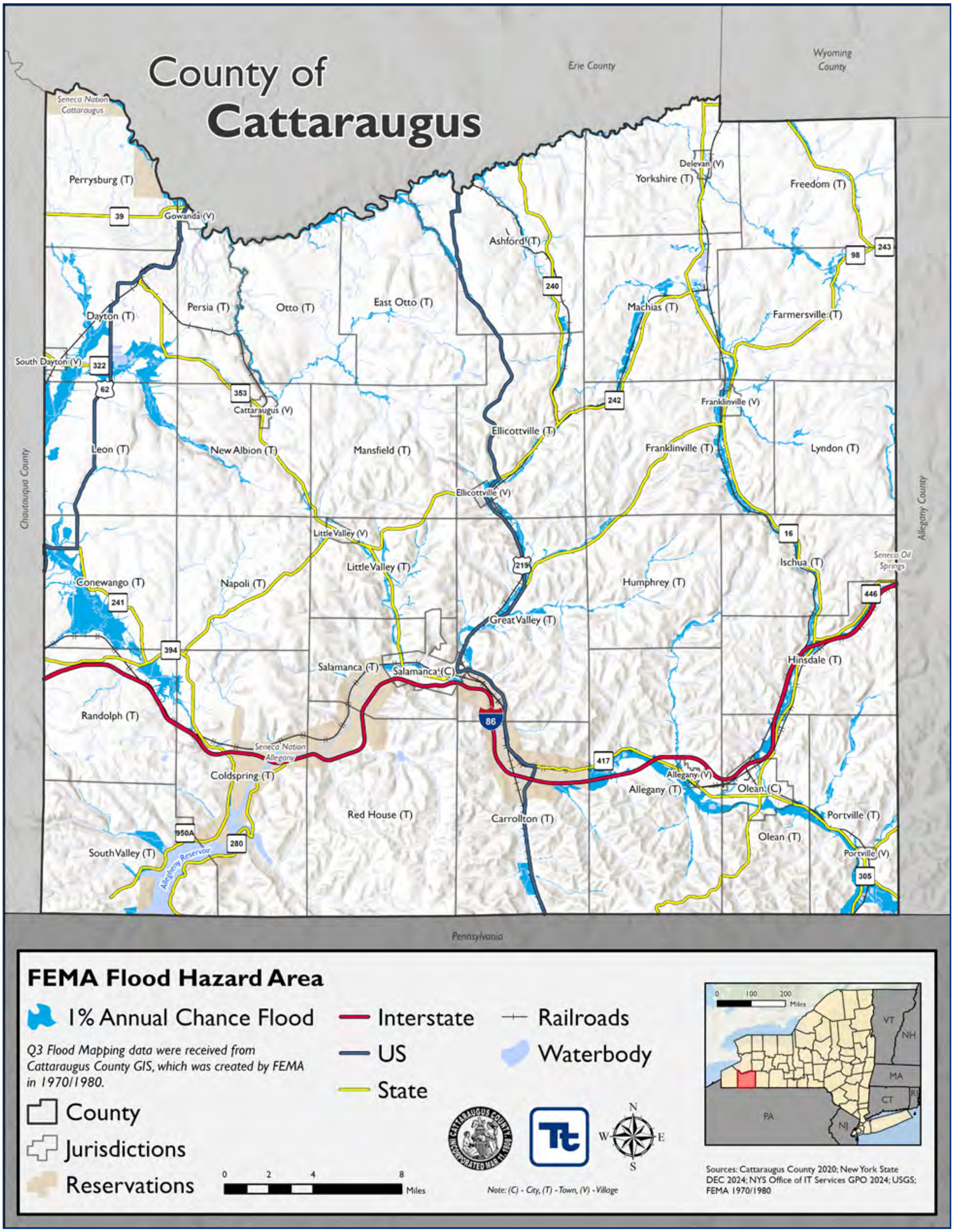
Table 7-2. Number of Acres Cattaraugus County Is Exposed to 1 Percent Annual Chance Flood

Jurisdiction	Total Land Area (Excluding Waterbodies) (acres)	Land Area (Excluding Waterbodies) in the 1% Annual Chance Flood Hazard Area	
		Total Area (acres)	% of Jurisdiction Total
Allegany (T)	45,429	2,780	6.1%
Allegany (V)	493	108	21.9%
Ashford (T)	32,735	1,291	3.9%
Carrollton (T)	33,401	900	2.7%
Cattaraugus (V)	711	33	4.6%
Coldspring (T)	39,397	472	1.2%
Conewango (T)	23,022	4,330	18.8%
Dayton (T)	22,025	3,783	17.2%
Delevan (V)	624	116	18.7%
East Otto (T)	26,358	712	2.7%
Ellicottville (T)	28,268	971	3.4%
Ellicottville (V)	541	151	28.0%
Farmersville (T)	30,618	1,153	3.8%

Jurisdiction	Total Land Area (Excluding Waterbodies) (acres)	Land Area (Excluding Waterbodies) in the 1% Annual Chance Flood Hazard Area	
		Total Area (acres)	% of Jurisdiction Total
Franklinville (T)	32,552	1,566	4.8%
Franklinville (V)	684	112	16.4%
Freedom (T)	25,830	661	2.6%
Gowanda (V)	652	132	20.2%
Great Valley (T)	34,561	1,852	5.4%
Hinsdale (T)	24,808	1,220	4.9%
Humphrey (T)	23,326	775	3.3%
Ischua (T)	20,956	445	2.1%
Leon (T)	23,046	2,367	10.3%
Little Valley (T)	18,331	841	4.6%
Little Valley (V)	644	92	14.3%
Lyndon (T)	21,254	345	1.6%
Machias (T)	25,885	1,531	5.9%
Mansfield (T)	25,333	167	0.7%
Napoli (T)	23,317	206	0.9%
New Albion (T)	22,314	476	2.1%
Olean (C)	3,937	533	13.6%
Olean (T)	18,952	993	5.2%
Otto (T)	20,539	805	3.9%
Perrysburg (T)	21,997	330	1.5%
Persia (T)	12,779	410	3.2%
Portville (T)	22,350	2,601	11.6%
Portville (V)	498	54	10.8%
Randolph (T)	23,026	1,054	4.6%
Red House (T)	39,484	0	0.0%
Salamanca (C)	3,995	320	8.0%
Salamanca (T)	14,504	164	1.1%
South Dayton (V)	640	60	9.3%
South Valley (T)	24,859	892	3.6%
Yorkshire (T)	22,929	357	1.6%
Cattaraugus County (Total)	837,605	38,163	4.6%

Source: FEMA 1970/1980; Cattaraugus County; USGS; NYS Office of Information Technology Services 2024
Note: C = City, T = Town, V = Village, % = Percent

Figure 7-2. FEMA Flood Hazard Areas in Cattaraugus County



Watersheds

Cattaraugus County includes parts of five watersheds that drain into the Great Lakes Basin and the Allegheny River Basin. The Allegheny River Watershed, encompassing land in the southern, central, and eastern sections, is the largest watershed in the County. This area drains into the Allegheny River, the major river flowing through the County's southernmost communities (Cattaraugus County 2025)

Two watersheds in the County contribute to the Allegheny River Basin. The Upper Allegheny Watershed encompasses much of the County. This area either drains directly into the Allegheny River as it flows through the area or it drains into streams that are tributaries to the Allegheny. Major tributary streams include Great Valley Creek and Little Valley Creek, which drain the central area of the County; both creeks flow into the Allegheny River at separate locations in Salamanca. Ischua Creek flows south, joining Oil Creek to become the Olean Creek, which flows into the Allegheny River in Olean. Tunungwant (Tuna) Creek, flows northward through the Town of Carrollton to the Allegheny River. Many other smaller streams are tributaries to these larger streams (Cattaraugus County 2015).

The Conewango Watershed, located in the western part of Cattaraugus County, is the other watershed that contributes to the Allegheny River Basin. Little Conewango Creek flows through the Town of Randolph and joins Conewango Creek in western Cattaraugus County. Conewango Creek flows southwest into Chautauqua County and then south into Pennsylvania, where it flows into the Allegheny River at Warren, Pennsylvania (Cattaraugus County 2015).

Three of Cattaraugus County's watersheds drain into the Great Lakes Basin. Two watersheds drain into Lake Erie and one drains into Lake Ontario. (Cattaraugus County 2015).

The Cattaraugus Creek Watershed consists of land drained by Cattaraugus Creek and its tributaries. All the northernmost towns in the County are in the Cattaraugus Creek Watershed, as well as parts of New Albion, Mansfield, Ellicottville, Machias and Farmersville. Cattaraugus Creek comprises the entire boundary between Cattaraugus County and Erie County. Major streams that are tributary to Cattaraugus Creek include Mansfield Creek, which originates in the Town of Ellicottville and flows westerly through the Town of Mansfield, eventually joining the South Branch of Cattaraugus Creek (Cattaraugus County 2015).

A very small portion of the Town of Perrysburg is in the Chautauqua-Conneaut Watershed. This watershed also drains into Lake Erie (Cattaraugus County 2015).

Portions of the Towns of Lyndon and Farmersville, in the northeastern section of the County, are in The Upper Genesee Watershed. This area is drained by Canadea Creek, which flows eastward into the Genesee River. (Cattaraugus County 2015).

Flash Flooding

Flash flooding can occur throughout any region of the State of New York; however, the distinctive flash flood event characterized by fast moving water and damaging impacts requires a steep topography. While Cattaraugus County could undergo flash floods (and has, in the past), the County is at a lower risk than other parts of the state for this type of flood event (NYS DHSES 2023).

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 coverage 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.

Ice Jam Flooding

Ice jams are common in the northeast United States, including the State of New York. According to the US Army Corps of Engineers (USACE), New York ranks second in the nation for total number of ice jam events, with over 1,700 incidents documented between 1867 and 2024. 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).

The Ice Jam Database, maintained by the Ice Engineering Group at the USACE Cold Regions Research and Engineering Laboratory (CRREL), currently consists of over 23,000 records from across the United States. According to the USACE-CRREL, Cattaraugus County underwent or may have been impacted by 18 historic ice jam incidents between 1780 and 2024, three being since 2003 (USACE 2022). Ice Jams have formed along Cattaraugus Creek and Allegheny River.

7.1.3 Extent

The severity of a flood event is typically determined by a combination of several factors depending on the type of flooding event.

Riverine Flooding

The severity of riverine and flash flooding is determined by a combination of several factors including stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and degree of vegetative clearing and impervious surface. Generally, floods are long-term events that may last for several days. The severity of a flood depends not only on the amount of water that accumulates in a period of time, but also on the land's ability to manage this water. One element is the size of rivers and streams in an area; but an equally important factor is the land's absorbency. When it rains, soil acts as a sponge. When the land is saturated or frozen, infiltration rates decrease and any more water that accumulates must flow as runoff (Harris 2008).

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. Flood studies use historical records to determine the probability of occurrence for the different discharge levels.

In the case of riverine or flash flooding, once a river reaches flood stage, the flood extent or severity categories used by the NWS include minor flooding, moderate flooding, and major flooding. Each category has a definition based on property damage and public threat (NOAA NSSL n.d.):

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

Stream Gages

The US Geological Survey (USGS) National Water Information System (NWIS) collects surface water data from more than 850,000 stations across the country. The time-series data describes stream levels, streamflow (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. There are numerous gages in Cattaraugus County, in addition to others just outside of the County's boundary, that provide critical flood data for waterways affecting the County.

There are six stream gages in the County. Table 7-3 provides details about the stream gages in the County. The USGS website provides details about each of the gages (https://waterwatch.usgs.gov/index.php) and the gage heights of flooding events. The NWS provides the different flood stages for the gages (https://water.weather.gov/ahps/). Figure 7-3 displays the locations of the stream gages in Cattaraugus County.

Table 7-3. Stream Gages in Cattaraugus County

Gage Site Number	Site Name	Flood Stage Height	Record Flood Height
03010720	Dodge Creek at Portville	Not Defined	7.97
03010820	Allegheny River at Olean	12	15.74
03011020	Allegheny River at Salamanca	12	24.01
03011500	Allegheny River at Red House	Not Defined	15.11
04213500	Cattaraugus Creek at Gowanda	10	13.99
04213508	Thatcher Brook at Gowanda	Not Defined	7.54

Source: FEMA FIS 2022; NWS 2022; USGS 2022

Flash Flooding

The extent of a flash flood is consistent with that of a riverine flood. Refer to Riverine Flooding.

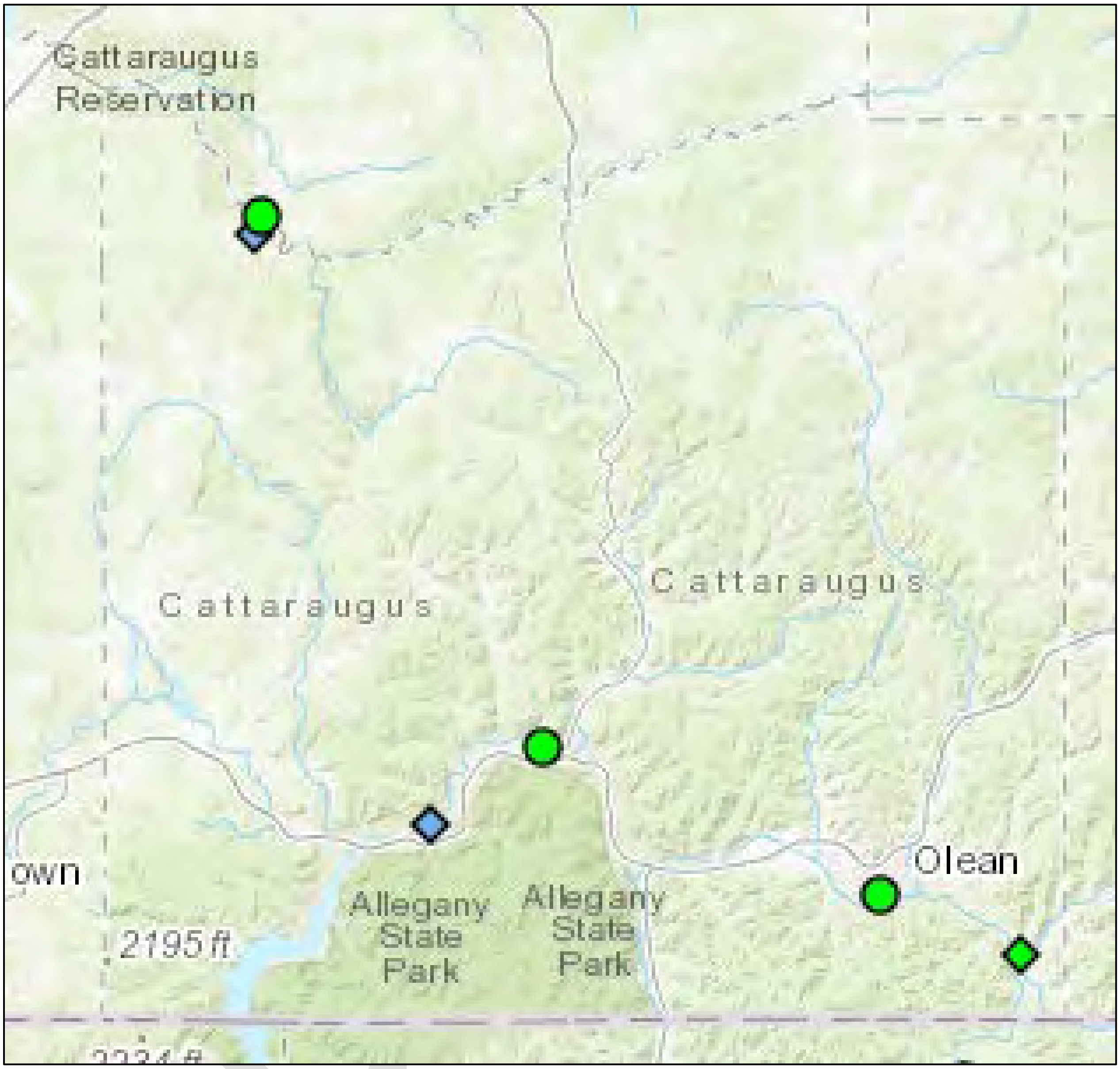
Stormwater/Urban Flooding

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

Ice Jam

Ice jam flooding events often occur suddenly and 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).

Figure 7-3. Stream Gages in Cattaraugus County



Source: NWS 2023

7.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Between 1954 and 2024, Cattaraugus County was included in three major disaster (DR) or emergency (EM) declarations for flood-related events (FEMA 2024). Table 7-4 lists these declarations.

Table 7-4. FEMA Declarations for Flood Events in Cattaraugus County (1954 to 2024)

Event Date	Declaration Date	Declaration Number	Description
January 19-30, 1996	January 24, 1996	DR-1095-NY	New York Severe Storms, Flooding
June 23, 1972	June 23, 1972	DR-338-NY	New York Tropical Storm Agness
October 30, 1967	October 30, 1967	DR-233-NY	New York Severe Storms, Flooding

Sources: FEMA 2024

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in contiguous counties. Between 2018 and 2024, Cattaraugus County was included in two USDA flood-related agricultural disaster declarations, as shown in Table 7-5 (USDA 2024).

Table 7-5. USDA Declarations for Flood Events in Cattaraugus County (2018-2024)

Event Date	USDA Declaration Number	Description
July 21, 2018–March 20, 2019	S4465	Excessive Rain, Flash Flooding, and Flooding
April 15, 2019	S4623	Excessive Rain, Flash Flooding, and Flooding

Sources: USDA 2024

Previous Events

For this HMP update, known flood events that impacted Cattaraugus County between 2018 and 2024 are discussed in Table 7-6. For events prior to 2018, refer to the 2020 Cattaraugus County HMP.

Table 7-6. Flood Events in Cattaraugus County (2018 to 2024)

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
July 4, 2018	N/A	N/A	Hinsdale	Thunderstorms developed across Allegany County early in the morning. They maintained intensity, eventually dropping a radar estimated 2.5 inches in about an hour. Flooding along Union Valley Road and Windfall Road in Olean. A bridge also washed out on Union Valley Road.
July 25, 2018	N/A	N/A	Elton	A moist environment was over the area with a deep and slow-moving closed low to the west. This resulted in 1 to 1.5 inches of rainfall and isolated flooding.
June 1, 2019	N/A	N/A	Vandalia	Storms developed in the mid-afternoon, which prompted the first set of warnings. These first storms produced

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
				mostly sub-severe hail (up to three quarters of an inch). A second line then moved in with a bowing segment off Lake Erie, resulting in several wind damage reports. Storms became slower moving as the event dragged on, and reports of rainfall up to 2.5 inches prompted flash flood warnings over the Southern Tier, as well. Birch Run Road was flooded with water running over the road.
June 20, 2019	N/A	N/A	Salamanca	The rainfall intensity was enhanced by a mesolow that moved through simultaneously. Overall, multiple locations saw rainfall totals over 3 inches in less than 12 hours. Numerous road closures occurred during the event including both directions of the Thruway near Rochester. Many flash flood and areal flood warnings were issued during this event and some of these persisted well into Friday morning. Street flooding was reported in Salamanca.
July 4. 2019	N/A	N/A	Little Valley, Limestone, Peth, Kill Buck	A weak warm front meandered north and increased dewpoints and surface-based instability across western New York in the afternoon hours. Precipitable water values increased to nearly 2 inches on the warm side of the boundary. Storms developed along subtle boundaries in the mid-afternoon, but initially maintained enough movement to limit rainfall amounts. Then cells started to briefly back-build or organize into larger clusters late in the afternoon across southern Erie and Cattaraugus counties. Using spotter reports, it was realized that radar precipitation algorithms were underdone, and reports of 2 to 3 inches of rain were common in the flooding areas. Flooding prompted the closure of route 353 in Little Valley. Several roads were reported under water in Limestone. Flooding forced the closure of route 219 from Hungry Hollow Road to Peth Road.
July 11, 2020	N/A	N/A	South Dayton	A sharp short-wave trough embedded within a broad upper level trough over the northeastern U.S. supported a

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
				wave of convection that moved across the entire area. A precipitable water value of 1.65 inches was observed, and models suggested over 2 inches in portions of the area. Multiple roads were closed due to flooding in South Dayton.
July 16, 2020	N/A	N/A	Countywide	Precipitable water values were between 1.75 and 2 inches, which resulted in torrential rainfall in concert with severe thunderstorm development. Route 242 at Dutch Hill Road closed due to flooding. Route 62 was closed in Conewango due to flooding. Mosher Hollow Road was closed due to flooding.
August 15, 2020	N/A	N/A	Lime Lake	Flash flooding. Marble Road and Potter Road were reported to be washed out by law enforcement.
June 9, 2021	N/A	N/A	Ellicottville	Flash flooding and heavy rain. Route 219 flooded and closed in front of the Dollar General.
July 17, 2021	N/A	N/A	South Dayton Airport	An area of low pressure tracked northeast across Ohio along a stationary front that stretches all the way east through western and central New York. This area of low pressure then tracked east across western New York and the Finger Lakes region. Moderate to heavy rain entered far western NY and advanced eastward across the region. Multiple reports of flooded roads were received south of Dayton.
September 4-5, 2022	N/A	N/A	Countywide	Heavy rain and flash flooding. Flash flooding with road closures occurred on South Union Street and Martha Avenue just south of Olean. Flash flooding in Dayton and Route 219 and Route 39.

Sources: NOAA NCEI 2024

7.1.5 Probability of Future Occurrences

Information on previous flood occurrences in the County was used to calculate the probability of future occurrence of such events, as summarized in Table 7-7. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. In Chapter 14, the identified hazards of concern for Cattaraugus County were ranked. Based on historical records and input from the Steering Committee, the probability of occurrence for flood in the County is considered “frequent”.

Table 7-7. Probability of Future Flood Events in Cattaraugus County

Hazard Type	Number of Occurrences Between 1996 and 2024	Percent Chance of Occurring in Any Given Year
Flash Flood	16	57.14%
Flood	1	3.57%
Ice Jam	0	0.00%
Total	**17**	**60.71%**

Sources: USACE 2022; NOAA NCEI 2024

Notes: Due to limitations in data, not all flood events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is calculated using the number of occurrences between 1996 and 2024; % = Percent

Climate Change Projections

Climate change affects the State of New York’s residents and resources. 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 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. Annual average precipitation is projected to decrease in the low estimate but increase in the middle range and high estimate 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 Cattaraugus County and the southern tier region, temperatures are estimated to increase by 3.6ºF to 7.4ºF by the 2050s, 5ºF to 12.2ºF by the 2080s, and 5.5ºF to 14.1ºF by 2100, relative to the 1981–2010 base period. Precipitation totals are estimated increase by 0 to 12 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).

The projected increase in precipitation is expected to fall as heavy downpours. Downpours are very likely to increase in frequency and intensity, a change which has the potential to affect drinking water; heighten the risk of riverine flooding; flood key rail lines, roadways, and transportation hubs; and increase delays and hazards related to extreme weather events. Less frequent rainfall during the summer months may impact the potable water availability. A secondary impact of flooding that could occur due to climate change includes impacts from increasing water temperatures in rivers and streams, which will affect aquatic health and reduce the capacity of streams to assimilate effluent wastewater treatment plants (Stevens & Lamie 2024). Table 7-8 displays the mean annual change in precipitation in the Southern Tier region.

Table 7-8. Mean Annual Changes in Precipitation in the Southern Tier Region

Decade	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2030s	0%	1%	4%	7%	8%
2040s	0%	3%	6%	8%	10%
2050s	0%	3%	7%	10%	12%
2060s	1%	5%	8%	11%	13%
2070s	1%	6%	9%	12%	14%
2080s	2%	7%	10%	13%	17%
2100	-3%	4%	11%	17%	22%

Source: Stevens & Lamie 2024

7.1.6 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

Cascading impacts may also include exposure to pathogens such as mold. After flood events, excess moisture and standing water contribute to the growth of mold in buildings. Mold may present a health risk to building occupants, especially those with already compromised immune systems such as infants, children, the elderly and pregnant women. The degree of impact will vary and is not strictly measurable. Mold spores can grow in as short a period as 24-48 hours in wet and damaged areas of buildings that have not been properly cleaned. Very small mold spores can easily be inhaled, creating the potential for allergic reactions, asthma episodes, and other respiratory problems. Buildings should be properly cleaned and dried out to safely prevent mold growth **Invalid source specified.**.

Molds and mildews are not the only public health risk associated with flooding. Floodwaters can be contaminated by pollutants such as sewage, human and animal feces, pesticides, fertilizers, oil, asbestos, and rusting building materials. Common public health risks associated with flood events also include (FEMA 2022):

- Unsafe food
- Contaminated drinking and washing water and poor sanitation
- Mosquitos and animals
- Carbon monoxide poisoning
- Secondary hazards associated with re-entering/cleaning flooded structures
- Mental stress and fatigue

Current loss estimation models such as Hazus are not equipped to measure public health impacts. The best level of mitigation for these impacts is to be aware that they can occur, educate the public on prevention, and be prepared to deal with these vulnerabilities in responding to flood events.

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. Refer to the list below to view flooding's harmful effects on the water supply **Invalid source specified.**:

- 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 only having access to contaminated water, consumers are unable to cook or clean in their home the water is certified as safe. Depending on the severity of the flood and the storm, this could take days, weeks, months and in some cases even years. Without access to clean drinking and cooking water, consumers ultimately become reliant on bottled water. In impoverished communities, this reality is even more detrimental because those affected may not have the economic means to "stock up" on bottled water. Moreover, in a flood, retail locations are often inaccessible and/or low on water supply.

Floodwaters can also cause damage to power utilities. In particular, flooded buildings may have the utilities disrupted if the 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 storms, which are 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, which could 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.

7.2 VULNERABILITY AND IMPACT ASSESSMENT

To assess Cattaraugus County's risk to the flood hazard, a spatial analysis was conducted using the FEMA Risk Map effective 2023. The 1 percent annual chance flood event was further examined to estimate potential loss using the FEMA Hazus model. These results are summarized below. Refer to Chapter 4 for additional details on the methodology used to assess flood risk.

7.2.1 Life, Health, and Safety

The impact of flooding on life, health, and safety depends on several factors, including the severity of the event and whether adequate warning time is provided to residents. The total number of injuries and casualties resulting from flooding is generally limited based on advance weather forecasting, blockades, and warnings. More likely, persons could become displaced from their homes or may seek shelter due to the impacts of a flood event. Therefore, injuries and deaths generally are not anticipated if proper warning and precautions are in place. Ongoing mitigation efforts should help to avoid the most likely cause of injury, which results from persons trying to cross flooded roadways or channels during a flood.

Overall Population

To estimate population exposure to the 1 percent annual chance flood events, the DFIRM flood boundaries were used. Based on the spatial analysis, there are an estimated 3,937 residents living in the 1 percent annual chance floodplain, or 5.2 percent of the County's total population. The Town of Portville has the greatest number of residents living in the floodplain, with approximately 482 residents living in the 1 percent annual chance floodplain. Table 7-9 summarizes the population exposed to the flood hazard by jurisdiction.

Table 7-9. Estimated Population Exposed to the 1 Percent Annual Chance Flood Event Hazard Area

Jurisdiction	Total Population (American Community Survey 2022)	Population in the 1% Annual Chance Flood Hazard Area	
		Number of Persons	% of Jurisdiction Total
Allegany (T)	5,949	375	6.3%
Allegany (V)	1,544	171	11.1%
Ashford (T)	1,961	68	3.5%
Carrollton (T)	1,207	78	6.5%
Cattaraugus (V)	960	0	0.0%
Coldspring (T)	658	43	6.5%
Conewango (T)	1,785	180	10.1%
Dayton (T)	1,149	38	3.3%
Delevan (V)	1,043	30	2.9%
East Otto (T)	974	47	4.8%
Ellicottville (T)	1,059	89	8.4%
Ellicottville (V)	256	99	38.7%
Farmersville (T)	1,073	51	4.8%
Franklinville (T)	1,150	37	3.2%
Franklinville (V)	1,652	42	2.5%
Freedom (T)	2,261	108	4.8%
Gowanda (V)	1,834	472	25.7%
Great Valley (T)	1,991	187	9.4%
Hinsdale (T)	2,113	82	3.9%
Humphrey (T)	703	28	4.0%
Ischua (T)	736	17	2.3%
Leon (T)	1,244	67	5.4%
Little Valley (T)	617	46	7.5%
Little Valley (V)	1,058	19	1.8%
Lyndon (T)	685	6	0.9%
Machias (T)	2,310	26	1.1%
Mansfield (T)	843	2	0.2%
Napoli (T)	1,171	5	0.4%
New Albion (T)	1,021	49	4.8%

Jurisdiction	Total Population (American Community Survey 2022)	Population in the 1% Annual Chance Flood Hazard Area	
		Number of Persons	% of Jurisdiction Total
Olean (C)	13,937	323	2.3%
Olean (T)	1,881	234	12.4%
Otto (T)	777	19	2.4%
Perrysburg (T)	1,518	20	1.3%
Persia (T)	596	45	7.6%
Portville (T)	2,612	482	18.5%
Portville (V)	892	2	0.2%
Randolph (T)	2,469	86	3.5%
Red House (T)	27	0	0.0%
Salamanca (C)	5,929	231	3.9%
Salamanca (T)	470	15	3.2%
South Dayton (V)	541	2	0.4%
South Valley (T)	250	6	2.4%
Yorkshire (T)	2,784	10	0.4%
Cattaraugus County (Total)	75,690	3,937	5.2%

Source: Cattaraugus County 2024; U.S. Census Bureau, 5-Year American Community Survey 2022; FEMA 1970/1980
Notes: % = Percent; C = City; T = Town; V = Village; Values are Rounded Down

Socially Vulnerable Population

Social vulnerability is defined as the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood. Social vulnerability considers the social, economic, demographic, and housing characteristics of a community that influence its ability to prepare for, respond to, cope with, recover from, and adapt to environmental hazards.

Socially vulnerable populations are most susceptible to flood events based on several factors, including their physical and financial ability to react or respond during a flood. Vulnerable populations include homeless persons, elderly (over 65 years old), low income or linguistically isolated populations, people with life-threatening illnesses, and residents that may struggle to evacuate. The population over the age of 65 is also more vulnerable. They may require extra time to evacuate or need assistance to evacuate and are more likely to seek or need medical attention.

Table 7-10 presents the estimated socially vulnerable populations located in the 1 percent annual chance flood hazard area. Of the 3,567 persons located in the 1 percent annual chance flood hazard area, there are 560 persons over the age of 65 years, 250 persons under 5 years, 321 non-English speakers, 297 persons with a disability, and 454 living in poverty.

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.

According to 2022 Point-in-Time-Data from ALICE, 29 percent of the 32,016 households in Cattaraugus County are ALICE households (compared to the state average of 31 percent). The median household income in Cattaraugus County is $50,508, and the County sees a labor force participation rate of 56 percent. Cattaraugus County faces a lower-than-average household income compared to the state average of $79,557 and suffers from a higher-than-average poverty rate at 19 percent (compared to the state average of 15 percent). See Table 7-11 for ALICE data by jurisdiction.

Using 2020 U.S. Census data, Hazus estimates the potential sheltering needs as a result of a 1 percent annual chance flood event. For the 1 percent flood event, Hazus estimates 4,051 individuals will be displaced, and 876 people will seek short-term sheltering. These statistics, by jurisdiction and by flood zone, are presented in Table 7-12.

The total number of injuries and casualties resulting from flooding is generally limited based on advance weather forecasting, blockades, and warnings. More likely, persons could become displaced from their homes or may seek shelter due to the impacts of a flood event. Therefore, injuries and deaths generally are not anticipated if proper warning and precautions are in place. Ongoing mitigation efforts should help to avoid the most likely cause of injury, which results from persons trying to cross flooded roadways or channels during a flood.

Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on the net economic impact to their family. The population over the age of 65 is more vulnerable because they are more likely to seek or need medical attention which may not be available due to isolation during a flood event, and they may have more difficulty evacuating. Special consideration should be taken when planning for disaster preparation, response, and recovery for these vulnerable groups.

Table 7-10. Estimated Number of Vulnerable Persons Located in the 1 Percent Annual Chance Flood Hazard Area by Jurisdiction

Jurisdiction	Estimated Number of Vulnerable Persons Located in the 1% Annual Chance Flood Hazard Area									
	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Allegany (T)	74	6.3%	13	6.1%	1	5.3%	42	6.3%	40	6.3%
Allegany (V)	44	11.0%	7	10.8%	2	10.5%	23	10.7%	34	10.9%
Ashford (T)	16	3.4%	2	2.6%	0	0.0%	12	3.3%	3	2.8%
Carrollton (T)	17	6.3%	3	5.3%	0	0.0%	12	6.1%	9	6.0%
Cattaraugus (V)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Coldspring (T)	6	5.9%	1	5.9%	0	0.0%	8	6.2%	5	5.9%
Conewango (T)	22	10.0%	35	9.9%	3	9.7%	16	9.9%	87	10.1%
Dayton (T)	11	3.3%	1	2.2%	0	0.0%	6	3.3%	4	2.8%
Delevan (V)	6	2.6%	1	1.6%	0	0.0%	7	2.6%	6	2.8%
East Otto (T)	6	4.2%	2	4.3%	0	0.0%	7	4.8%	4	4.0%
Ellicottville (T)	29	8.3%	1	7.1%	0	0.0%	6	7.8%	10	7.9%
Ellicottville (V)	45	38.5%	15	37.5%	0	0.0%	15	38.5%	5	38.5%
Farmersville (T)	15	4.7%	5	4.3%	0	0.0%	10	4.6%	13	4.7%
Franklinville (T)	10	3.2%	0	0.0%	0	0.0%	4	3.0%	2	2.4%
Franklinville (V)	6	2.2%	3	2.3%	0	0.0%	7	2.3%	7	2.6%
Freedom (T)	18	4.6%	5	4.2%	0	0.0%	14	4.7%	11	4.5%
Gowanda (V)	86	25.5%	65	25.4%	6	25.0%	105	25.7%	55	25.6%
Great Valley (T)	39	9.3%	7	9.0%	1	8.3%	25	9.1%	5	8.9%
Hinsdale (T)	17	3.8%	5	3.6%	0	0.0%	19	3.9%	12	3.9%
Humphrey (T)	3	3.8%	0	0.0%	0	0.0%	2	3.3%	4	3.8%
Ischua (T)	5	2.3%	0	0.0%	0	0.0%	3	1.9%	3	1.9%
Leon (T)	7	5.1%	9	5.1%	2	4.0%	10	5.2%	10	5.2%
Little Valley (T)	10	6.9%	0	0.0%	0	0.0%	19	7.5%	2	5.4%
Little Valley (V)	3	1.8%	0	0.0%	0	0.0%	3	1.5%	5	1.7%

Jurisdiction	Estimated Number of Vulnerable Persons Located in the 1% Annual Chance Flood Hazard Area									
	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Lyndon (T)	1	0.6%	0	0.0%	0	0.0%	1	0.8%	1	0.8%
Machias (T)	6	1.1%	0	0.0%	0	0.0%	4	1.1%	4	1.0%
Mansfield (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Napoli (T)	1	0.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
New Albion (T)	7	4.4%	3	4.7%	1	3.2%	4	4.5%	5	4.6%
Olean (C)	57	2.3%	19	2.2%	1	1.9%	58	2.3%	75	2.3%
Olean (T)	61	12.4%	6	10.9%	0	0.0%	40	12.4%	32	12.2%
Otto (T)	5	2.2%	0	0.0%	0	0.0%	3	1.9%	1	2.0%
Perrysburg (T)	6	1.2%	0	0.0%	0	0.0%	5	1.2%	4	1.3%
Persia (T)	10	7.0%	4	6.1%	0	0.0%	7	6.9%	4	6.1%
Portville (T)	121	18.4%	25	18.4%	0	0.0%	49	18.2%	43	18.1%
Portville (V)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Randolph (T)	16	3.4%	2	2.4%	0	0.0%	10	3.4%	7	3.2%
Red House (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Salamanca (C)	36	3.8%	14	3.7%	2	3.5%	42	3.8%	58	3.9%
Salamanca (T)	4	3.1%	0	0.0%	0	0.0%	2	2.7%	2	2.4%
South Dayton (V)	1	0.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
South Valley (T)	3	2.6%	0	0.0%	0	0.0%	1	1.8%	2	2.6%
Yorkshire (T)	2	0.4%	0	0.0%	0	0.0%	2	0.3%	2	0.3%
Cattaraugus County (Total)	832	5.3%	253	5.9%	19	4.9%	603	4.8%	576	4.5%

Source: Cattaraugus County 2024; U.S. Census Bureau ACS 2022; FEMA 1970/1980
Note: % = Percent; Values are Rounded Down

Table 7-11. Cattaraugus County ALICE Data

Name	Total Households	% Below ALICE Threshold
Allegany (T)	2,676	39
Allegany (V)	-	-
Ashford (T)	879	30
Carrollton (T)	527	44
Cattaraugus (V)	-	-
Coldspring (T)	286	44
Conewango (T)	561	55
Dayton (T)	691	39
Delevan (V)	-	-
East Otto (T)	451	36
Ellicottville (T)	586	41
Ellicottville (V)	-	-
Farmersville (T)	480	61
Franklinville (T)	1,129	42
Franklinville (V)	-	-
Freedom (T)	939	32
Gowanda (V)	-	-
Great Valley (T)	806	40
Hinsdale (T)	939	46
Humphrey (T)	296	25
Ischua (T)	310	45
Leon (T)	354	33
Little Valley (T)	671	43
Little Valley (V)	-	-
Lyndon (T)	303	41
Machias (T)	925	44
Mansfield (T)	287	36
Napoli (T)	493	36
New Albion (T)	847	39
Olean (C)	6,142	54
Olean (T)	898	33
Otto (T)	353	40
Perrysburg (T)	694	38
Persia (T)	930	44
Portville (T)	1,405	40
Portville (V)	-	-
Randolph (T)	888	37
Red House (T)	-	-
Salamanca (C)	2,420	60

Name	Total Households	% Below ALICE Threshold
Salamanca (T)	244	53
South Dayton (V)	-	-
South Valley (T)	150	45
Yorkshire (T)	1,663	51
Cattaraugus County (Total)	32,016	29

Source: United For ALICE 2024

Note: Totals for the Town of Red House or the Villages of Alleghany, Cattaraugus, Delevan, Ellicottville, Franklinville, Gowanda, Little Valley, Portville, and South Dayton were unavailable.

Table 7-12. Estimated Population Displaced or Seeking Short-Term Shelter from the 1 Percent Annual Chance Flood Event Hazard Area

Jurisdiction	Total Population (2020 Decennial)	1% Annual Chance Flood Impacts on People	
		Displaced Population	Persons Seeking Short-Term Sheltering
Allegany (T)	5,949	355	85
Allegany (V)	1,544	177	32
Ashford (T)	1,961	66	12
Carrollton (T)	1,207	92	30
Cattaraugus (V)	960	1	1
Coldspring (T)	658	44	3
Conewango (T)	1,785	77	13
Dayton (T)	1,149	42	9
Delevan (V)	1,043	44	25
East Otto (T)	974	31	4
Ellicottville (T)	1,059	72	40
Ellicottville (V)	256	79	11
Farmersville (T)	1,073	75	11
Franklinville (T)	1,150	66	3
Franklinville (V)	1,652	39	16
Freedom (T)	2,261	89	18
Gowanda (V)	1,834	489	85
Great Valley (T)	1,991	237	55
Hinsdale (T)	2,113	145	26
Humphrey (T)	703	40	4
Ischua (T)	736	10	3
Leon (T)	1,244	60	10
Little Valley (T)	617	80	8
Little Valley (V)	1,058	31	16
Lyndon (T)	685	4	0
Machias (T)	2,310	36	9

Jurisdiction	Total Population (2020 Decennial)	1% Annual Chance Flood Impacts on People	
		Displaced Population	Persons Seeking Short-Term Sheltering
Mansfield (T)	843	1	1
Napoli (T)	1,171	9	0
New Albion (T)	1,021	39	18
Olean (C)	13,937	361	93
Olean (T)	1,881	248	18
Otto (T)	777	18	4
Perrysburg (T)	1,518	23	1
Persia (T)	596	23	13
Portville (T)	2,612	539	70
Portville (V)	892	7	6
Randolph (T)	2,469	72	20
Red House (T)	27	0	0
Salamanca (C)	5,929	183	93
Salamanca (T)	470	14	1
South Dayton (V)	541	5	0
South Valley (T)	250	12	4
Yorkshire (T)	2,784	16	5
Cattaraugus County (Total)	75,690	4,051	876

Source: Hazus v6.1; U.S. Census Bureau 2020; FEMA 1970/1980
Notes: C = City; T = Town; V = Village

7.2.2 General Building Stock

Exposure to the flood hazard includes those buildings located in the flood zone or those that are built downstream in other flood inundation areas such as dam failure inundation areas. The potential damage is the modeled loss that could occur to the exposed inventory measured by the structural and content replacement cost value. There are an estimated 2,543 buildings located in the 1 percent annual chance flood event hazard area, respectively. This represents approximately 5.7 percent of the County's total general building stock inventory replacement cost value, respectively (approximately $2 billion). The Town of Portville has the greatest number of its buildings located in the 1 percent annual chance floodplain (283 buildings or 19 percent of its total building stock). Refer to Table 7-13 for the estimated exposure of 1 percent flood events by jurisdiction. Refer to Table 7-14 for the Hazus estimated losses by jurisdiction, for residential, commercial, and other occupancy structures, respectively.

Table 7-13. Estimated General Building Stock Exposure to the 1 Percent Annual Chance Flood Event

Jurisdiction	Jurisdiction Total Buildings		Buildings in the 1% Annual Chance Flood Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Jurisdiction Total	Value	% of Jurisdiction Total
Allegany (T)	2,633	$1,828,453,626	192	7.3%	$164,787,559	9.0%
Allegany (V)	694	$534,281,350	93	13.4%	$86,078,433	16.1%

Jurisdiction	Jurisdiction Total Buildings		Buildings in the 1% Annual Chance Flood Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Jurisdiction Total	Value	% of Jurisdiction Total
Ashford (T)	1,255	$981,729,710	46	3.7%	$32,163,186	3.3%
Carrollton (T)	716	$446,787,985	55	7.7%	$36,196,871	8.1%
Cattaraugus (V)	429	$413,937,573	0	0.0%	$0	0.0%
Coldspring (T)	509	$419,437,697	34	6.7%	$15,304,879	3.6%
Conewango (T)	1,092	$1,224,823,403	80	7.3%	$362,073,161	29.6%
Dayton (T)	760	$566,877,685	25	3.3%	$20,189,315	3.6%
Delevan (V)	398	$294,096,772	13	3.3%	$5,617,339	1.9%
East Otto (T)	726	$910,263,387	34	4.7%	$160,664,516	17.7%
Ellicottville (T)	2,319	$1,230,255,766	194	8.4%	$90,122,037	7.3%
Ellicottville (V)	594	$520,870,391	230	38.7%	$204,386,340	39.2%
Farmersville (T)	773	$336,948,280	45	5.8%	$33,023,494	9.8%
Franklinville (T)	1,019	$454,998,969	37	3.6%	$49,366,446	10.8%
Franklinville (V)	667	$458,799,506	23	3.4%	$25,708,785	5.6%
Freedom (T)	1,381	$1,243,878,371	60	4.3%	$80,143,512	6.4%
Gowanda (V)	731	$557,102,073	196	26.8%	$178,940,840	32.1%
Great Valley (T)	1,563	$1,678,197,808	150	9.6%	$76,702,636	4.6%
Hinsdale (T)	1,265	$1,154,148,484	56	4.4%	$27,542,629	2.4%
Humphrey (T)	567	$770,519,047	21	3.7%	$6,240,410	0.8%
Ischua (T)	596	$941,084,197	16	2.7%	$5,703,396	0.6%
Leon (T)	895	$871,766,032	44	4.9%	$83,298,691	9.6%
Little Valley (T)	496	$669,501,134	49	9.9%	$40,352,208	6.0%
Little Valley (V)	469	$431,938,926	14	3.0%	$25,880,657	6.0%
Lyndon (T)	668	$1,218,701,662	7	1.0%	$2,188,267	0.2%
Machias (T)	1,593	$1,010,913,905	18	1.1%	$9,764,940	1.0%
Mansfield (T)	869	$850,358,071	3	0.3%	$720,935	0.1%
Napoli (T)	828	$1,038,184,870	4	0.5%	$2,518,992	0.2%
New Albion (T)	740	$412,253,447	30	4.1%	$9,897,836	2.4%
Olean (C)	5,590	$5,029,125,342	127	2.3%	$70,852,529	1.4%
Olean (T)	1,122	$711,063,289	156	13.9%	$94,075,556	13.2%
Otto (T)	575	$270,712,477	15	2.6%	$5,023,864	1.9%
Perrysburg (T)	945	$635,389,864	12	1.3%	$6,174,161	1.0%
Persia (T)	340	$193,784,098	22	6.5%	$7,497,951	3.9%
Portville (T)	1,490	$1,452,207,760	283	19.0%	$206,404,500	14.2%
Portville (V)	390	$292,144,939	1	0.3%	$165,050	0.1%
Randolph (T)	1,232	$893,024,995	41	3.3%	$26,300,865	2.9%
Red House (T)	328	$141,446,242	0	0.0%	$0	0.0%
Salamanca (C)	2,320	$3,749,213,545	85	3.7%	$44,125,239	1.2%
Salamanca (T)	331	$193,028,563	10	3.0%	$3,271,883	1.7%

Jurisdiction	Jurisdiction Total Buildings		Buildings in the 1% Annual Chance Flood Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Jurisdiction Total	Value	% of Jurisdiction Total
South Dayton (V)	264	$203,422,751	1	0.4%	$375,258	0.2%
South Valley (T)	410	$607,773,120	14	3.4%	$5,450,787	0.9%
Yorkshire (T)	1,985	$2,733,993,018	7	0.4%	$55,362,164	2.0%
Cattaraugus County (Total)	44,567	$40,577,440,127	2,543	5.7%	$2,360,658,117	5.8%

Source: Cattaraugus County 2024; FEMA 1970/1980; RS Means 2024
Notes: C = City; T = Town; V = Village; % = Percent

Table 7-14. Estimated Building Stock Potential Loss by Occupancy to the 1 Percent Annual Chance Flood Event

Jurisdiction	Total Replacement Cost Value (RCV)	1% Annual Chance Flood Impacts on Buildings				
		Estimated Loss for All Occupancies	Percent of Total	Estimated Loss for Residential Properties	Estimated Loss for Commercial Properties	Estimated Loss for All Other Occupancies
Allegany (T)	$1,828,453,626	$18,433,514	1.0%	$7,492,869	$9,648,500	$1,292,146
Allegany (V)	$534,281,350	$1,719,834	0.3%	$1,155,142	$564,691	$0
Ashford (T)	$981,729,710	$2,377,615	0.2%	$2,173,017	$12,563	$192,036
Carrollton (T)	$446,787,985	$1,801,876	0.4%	$834,499	$953,890	$13,487
Cattaraugus (V)	$413,937,573	$0	0.0%	$0	$0	$0
Coldspring (T)	$419,437,697	$1,495,516	0.4%	$504,163	$0	$991,353
Conewango (T)	$1,224,823,403	$16,372,318	1.3%	$16,365,074	$7,244	$0
Dayton (T)	$566,877,685	$1,843,717	0.3%	$1,843,460	$257	$0
Delevan (V)	$294,096,772	$507,212	0.2%	$504,114	$3,098	$0
East Otto (T)	$910,263,387	$12,603,122	1.4%	$12,587,914	$15,208	$0
Ellicottville (T)	$1,230,255,766	$7,987,087	0.6%	$6,669,310	$1,314,231	$3,545
Ellicottville (V)	$520,870,391	$8,685,806	1.7%	$2,402,664	$6,277,800	$5,342
Farmersville (T)	$336,948,280	$340,690	0.1%	$221,416	$119,274	$0
Franklinville (T)	$454,998,969	$13,235,851	2.9%	$589,079	$11,835,111	$811,660
Franklinville (V)	$458,799,506	$1,119,670	0.2%	$16,279	$13,168	$1,090,223
Freedom (T)	$1,243,878,371	$1,764,432	0.1%	$1,764,432	$0	$0
Gowanda (V)	$557,102,073	$5,579,079	1.0%	$1,891,156	$181,452	$3,506,471
Great Valley (T)	$1,678,197,808	$6,522,822	0.4%	$4,289,636	$111,162	$2,122,023
Hinsdale (T)	$1,154,148,484	$1,264,911	0.1%	$447,594	$817,317	$0
Humphrey (T)	$770,519,047	$806,905	0.1%	$806,905	$0	$0
Ischua (T)	$941,084,197	$456,712	<0.1%	$439,331	$17,381	$0
Leon (T)	$871,766,032	$626,322	0.1%	$626,322	$0	$0
Little Valley (T)	$669,501,134	$4,619,845	0.7%	$441,173	$4,099,478	$79,193
Little Valley (V)	$431,938,926	$1,922,325	0.4%	$89	$1,922,236	$0
Lyndon (T)	$1,218,701,662	$152,101	<0.1%	$152,101	$0	$0
Machias (T)	$1,010,913,905	$558,919	0.1%	$558,919	$0	$0

Jurisdiction	Total Replacement Cost Value (RCV)	1% Annual Chance Flood Impacts on Buildings				
		Estimated Loss for All Occupancies	Percent of Total	Estimated Loss for Residential Properties	Estimated Loss for Commercial Properties	Estimated Loss for All Other Occupancies
Mansfield (T)	$850,358,071	$12,412	<0.1%	$0	$12,412	$0
Napoli (T)	$1,038,184,870	$718	<0.1%	$718	$0	$0
New Albion (T)	$412,253,447	$1,555,331	0.4%	$1,555,331	$0	$0
Olean (C)	$5,029,125,342	$6,445,686	0.1%	$4,601,526	$1,844,161	$0
Olean (T)	$711,063,289	$4,144,570	0.6%	$3,909,675	$234,895	$0
Otto (T)	$270,712,477	$1,624,110	0.6%	$121,259	$0	$1,502,851
Perrysburg (T)	$635,389,864	$218,330	<0.1%	$218,330	$0	$0
Persia (T)	$193,784,098	$190,208	0.1%	$185,541	$4,667	$0
Portville (T)	$1,452,207,760	$66,967,080	4.6%	$58,895,185	$6,059,814	$2,012,081
Portville (V)	$292,144,939	$0	0.0%	$0	$0	$0
Randolph (T)	$893,024,995	$626,349	0.1%	$625,172	$1,178	$0
Red House (T)	$141,446,242	$0	0.0%	$0	$0	$0
Salamanca (C)	$3,749,213,545	$2,657,653	0.1%	$2,647,544	$8,701	$1,408
Salamanca (T)	$193,028,563	$165,269	0.1%	$165,269	$0	$0
South Dayton (V)	$203,422,751	$0	0.0%	$0	$0	$0
South Valley (T)	$607,773,120	$1,149,267	0.2%	$365,522	$783,745	$0
Yorkshire (T)	$2,733,993,018	$378,503	<0.1%	$378,503	$0	$0
Cattaraugus County (Total)	$40,577,440,127	$198,933,685	0.5%	$138,446,231	$46,863,633	$13,623,821

Source: Hazus v6.1; Cattaraugus County 2024; FEMA 1970/1980; RS Means 2024
Notes: C = City; T = Town; V = Village; % = Percent

NFIP Statistics

In addition to total building stock modeling, individual data available on flood policies, claims, repetitive loss (RL) properties, and severe RL (SRL) properties were analyzed. FEMA Region 2 provided a list of residential properties with NFIP policies, past claims, and multiple claims (RLs). According to the metadata provided, "The (*sic* National Flood Insurance Program) NFIP Repetitive Loss File contains losses reported from individuals who have flood insurance through the Federal Government. A property is considered a repetitive loss property when there are two or more losses reported that were paid more than $1,000 for each loss. The two losses must be within 10 years of each other and be at least 10 days apart. Only losses from (*sic* since) January 1, 1978, that are closed are considered."

SRLs were then examined for Cattaraugus County. According to Section 1361A of the National Flood Insurance Act, as amended (NFIA), 42 *United States Code* (U.S.C.) 4102a, an SRL property is defined as a residential property covered under an NFIP flood insurance policy, and satisfying either of conditions 1 and 2, as well as condition 3:

1. At least four NFIP claim payments for the property (including building and contents) over $5,000 each have occurred, and the cumulative amount of such claims payments exceeded $20,000.
2. At least two separate claims payments for the property (building payments only) have occurred, and the cumulative amount of the building portion of such claims exceeded the market value of the building.

3. For either of the above, at least two of the referenced claims must have occurred within any 10-year period and must have occurred more than 10 days apart.

Table 7-15 through Table 7-17 summarizes NFIP policies, claims, and repetitive loss statistics for Cattaraugus County as of February 2024. According to FEMA, Table 7-15 summarizes occupancy classes of RL properties in Cattaraugus County. The majority of properties within the RL occupancy class are single-family residences (72.4 percent). Severe repetitive loss data was not available.

Table 7-15. Occupancy Class of Repetitive Loss Structures in Cattaraugus County

Occupancy Class	Total Number of Repetitive Loss Properties
Single Family	21
Condo	0
2-4 Family	2
Other Residential	1
Business-Non-Residential	1
Other Non-Residential	4
Cattaraugus County	29

Source: FEMA Region 2 2024
Notes: Repetitive loss statistics provided by FEMA Region 2, and current as of February 2024.

Table 7-16. Occupancy Class of Repetitive Loss Structures in Cattaraugus County by Municipality

Municipality	Repetitive Loss Properties					
	2-4 Family	Assumed Condo	Business-Non Residential	Other-Non Residential	Other Residential	Single Family
Allegany (T)	0	0	0	0	0	1
Allegany (V)	0	0	0	1	0	1
Ashford (T)	0	0	0	0	0	0
Carrollton (T)	0	0	0	0	0	0
Cattaraugus (V)	0	0	0	0	0	1
Coldspring (T)	0	0	0	0	0	1
Conewango (T)	0	0	0	0	0	0
Dayton (T)	0	0	0	0	0	0
Delevan (V)	0	0	0	0	0	0
East Otto (T)	1	0	0	0	0	3
Ellicottville (T)	0	0	0	0	0	0
Ellicottville (V)	0	0	0	0	0	0
Farmersville (T)	0	0	0	0	0	0
Franklinville (T)	0	0	0	0	0	0
Franklinville (V)	0	0	0	0	0	0
Freedom (T)	0	0	0	0	0	0
Gowanda (V)	1	0	1	0	1	8
Great Valley (T)	0	0	0	1	0	0

Municipality	Repetitive Loss Properties					
	2-4 Family	Assumed Condo	Business-Non Residential	Other-Non Residential	Other Residential	Single Family
Hinsdale (T)	0	0	0	0	0	0
Humphrey (T)	0	0	0	0	0	0
Ischua (T)	0	0	0	0	0	0
Leon (T)	0	0	0	0	0	0
Little Valley (T)	0	0	0	0	0	0
Little Valley (V)	0	0	0	0	0	0
Lyndon (T)	0	0	0	0	0	0
Machias (T)	0	0	0	0	0	0
Mansfield (T)	0	0	0	0	0	0
Napoli (T)	0	0	0	0	0	0
New Albion (T)	0	0	0	0	0	0
Olean (C)	0	0	0	0	0	0
Olean (T)	0	0	0	0	0	1
Otto (T)	0	0	0	0	0	0
Perrysburg (T)	0	0	0	0	0	0
Persia (T)	0	0	0	0	0	0
Portville (T)	0	0	0	2	0	3
Portville (V)	0	0	0	0	0	0
Randolph (T)	0	0	0	0	0	1
Red House (T)	0	0	0	0	0	0
Salamanca (C)	0	0	0	0	0	0
Salamanca (T)	0	0	0	0	0	0
South Dayton (V)	0	0	0	0	0	0
South Valley (T)	0	0	0	0	0	0
Yorkshire (T)	0	0	0	0	0	1
Cattaraugus County	**2**	**0**	**1**	**4**	**1**	**21**

Source: FEMA Region 2 2024
Notes:
Policies, claims, repetitive loss and severe repetitive loss statistics provided by FEMA Region 2, and current as of February 2024.
Statistics summarized using the Community Name provided by FEMA Region 2. Severe repetitive loss properties data was unavailable.
C City
T Town
V Village

Table 7-17. NFIP Statistics in Cattaraugus County

Municipality	Total Number of Policies	Total Premium + Policy Fee	Total Payments	Total Claims	Number of NFIP Repetitive Loss (RL) Properties
Allegany (T)	39	$41,199	21	$67,136	1
Allegany (V)	24	$29,927	27	$179,738	2
Ashford (T)	4	$3,410	12	$37,283	0
Carrollton (T)	5	$2,873	2	$0	0
Cattaraugus (V)	0	$0	21	$31,837	1
Coldspring (T)	1	$890	5	$40,276	1
Conewango (T)	0	$0	2	$2,504	0
Dayton (T)	3	$1,385	1	$0	0
Delevan (V)	0	$0	0	$0	0
East Otto (T)	3	$11,987	24	$305,034	4
Ellicottville (T)	24	$33,588	6	$43,067	0
Ellicottville (V)	23	$60,400	22	$108,202	0
Farmersville (T)	2	$2,954	2	$16,411	0
Franklinville (T)	2	$1,310	2	$11,319	0
Franklinville (V)	4	$2,222	1	$7,187	0
Freedom (T)	6	$6,150	4	$81,006	0
Gowanda (V)	57	$77,930	136	$2,332,780	11
Great Valley (T)	16	$11,988	18	$134,846	1
Hinsdale (T)	5	$3,666	7	$9,876	0
Humphrey (T)	1	$480	0	$0	0
Ischua (T)	1	$355	1	$41,951	0
Leon (T)	0	$0	0	$0	0
Little Valley (T)	7	$7,555	0	$0	0
Little Valley (V)	2	$1,887	1	$75	0
Lyndon (T)	0	$0	0	$0	0
Machias (T)	1	$516	0	$0	0
Mansfield (T)	1	$733	1	$262	0
Napoli (T)	1	$2,710	2	$43,720	0
New Albion (T)	2	$1,022	3	$13,989	0
Olean (C)	57	$81,281	29	$214,595	0
Olean (T)	21	$27,851	26	$333,628	1
Otto (T)	0	$0	0	$0	0
Perrysburg (T)	1	$449	3	$2,234	0
Persia (T)	3	$4,581	0	$0	0
Portville (T)	54	$40,914	83	$560,324	5
Portville (V)	16	$9,965	15	$530,647	0
Randolph (T)	3	$3,878	6	$22,562	1
Red House (T)	0	$0	0	$0	0

Municipality	Total Number of Policies	Total Premium + Policy Fee	Total Payments	Total Claims	Number of NFIP Repetitive Loss (RL) Properties
Salamanca (C)	9	$20,276	6	$2,273	0
Salamanca (T)	5	$4,501	2	$6,554	0
South Dayton (V)	0	$0	0	$0	0
South Valley (T)	0	$0	1	$127	0
Yorkshire (T)	1	$597	3	$12,839	1
Cattaraugus County	**407**	**$504,504**	**499**	**$5,194,282**	**29**

Source: FEMA Region 2 2024

Note: NFIP statistics provided by FEMA Region 2 and are current as of February 2024. The statistics were summarized using the Community Name provided by FEMA Region 2

C City

T Town

V Village

7.2.3 Community Lifelines and Other Critical Facilities

It is important to determine the critical facilities and infrastructure within the County that may be at risk to flooding and who may be impacted should damage occur. Critical services during and after a flood event may not be available if critical facilities are directly damaged or transportation routes to access these critical facilities are impacted. Roads that are blocked or damaged can isolate residents and can prevent access throughout 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 or the surge of water from a dam failure event. Loss of these utilities could create additional isolation issues for the inundation zones.

There are several issues associated with transportation routes flooding, including isolation caused by bridges being washed out or blocked by floods or debris, health problems caused by water and sewer systems that are flooded or backed up, drinking water contamination caused by floodwaters carrying pollutants in water supplies, and localized urban flooding caused by culverts blocked with debris.

Critical facility exposure to the 1 percent annual chance flood hazard event boundary was examined. In addition, Hazus was used to estimate the flood loss potential to critical facilities located in the FEMA mapped floodplains. Table 7-18 summarizes the number of critical facilities exposed to the 1 percent flood inundation areas by jurisdiction. Of the 235 critical facilities located in the 1 percent annual chance flood event boundary, all 235 are considered lifelines for the County. Table 7-18 shows the number of lifeline facilities by category in the 1 percent annual chance flood event boundary. Refer to Chapter 3 (County Profile) for more information about the critical facilities and lifelines in Cattaraugus County.

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

Table 7-18. Number of Critical Facilities Located in the 1 Percent Annual Chance Flood Hazard Area

Jurisdiction	Number of Facilities in 1% 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	Count	% of Jurisdiction Total
Allegany (T)	0	0	0	1	0	1	7	1	4	14	24.6%
Allegany (V)	0	1	0	0	1	3	0	0	1	6	33.3%
Ashford (T)	0	0	0	0	0	0	6	0	0	6	14.3%
Carrollton (T)	0	0	0	0	0	1	1	0	3	5	11.6%
Cattaraugus (V)	0	0	0	0	0	0	1	0	0	1	4.8%
Coldspring (T)	0	0	0	0	0	1	3	0	1	5	27.8%
Conewango (T)	0	0	0	0	0	0	9	0	1	10	37.0%
Dayton (T)	0	0	0	1	0	1	3	0	1	6	25.0%
Delevan (V)	0	0	0	0	0	1	2	0	0	3	16.7%
East Otto (T)	0	0	0	0	0	0	5	0	0	5	18.5%
Ellicottville (T)	0	1	0	0	0	0	5	0	2	8	32.0%
Ellicottville (V)	0	0	0	0	0	1	3	0	0	4	23.5%
Farmersville (T)	0	0	0	0	0	0	5	0	0	5	25.0%
Franklinville (T)	0	1	0	0	0	2	6	1	1	11	50.0%
Franklinville (V)	0	1	0	1	0	0	1	0	0	3	10.7%
Freedom (T)	0	0	0	1	0	0	15	0	0	16	43.2%
Gowanda (V)	0	0	0	1	0	1	1	0	6	9	32.1%
Great Valley (T)	0	0	0	0	0	0	5	0	1	6	20.7%
Hinsdale (T)	0	0	0	0	0	2	4	1	0	7	17.9%
Humphrey (T)	0	0	0	0	0	0	9	0	0	9	56.3%
Ischua (T)	0	0	0	0	0	1	2	0	1	4	22.2%
Leon (T)	0	0	0	0	0	0	17	0	0	17	53.1%

Jurisdiction	Number of Facilities in 1% 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	Count	% of Jurisdiction Total
Little Valley (T)	0	0	0	0	0	0	6	0	0	6	50.0%
Little Valley (V)	0	0	0	0	0	0	4	0	0	4	14.8%
Lyndon (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Machias (T)	0	0	0	0	0	3	2	0	0	5	16.7%
Mansfield (T)	0	0	0	0	0	0	1	0	0	1	5.3%
Napoli (T)	0	0	0	0	0	0	2	0	0	2	14.3%
New Albion (T)	0	0	0	0	0	1	3	0	0	4	17.4%
Olean (C)	0	1	0	1	0	0	0	1	0	3	2.5%
Olean (T)	0	2	0	0	0	0	2	0	0	4	12.1%
Otto (T)	0	0	0	0	1	0	5	0	0	6	33.3%
Perrysburg (T)	0	0	0	0	0	0	0	0	1	1	4.3%
Persia (T)	0	0	0	0	0	2	1	0	0	3	50.0%
Portville (T)	0	0	0	0	0	1	5	0	2	8	36.4%
Portville (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Randolph (T)	0	1	0	0	1	4	4	1	1	12	24.5%
Red House (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Salamanca (C)	0	0	0	0	0	0	0	7	1	8	11.6%
Salamanca (T)	0	1	0	0	0	0	0	0	0	1	16.7%
South Dayton (V)	0	0	0	0	0	0	1	0	0	1	5.0%
South Valley (T)	0	0	0	0	0	0	3	0	0	3	33.3%
Yorkshire (T)	0	0	0	0	0	0	3	0	0	3	8.3%
Cattaraugus County	**0**	**9**	**0**	**6**	**3**	**26**	**152**	**12**	**27**	**235**	**19.8%**

Source: Cattaraugus County 2024; FEMA 1970/1980
Notes: C = City; T = Town; V = Village % = Percent

7.2.4 Economy

Flood events can significantly impact the local and regional economy. This includes but is not limited to general building stock damages and associated tax loss, impacts on utilities and infrastructure, business interruption, and impacts on tourism. In areas that are directly flooded, renovations of commercial and industrial buildings may be necessary, disrupting associated services. The Impact on General Building Stock subsection above discusses direct impacts on buildings in Cattaraugus County.

Debris management may also be a large expense after a flood event. HAZUS estimates the amount of structural debris generated during a flood event. The model breaks down debris into three categories: (1) finishes (dry wall, insulation, etc.); (2) structural (wood, brick, etc.); and (3) foundations (concrete slab and block, rebar, etc.). These distinctions are necessary because of the different types of equipment needed to handle debris. Table 7-19 summarizes the Hazus v5.1 countywide debris estimates for the 1 percent annual chance flood event. This table only estimates structural debris generated by flooding and does not include non-structural debris or additional potential damage and debris possibly generated by wind that may be associated with a flood event or storm that causes flooding. Overall, Hazus estimates that there will be 17,649 tons of debris generated during the 1 percent annual chance flood event in Cattaraugus County.

Table 7-19. Estimated Debris Generated from the 1 Percent Annual Chance Flood Event

Jurisdiction	1 Percent Annual Chance Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Allegany (T)	593	271	159	164
Allegany (V)	75	71	2	2
Ashford (T)	242	66	98	78
Carrollton (T)	87	36	27	24
Cattaraugus (V)	0	0	0	0
Coldspring (T)	27	21	3	3
Conewango (T)	1,279	1,273	2	4
Dayton (T)	6	5	0	1
Delevan (V)	61	24	20	18
East Otto (T)	3,777	598	2,214	965
Ellicottville (T)	110	93	10	7
Ellicottville (V)	127	93	13	21
Farmersville (T)	15	10	2	3
Franklinville (T)	58	27	16	15
Franklinville (V)	20	20	0	0
Freedom (T)	168	76	60	32
Gowanda (V)	451	283	64	105
Great Valley (T)	355	177	96	82
Hinsdale (T)	74	39	17	18
Humphrey (T)	56	21	18	16

Jurisdiction	1 Percent Annual Chance Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Ischua (T)	31	17	9	6
Leon (T)	27	12	7	8
Little Valley (T)	529	123	236	170
Little Valley (V)	23	17	4	3
Lyndon (T)	0	0	0	0
Machias (T)	31	15	7	9
Mansfield (T)	2	2	0	0
Napoli (T)	8	8	0	0
New Albion (T)	102	34	38	30
Olean (C)	454	314	77	62
Olean (T)	296	176	67	54
Otto (T)	74	22	30	22
Perrysburg (T)	8	5	2	1
Persia (T)	59	23	20	16
Portville (T)	3,687	1,318	1,458	910
Portville (V)	0	0	0	0
Randolph (T)	34	22	6	6
Red House (T)	0	0	0	0
Salamanca (C)	3,079	513	1,460	1,106
Salamanca (T)	74	49	14	10
South Dayton (V)	0	0	0	0
South Valley (T)	1,532	279	864	389
Yorkshire (T)	15	6	4	4
Cattaraugus County (Total)	17,649	6,158	7,125	4,366

Source: Hazus v6.1; Cattaraugus County 2024; FEMA 1970/1980
Notes: V = Village, T = Town, C = City

7.2.5 Natural, Historic, and Cultural Resources

Natural

As Cattaraugus County and its jurisdictions evolve with changes in population and density, flood events may increase in frequency and/or severity as land use changes, more structures are built, and impervious surfaces expand. Furthermore, flood extents for the 1 percent annual chance flood event will continue to evolve alongside natural occurrences such as climate change and/or severe storm events. These flood events will inevitably impact Cattaraugus County's natural and local environment.

Flood waters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooded waterway. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals get added to flood waters. Hazardous materials may be released and distributed widely across the floodplain. Water supply and wastewater treatment facilities could be offline for weeks. After the flood waters subside, contaminated and flood-damaged building materials and contents must be properly disposed of. Contaminated sediment must be removed from buildings, yards, and properties. In addition, severe erosion is likely; such erosion can negatively impact local ecosystems.

Historic

Historic resources, such as historic places, community facilities, and religious institutions, are all vulnerable to impacts from flooding. Venues such as museums and 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 closely to waterways, increasing their flood risk. Depending on severity, flood events affecting the County could bring devastating loss of life and property to the area in and around historical landmarks.

Cultural

Cultural resources, such as cultural institutions, parks and open spaces, community facilities, and religious institutions, are all vulnerable to impacts from flooding. Venues such as museums and historic buildings face structural damage during flood events, with additional risk of damage to important cultural artifacts housed within that are not easily replaceable. Parks, recreation, and community space closures due to flood events can disrupt residents' lives and hinder access to critical community services. Furthermore, 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. Depending on severity, flood events affecting the County could bring devastating loss of life and property to the area in and around historical landmarks.

7.3 FUTURE CHANGES THAT MAY AFFECT RISK

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The following sections examine potential conditions that may affect hazard vulnerability.

7.3.1 Potential or Planned Development

Chapter 3 (County Profile) identifies areas targeted for future growth and development across the County. Any areas of growth located in the special flood hazard area could be potentially impacted by flooding. Areas outside of the special flood hazard can also be impacted by urban flooding and less frequent and more severe flooding events. Specific areas of recent and new development are indicated in tabular form and/or on the hazard maps included in Volume II of this plan.

7.3.2 Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 4 percent since 2010. Population projections from Cornell University reveal the County's population is anticipated to continue decreasing. The population is projected to decline to 73,254 persons in 2030 and to 70,468 by 2040 (Cornell University 2018). Despite having a decrease in population, any changes in the density of population can create issues for local residents during evacuation of a natural hazard severe storm event. Historically, flooding and debris have severely impacted transportation corridors as well as infrastructure. As areas continue to be cleared for new development and run-off persists, the population in the County will remain exposed to this hazard. Refer to Chapter 3 (County Profile), which includes a discussion on population trends for the County.

7.3.3 Climate Change

Climate is defined not simply as average temperature and precipitation but also by 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 conditions. Warmer temperatures may lead to an increase in frequency of storms, thus leading to more weather events with potentially increased severity.

7.3.4 Change of Vulnerability Since 2020 Cattaraugus County HMP

The entire County continues to be vulnerable to the flood hazard. Since the 2020 analysis, the general building stock was updated using RS Means 2024 building valuations that estimated replacement cost value for each building in the inventory. This provides an up-to-date look at the entire building stock for Cattaraugus County and gives more accurate results for the exposure and loss estimation analysis. Additionally, the 2020 critical facility dataset was updated by the County and includes FEMA community lifelines.

8. LANDSLIDE

8.1 HAZARD PROFILE

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

8.1.1 Hazard Description

According to the U.S. Geological Survey (USGS), the term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Gravity acting on an over-steepened slope is the primary reason for a landslide, but there are other contributing factors that include the following (USGS n.d.).

- Erosion by rivers, glaciers, or ocean waves create over steepened slopes
- Rock and soil slopes are weakened through saturation by snowmelt or heavy rains
- Earthquakes create stresses that make weak slopes fail
- Earthquakes of magnitude 4.0 and greater have been known to trigger landslides
- Volcanic eruptions produce loose ash deposits, heavy rain, and debris flows
- Excess weight from accumulation of rain or snow, stockpiling of rock or ore, from waste piles, or from man-made structures may stress weak slopes to failure and other structures

Areas generally prone to landslide hazards include previous landslide areas, bases of steep slopes, bases of drainage channels, developed hillsides, and areas recently burned by forest and brush fires (NYS DHSES n.d.). Landslide materials may be composed of natural rock, soil, artificial fill, or a combination of these materials. These events can transpire quickly with little to no warning. Depending on the location of a landslide, they can pose significant risks to health, safety, transportation, as well as other services. Annually, landslides in the U.S. cause approximately $1 billion in damages and between 25 and 50 fatalities (USGS n.d.):

Landslides may be triggered by both natural and human-caused changes in the environment. Natural causes can include heavy rain, rapid snow melt, steepening of slopes caused by erosion, earthquakes, and changes in groundwater levels. Human activities that contribute to slope failure include altering the natural slope gradient, steepening slopes by construction, increasing soil water content, and removing vegetation cover. Warning signs for landslide activity include the following (USGS n.d.):

- Springs, seeps, or saturated ground in areas that have not typically been wet before
- New cracks or unusual bulges in the ground, street pavement, or sidewalk
- Soil moving away from foundations
- Ancillary structures, such as decks and patios, tilting and moving relative to the main house
- Tilting or cracking of concrete floors and foundations
- Broken water lines and other underground utilities
- Leaning telephone poles, trees, retaining walls, or fences
- Offset fence lines
- Sunken or down dropped road beds

- Rapid increase in creek water levels, possibly accompanied by increased turbidity
- Sudden increase in creek water levels while rain is still failing or just recently ended
- Sticking doors and windows, and visible open spaces indicating jambs and frames out of plumb
- A faint rumbling sound that increases in volume as the landslide nears
- Unusual sounds, such as trees cracking or boulders knocking together.

There are several different types of landslides including (NYS DHSES 2023):

- *Rock Falls:* blocks of rock that fall away from a bedrock unit without a rotational component
- *Rock Topples:* blocks of rock that fall away from a bedrock unit with a rotational component
- *Rotational Slump:* blocks of fine-grained sediment that rotate and move down slope
- *Transitional Slide:* sediments that move along a flat surface without a rotational component
- *Earth Flows:* fine-grained sediments that flow downhill and typically form a fan structure
- *Creep:* a slow-moving landslide often only noticed through crooked trees and disturbed structures
- *Block Slides:* blocks of rock that slide along a slip plane as a unit down a slope
- *Debris Avalanche:* predominately gravel, cobble, boulder, and sediment portions, and trees that move quickly down slope
- *Debris Flows:* coarse sediments that flow downhill and spread out over relatively flat areas

8.1.2 Location

The potential for landslides exists throughout New York State, including Cattaraugus County. Generally, the highest potential for landslides is located along major rivers and lake valleys that were previously glacial lakes resulting in glacial lake deposits (glacial lake clays) and areas associated with steeper slopes. Figure 8-1 displays the Landslide Risk Index for Cattaraugus County. This index helps to understand the susceptibility of the County to landslides. According to the National Risk Index, on the County scale, the County has a relatively moderate risk to landslides (FEMA 2019).

Information contained in the 2020 HMP indicates that the Route 16 corridor, between Franklinville and Hinsdale, has had large landslides, and the Town of New Albion also exhibited several trouble spots where severe erosion and landslides occur, such as along County Road 76 (Lovers Lane Road). In addition, the Town of Yorkshire noted landslides occurring on Creek and Bolton Roads with several “sink holes.” Many landslides have also been located along Cattaraugus Creek, which makes up the northern border of the County. Other landslide sites would include County Route 12 in the Town of Otto, Connasauraley in the Town of East Otto, Town Line Road in the Towns of Ashford/Yorkshire, Creek Road in the Town of Yorkshire, Point Peter and Dewey Roads in the Town of Persia, and Skinner Hollow area. The City of Salamanca also noted riverbank scour and settlement along the banks of the Allegany River.

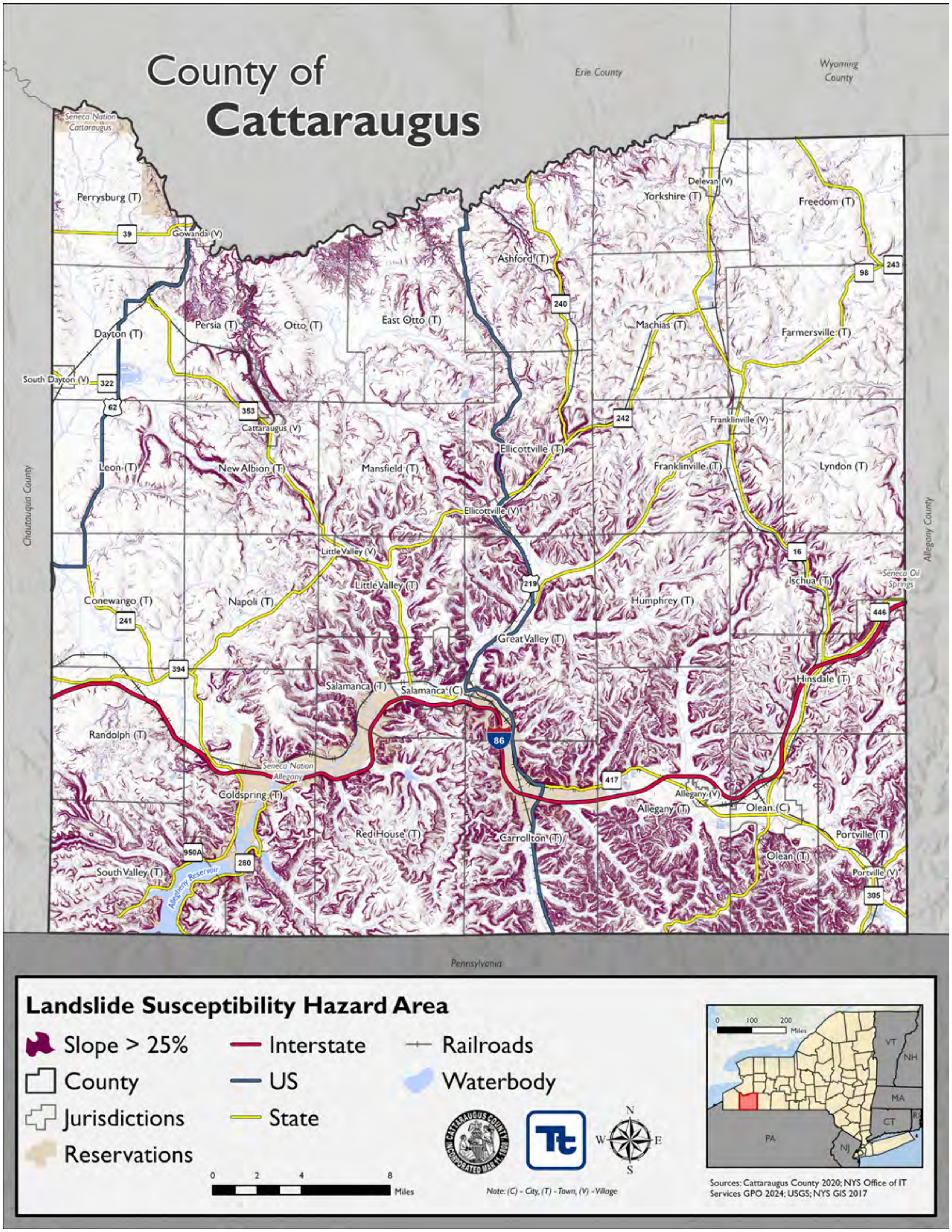
The Village of Cattaraugus noted that three roads in or near the village have dropped and slid. The main business district of the Village is situated on a steep slope. Threats of a landslide from the nearby hill are a concern, with Leavenworth and Waverly Streets being especially vulnerable and requiring high maintenance. About a dozen homes are at risk from potential slides in the Village.

There are 2,142 persons in Cattaraugus County that live in landslide susceptibility areas and 1,488 buildings located in landslide susceptibility areas. Figure 8-2 shows the landslide incidence and susceptibility in Cattaraugus County based on terrain slopes and soil type throughout the County.

Figure 8-1. National Risk Index, Landslide Risk Index

Source: FEMA 2019

Figure 8-2. Landslide Incidence and Susceptibility in Cattaraugus County



8.1.3 Extent

The extent of a landslide hazard is determined by identifying the affected areas and assessing the probability of a landslide occurring within a time period. Natural variables that contribute to the overall extent of potential landslide activity in any particular area include soil properties, topographic position and slope, and historical incidence. Predicting a landslide is difficult, even under ideal conditions. As a result, the landslide hazard is often represented by landslide incidence and susceptibility, as defined below.

- 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 (Radbruch-Hall 1982).
- Landslide susceptibility is defined as the probable degree of response of geologic formations to natural or artificial cutting, to loading of slopes, or to unusually high precipitation. It can be assumed that unusually high precipitation or changes in existing conditions can initiate landslide movement in areas where rocks and soils have experienced landslides in the past. Landslide susceptibility 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 used for classifying the incidence of landsliding (Radbruch-Hall 1982).

8.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Between 1954 and 2024, Cattaraugus County was not included in any major disaster (DR) or emergency (EM) declarations for landslide-related events (FEMA 2024).

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in contiguous counties. Between 2018 and 2024, Cattaraugus County was included in three USDA excessive precipitation or rain agricultural disaster declarations, as shown in Table 8-1. These events may contribute to slide events (USDA 2024).

Table 8-1. USDA Declarations for Landslide Events in Cattaraugus County (2018 to 2024)

Event Date	USDA Declaration Number	Description
2018	S4465	Excessive rain, flash flooding, and flooding
2018	S4479	Excessive Precipitation
2019	S4622	Excessive Rain
2019	S4623	Excessive Rain, Flash Flooding and Flooding

Sources: USDA 2024

Previous Events

There are not many recorded events of landslide events occurring in Cattaraugus County. However, this does not mean that landslide events have not and do not occur regularly in the area. There were no landslide events that impacted Cattaraugus County between 2018 and December 2024. For events prior to 2018, refer to the 2020 Cattaraugus County HMP.

8.1.5 Probability of Future Occurrences

As indicated in the New York State HMP, and given the history of landslides in New York State, it is certain that future landslides will occur, but the severity of these landslides cannot be determined. Therefore, the probability of future landslides in New York State is considered high; however, since documentation on landslides in Cattaraugus County is sparse, it is difficult to predict the extent of future landslides in the County.

The frequency of damaging landslides within Cattaraugus County can be classified, relative to other higher risk areas, as low. However, the fact that high landslide susceptibility exists, and landslides have occurred in the past suggests that the certain parts of the County's infrastructure, as well as people, are at risk from damaging landslide hazards in in the County.

The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. In Chapter 14, the identified hazards of concern for Cattaraugus County were ranked. While the County does not have well documented landslide occurrences, they do experience landslide creeps that are not well documented due to the slow nature of the gradual slide, therefore, the County is at risk for future slide occurrences. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Steering Committee, the probability of occurrence for landslide in the County is considered "occasional."

Climate Change Projections

Climate change affects the State of New York's residents and resources. 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 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. Annual average precipitation is projected to decrease in the low estimate but increase in the middle range and high estimate 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 Cattaraugus County and the southern tier region, temperatures are estimated to increase by 3.6ºF to 7.4ºF by the 2050s, 5ºF to 12.2ºF by the 2080s, and 5.5ºF to 14.1ºF by 2100, relative to the 1981–2010 base period. Precipitation totals are estimated increase by 0 to 12 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).

Recent studies show that climate change is impacting slow-moving landslides, which is where the land creeps downhill just inches to feet in a single year. A NASA study shows that landslides in wet and dry regions showed similar sensitivity to extreme precipitation events, moving on average faster and farther downhill during rainy periods compared to drought years. These slides have the ability to damage infrastructure over time and is directly related to the frequency and intensity of precipitation events (NASA 2022).

Climate change may impact storm patterns, increasing 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 for landslide occurrences.

8.1.6 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. 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 its bank.

8.2 VULNERABILITY AND IMPACT ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For this analysis, the hazard area is defined as the moderate susceptibility and moderate incidence landslide zones.

8.2.1 Life, Health, and Safety

Generally, a landslide or subsidence event is an isolated incidence, impacting the populations within the immediate area. Specifically, the population located downslope of the landslide hazard areas are vulnerable. In addition to causing damages to residential buildings and displacing residents, landslides and subsidence events can block or damage major roadways and inhibit travel for emergency responders or populations trying to evacuate the area.

Overall Population

To estimate the population located within the landslide hazard areas, the approximate hazard area boundaries were overlaid upon the 2022 5-Year American Community Survey. The Census blocks having their center (centroid) within the boundary of the landslide incidence hazard areas were used to calculate the estimated population considered exposed to this hazard. In total, 2,142 (2.8 percent) of the County's population is exposed to the landslide susceptibility hazard area. Table 8-2 displays the population in each municipality that is located in the landslide susceptibility area.

Table 8-2. Estimated Population Exposed to Landslides in Cattaraugus County

Jurisdiction	Total Population (American Community Survey 2022)	Population in Landslide Susceptibility Areas (Slope Degrees >25%)	
		Number of Persons	% of Jurisdiction Total
Allegany (T)	5,949	193	3.2%
Allegany (V)	1,544	12	0.8%
Ashford (T)	1,961	75	3.8%
Carrollton (T)	1,207	65	5.4%
Cattaraugus (V)	960	64	6.7%

Jurisdiction	Total Population (American Community Survey 2022)	Population in Landslide Susceptibility Areas (Slope Degrees >25%)	
		Number of Persons	% of Jurisdiction Total
Coldspring (T)	658	17	2.6%
Conewango (T)	1,785	19	1.1%
Dayton (T)	1,149	21	1.8%
Delevan (V)	1,043	11	1.1%
East Otto (T)	974	59	6.1%
Ellicottville (T)	1,059	127	12.0%
Ellicottville (V)	256	12	4.7%
Farmersville (T)	1,073	29	2.7%
Franklinville (T)	1,150	37	3.2%
Franklinville (V)	1,652	2	0.1%
Freedom (T)	2,261	37	1.6%
Gowanda (V)	1,834	17	0.9%
Great Valley (T)	1,991	78	3.9%
Hinsdale (T)	2,113	144	6.8%
Humphrey (T)	703	49	7.0%
Ischua (T)	736	46	6.3%
Leon (T)	1,244	32	2.6%
Little Valley (T)	617	30	4.9%
Little Valley (V)	1,058	19	1.8%
Lyndon (T)	685	21	3.1%
Machias (T)	2,310	106	4.6%
Mansfield (T)	843	48	5.7%
Napoli (T)	1,171	51	4.4%
New Albion (T)	1,021	46	4.5%
Olean (C)	13,937	119	0.9%
Olean (T)	1,881	64	3.4%
Otto (T)	777	27	3.5%
Perrysburg (T)	1,518	30	2.0%
Persia (T)	596	23	3.9%
Portville (T)	2,612	110	4.2%
Portville (V)	892	7	0.8%
Randolph (T)	2,469	56	2.3%
Red House (T)	27	0	0.0%
Salamanca (C)	5,929	107	1.8%
Salamanca (T)	470	15	3.2%
South Dayton (V)	541	2	0.4%
South Valley (T)	250	25	10.0%
Yorkshire (T)	2,784	90	3.2%
Cattaraugus County	**75,690**	**2,142**	**2.8%**

Source: Cattaraugus County 2024; U.S. Census Bureau, 5-Year American Community Survey 2022; NYS GIS 2017
Note: % = Percent
Note: Values are Rounded Down

Socially Vulnerable Population

Research has also shown that some populations, while they may not have more hazard exposure, may experience exacerbated impacts and prolonged recovery if/when impacted. For example, persons over the age of 65 and people below the poverty level are most vulnerable to geological hazards because of the potential limited access to mobilization or medical resources if a landslide or subsidence event occurs.

As shown in Table 8-3, the Town of Ellicottville has the highest population percentage located in the landslide susceptibility area for populations over 65 (12 percent), under 5 (7 percent), disabled (11.7 percent), and the largest number individuals living in poverty (11.8 percent). The Village of Cattaraugus has the highest population percentage located in the landslide susceptibility area for non-English speaking individuals (6.5 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.

According to 2022 Point-in-Time-Data from ALICE, 29 percent of the 32,016 households in Cattaraugus County are ALICE households (compared to the state average of 31 percent). The median household income in Cattaraugus County is $50,508, and the County sees a labor force participation rate of 56 percent. Cattaraugus County faces a lower-than-average household income compared to the state average of $79,557 and suffers from a higher-than-average poverty rate at 19 percent (compared to the state average of 15 percent). See Table 8-4 for ALICE data by jurisdiction.

Table 8-3. Cattaraugus County Socially Vulnerable Populations Impacted by Landslide Susceptibility

Estimated Number of Vulnerable Persons Located in Landslide Susceptibility Areas (Slope Degrees >25%)										
Jurisdiction	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Allegany (T)	38	3.2%	6	2.8%	0	0.0%	21	3.1%	20	3.1%
Allegany (V)	3	0.7%	0	0.0%	0	0.0%	1	0.5%	2	0.6%
Ashford (T)	17	3.6%	2	2.6%	0	0.0%	14	3.8%	4	3.7%
Carrollton (T)	14	5.2%	3	5.3%	0	0.0%	10	5.1%	8	5.3%
Cattaraugus (V)	11	6.6%	3	6.1%	2	6.5%	12	6.4%	12	6.6%
Coldspring (T)	2	2.0%	0	0.0%	0	0.0%	3	2.3%	2	2.4%
Conewango (T)	2	0.9%	3	0.9%	0	0.0%	1	0.6%	9	1.0%
Dayton (T)	6	1.8%	0	0.0%	0	0.0%	3	1.6%	2	1.4%
Delevan (V)	2	0.9%	0	0.0%	0	0.0%	2	0.7%	2	0.9%
East Otto (T)	8	5.6%	2	4.3%	0	0.0%	8	5.5%	6	6.1%
Ellicottville (T)	42	12.0%	1	7.1%	0	0.0%	9	11.7%	15	11.8%
Ellicottville (V)	5	4.3%	2	5.0%	0	0.0%	1	2.6%	0	0.0%
Farmersville (T)	8	2.5%	3	2.6%	0	0.0%	6	2.8%	7	2.5%
Franklinville (T)	10	3.2%	0	0.0%	0	0.0%	4	3.0%	2	2.4%
Franklinville (V)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Freedom (T)	6	1.5%	1	0.8%	0	0.0%	4	1.3%	4	1.6%
Gowanda (V)	3	0.9%	2	0.8%	0	0.0%	3	0.7%	2	0.9%
Great Valley (T)	16	3.8%	3	3.8%	0	0.0%	10	3.6%	2	3.6%
Hinsdale (T)	30	6.7%	9	6.5%	0	0.0%	33	6.7%	21	6.8%
Humphrey (T)	5	6.4%	0	0.0%	0	0.0%	4	6.7%	7	6.7%
Ischua (T)	13	6.0%	0	0.0%	0	0.0%	10	6.2%	9	5.8%
Leon (T)	3	2.2%	4	2.3%	1	2.0%	5	2.6%	5	2.6%
Little Valley (T)	7	4.9%	0	0.0%	0	0.0%	12	4.7%	1	2.7%
Little Valley (V)	3	1.8%	0	0.0%	0	0.0%	3	1.5%	5	1.7%
Lyndon (T)	4	2.6%	0	0.0%	0	0.0%	3	2.4%	3	2.5%

Estimated Number of Vulnerable Persons Located in Landslide Susceptibility Areas (Slope Degrees >25%)										
Jurisdiction	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Machias (T)	26	4.6%	3	3.9%	0	0.0%	16	4.6%	18	4.6%
Mansfield (T)	7	5.5%	2	5.7%	0	0.0%	4	5.0%	2	5.6%
Napoli (T)	10	4.1%	5	3.9%	0	0.0%	8	4.2%	7	4.1%
New Albion (T)	7	4.4%	2	3.1%	1	3.2%	4	4.5%	4	3.7%
Olean (C)	21	0.9%	7	0.8%	0	0.0%	21	0.8%	28	0.9%
Olean (T)	16	3.3%	1	1.8%	0	0.0%	10	3.1%	8	3.1%
Otto (T)	8	3.5%	0	0.0%	0	0.0%	5	3.1%	1	2.0%
Perrysburg (T)	9	1.8%	0	0.0%	0	0.0%	8	1.9%	6	1.9%
Persia (T)	5	3.5%	2	3.0%	0	0.0%	3	3.0%	2	3.0%
Portville (T)	27	4.1%	5	3.7%	0	0.0%	11	4.1%	10	4.2%
Portville (V)	1	0.6%	0	0.0%	0	0.0%	1	0.6%	0	0.0%
Randolph (T)	10	2.1%	1	1.2%	0	0.0%	6	2.0%	5	2.3%
Red House (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Salamanca (C)	16	1.7%	6	1.6%	1	1.8%	19	1.7%	27	1.8%
Salamanca (T)	4	3.1%	0	0.0%	0	0.0%	2	2.7%	2	2.4%
South Dayton (V)	1	0.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
South Valley (T)	11	9.6%	1	5.6%	0	0.0%	5	9.1%	7	9.0%
Yorkshire (T)	17	3.2%	5	3.2%	0	0.0%	18	3.1%	19	3.1%
Cattaraugus County	**454**	**2.9%**	**84**	**2.0%**	**5**	**1.3%**	**323**	**2.6%**	**296**	**2.3%**

Source: Cattaraugus County 2024; U.S. Census Bureau, 5-Year American Community Survey 2022; NYS GIS 2017

Note: % = Percent

Note: Values are Rounded Down

Table 8-4. Cattaraugus County ALICE Data

Name	Total Households	% Below ALICE Threshold
Allegany (T)	2,676	39
Allegany (V)	-	-
Ashford (T)	879	30
Carrollton (T)	527	44
Cattaraugus (V)	-	-
Coldspring (T)	286	44
Conewango (T)	561	55
Dayton (T)	691	39
Delevan (V)	-	-
East Otto (T)	451	36
Ellicottville (T)	586	41
Ellicottville (V)	-	-
Farmersville (T)	480	61
Franklinville (T)	1,129	42
Franklinville (V)	-	-
Freedom (T)	939	32
Gowanda (V)	-	-
Great Valley (T)	806	40
Hinsdale (T)	939	46
Humphrey (T)	296	25
Ischua (T)	310	45
Leon (T)	354	33
Little Valley (T)	671	43
Little Valley (V)	-	-
Lyndon (T)	303	41
Machias (T)	925	44
Mansfield (T)	287	36
Napoli (T)	493	36
New Albion (T)	847	39
Olean (C)	6,142	54
Olean (T)	898	33
Otto (T)	353	40
Perrysburg (T)	694	38
Persia (T)	930	44
Portville (T)	1,405	40
Portville (V)	-	-
Randolph (T)	888	37
Red House (T)	-	-

Name	Total Households	% Below ALICE Threshold
Salamanca (C)	2,420	60
Salamanca (T)	244	53
South Dayton (V)	-	-
South Valley (T)	150	45
Yorkshire (T)	1,663	51
Cattaraugus County (Total)	32,016	29

Source: United For ALICE 2024

Note: Totals for the Town of Red House or the Villages of Alleghany, Cattaraugus, Delevan, Ellicottville, Franklinville, Gowanda, Little Valley, Portville, and South Dayton were unavailable.

8.2.2 General Building Stock

In general, the building environment located in the high susceptibility zones and the population, structures, and infrastructure located downslope are vulnerable to this hazard. The Census blocks having their center (centroid) within the boundary of the landslide incidence hazard areas were used to calculate the estimated building stock exposed to this hazard.

The potential damage is the modeled loss that could occur to the exposed inventory measured by the structural and content replacement cost value. There are an estimated 1,488 buildings in landslide susceptible hazard area, representing approximately 3.3 percent of the County's total general building stock inventory replacement cost value. The Town of Ellicottville has the greatest number of its buildings located in the landslide susceptible hazard area (271 buildings or 11.7 percent of its total building stock). Table 8-5 lists the results of the general building stock exposed to this hazard.

Table 8-5. Number of Buildings located in the Landslide Hazard Area

Municipality	Jurisdiction Total Buildings	Buildings in Landslide Susceptibility Areas (Slope Degrees >25%)			
		Number of Buildings		Replacement Cost Value	
		Count	% of Jurisdiction Total	Value	% of Jurisdiction Total
Allegany (T)	2,633	81	3.1%	$134,349,080	7.3%
Allegany (V)	694	5	0.7%	$2,346,473	0.4%
Ashford (T)	1,255	46	3.7%	$69,869,612	7.1%
Carrollton (T)	716	37	5.2%	$11,580,079	2.6%
Cattaraugus (V)	429	27	6.3%	$16,177,197	3.9%
Coldspring (T)	509	12	2.4%	$4,219,643	1.0%
Conewango (T)	1,092	15	1.4%	$11,385,269	0.9%
Dayton (T)	760	14	1.8%	$9,734,044	1.7%
Delevan (V)	398	6	1.5%	$3,479,365	1.2%
East Otto (T)	726	38	5.2%	$160,088,955	17.6%
Ellicottville (T)	2,319	271	11.7%	$157,305,410	12.8%
Ellicottville (V)	594	26	4.4%	$11,469,195	2.2%

Municipality	Jurisdiction Total Buildings	Buildings in Landslide Susceptibility Areas (Slope Degrees >25%)			
		Number of Buildings		Replacement Cost Value	
		Count	% of Jurisdiction Total	Value	% of Jurisdiction Total
Farmersville (T)	773	20	2.6%	$8,271,949	2.5%
Franklinville (T)	1,019	30	2.9%	$11,351,586	2.5%
Franklinville (V)	667	1	0.1%	$379,389	0.1%
Freedom (T)	1,381	22	1.6%	$10,619,799	0.9%
Gowanda (V)	731	8	1.1%	$7,330,559	1.3%
Great Valley (T)	1,563	61	3.9%	$264,486,034	15.8%
Hinsdale (T)	1,265	81	6.4%	$119,975,193	10.4%
Humphrey (T)	567	37	6.5%	$106,556,154	13.8%
Ischua (T)	596	37	6.2%	$200,816,575	21.3%
Leon (T)	895	19	2.1%	$10,897,386	1.3%
Little Valley (T)	496	20	4.0%	$147,438,271	22.0%
Little Valley (V)	469	8	1.7%	$3,094,366	0.7%
Lyndon (T)	668	20	3.0%	$54,102,446	4.4%
Machias (T)	1,593	71	4.5%	$31,573,382	3.1%
Mansfield (T)	869	46	5.3%	$112,831,491	13.3%
Napoli (T)	828	32	3.9%	$153,800,498	14.8%
New Albion (T)	740	33	4.5%	$13,233,315	3.2%
Olean (C)	5,590	44	0.8%	$35,131,739	0.7%
Olean (T)	1,122	37	3.3%	$39,568,065	5.6%
Otto (T)	575	18	3.1%	$6,626,936	2.4%
Perrysburg (T)	945	16	1.7%	$6,712,815	1.1%
Persia (T)	340	12	3.5%	$4,695,325	2.4%
Portville (T)	1,490	59	4.0%	$255,159,925	17.6%
Portville (V)	390	3	0.8%	$923,829	0.3%
Randolph (T)	1,232	29	2.4%	$14,778,780	1.7%
Red House (T)	328	1	0.3%	$790,518	0.6%
Salamanca (C)	2,320	39	1.7%	$17,784,796	0.5%
Salamanca (T)	331	11	3.3%	$51,390,407	26.6%
South Dayton (V)	264	1	0.4%	$519,824	0.3%
South Valley (T)	410	36	8.8%	$58,753,182	9.7%
Yorkshire (T)	1,985	58	2.9%	$226,304,081	8.3%
Cattaraugus County (Total)	44,567	1,488	3.3%	$2,567,902,936	6.3%

Source: Cattaraugus County 2024; RS Means 2024; NYS GIS 2017
Note: % = Percent

There are an estimated 1,403 residential buildings, 21 commercial buildings, four industrial buildings and 50 other building types that are located in landslide susceptible hazard areas. The Town of Ellicottville has the greatest number of residential (265) and commercial (4) buildings located in the landslide susceptibility hazard area. The

Town of Freedom has the greatest number of industrial (3) buildings in the landslide susceptibility hazard area and the Town of Conewango has the greatest number of other buildings (7) in the landslide susceptibility hazard area. Table 8-6 lists the results of the general building stock exposed to this hazard by general occupancy class.

Table 8-6. Buildings in Landslide Susceptibility Areas by General Occupancy Class

Jurisdiction	Buildings in Landslide Susceptibility Areas (Slope Degrees >25%) by General Occupancy Class			
	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education
Allegany (T)	75	2	0	4
Allegany (V)	5	0	0	0
Ashford (T)	43	3	0	0
Carrollton (T)	36	0	0	1
Cattaraugus (V)	25	2	0	0
Coldspring (T)	12	0	0	0
Conewango (T)	7	1	0	7
Dayton (T)	11	1	0	2
Delevan (V)	4	1	0	1
East Otto (T)	38	0	0	0
Ellicottville (T)	265	4	0	2
Ellicottville (V)	26	0	0	0
Farmersville (T)	19	0	0	1
Franklinville (T)	27	1	0	2
Franklinville (V)	1	0	0	0
Freedom (T)	19	0	3	0
Gowanda (V)	6	2	0	0
Great Valley (T)	56	1	0	4
Hinsdale (T)	80	0	0	1
Humphrey (T)	37	0	0	0
Ischua (T)	37	0	0	0
Leon (T)	13	0	0	6
Little Valley (T)	20	0	0	0
Little Valley (V)	7	1	0	0
Lyndon (T)	19	0	0	1
Machias (T)	64	5	0	2
Mansfield (T)	44	2	0	0
Napoli (T)	30	0	0	2
New Albion (T)	28	1	0	4
Olean (C)	43	0	0	1
Olean (T)	35	0	1	1
Otto (T)	17	0	0	1
Perrysburg (T)	16	0	0	0
Persia (T)	11	0	0	1
Portville (T)	58	1	0	0

Jurisdiction	Buildings in Landslide Susceptibility Areas (Slope Degrees >25%) by General Occupancy Class			
	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education
Portville (V)	3	0	0	0
Randolph (T)	23	0	0	6
Red House (T)	0	1	0	0
Salamanca (C)	38	1	0	0
Salamanca (T)	10	1	0	0
South Dayton (V)	1	0	0	0
South Valley (T)	36	0	0	0
Yorkshire (T)	58	0	0	0
Cattaraugus County	**1,403**	**31**	**4**	**50**

Source: Cattaraugus County 2024; NYS GIS 2017

8.2.3 Community Lifelines and Other Critical Facilities

In addition to critical facilities, a significant amount of infrastructure can be exposed to mass movements of geological material (USGS 2023):

- *Roads*—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, causing isolation for neighborhoods, traffic problems, and delays for public and private transportation. This can result in economic losses for businesses.
- *Bridges*—Landslides can significantly impact road bridges. Mass movements can knock out bridge abutments or significantly weaken the soil supporting them, making them hazardous for use.
- *Power Lines*—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 ripping down the lines.
- *Rail Lines*—Similar to roads, rail lines are important for response and recovery operations after a disaster. Landslides can block travel along the rail lines, which would become especially troublesome, because it would not be as easy to detour a rail line as it is on a local road or highway.

To estimate exposure, the approximate landslide hazard areas were overlaid upon the critical facilities. Table 8-7 shows the critical facilities that are located in the landslide susceptibility hazard areas. In total, 116 critical facilities are located in the landslide susceptibility area, which makes up 9.8 percent of the County's critical facilities.

Table 8-7. Number of Critical Lifelines Located in the Landslide Susceptibility Hazard Area

Jurisdiction	Number of Facilities in Landslide Susceptibility Areas (Slope Degrees >25%), 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	Count	% of Jurisdiction Total
Allegany (T)	0	0	0	2	0	0	0	0	0	2	3.5%
Allegany (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Ashford (T)	0	0	0	0	0	2	3	0	1	6	14.3%
Carrollton (T)	0	0	0	4	0	0	3	1	0	8	18.6%
Cattaraugus (V)	0	0	0	0	0	0	1	0	0	1	4.8%
Coldspring (T)	0	0	0	0	0	1	0	0	0	1	5.6%
Conewango (T)	0	0	0	0	0	2	3	0	0	5	18.5%
Dayton (T)	0	0	0	0	0	0	0	0	1	1	4.2%
Delevan (V)	0	0	0	0	0	0	1	0	0	1	5.6%
East Otto (T)	0	0	0	0	0	0	5	0	0	5	18.5%
Ellicottville (T)	0	1	0	0	0	1	2	0	0	4	16.0%
Ellicottville (V)	0	0	0	0	0	0	1	0	0	1	5.9%
Farmersville (T)	0	0	0	0	0	2	1	0	0	3	15.0%
Franklinville (T)	0	0	0	0	0	1	2	0	0	3	13.6%
Franklinville (V)	0	0	0	1	0	0	0	0	0	1	3.6%
Freedom (T)	0	0	0	1	0	1	7	0	0	9	24.3%
Gowanda (V)	0	1	0	0	0	0	0	1	0	2	7.1%
Great Valley (T)	0	0	0	0	0	1	4	1	0	6	20.7%
Hinsdale (T)	0	1	0	0	1	0	2	1	0	5	12.8%
Humphrey (T)	0	0	0	0	0	0	2	0	0	2	12.5%
Ischua (T)	0	0	0	0	0	2	2	0	0	4	22.2%
Leon (T)	0	0	0	0	0	1	7	0	0	8	25.0%
Little Valley (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Little Valley (V)	0	0	0	0	0	1	1	1	0	3	11.1%

Jurisdiction	Number of Facilities in Landslide Susceptibility Areas (Slope Degrees >25%), 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	Count	% of Jurisdiction Total
Lyndon (T)	0	0	0	0	0	1	0	0	0	1	8.3%
Machias (T)	0	0	0	0	0	2	1	0	0	3	10.0%
Mansfield (T)	0	0	0	0	0	0	3	0	0	3	15.8%
Napoli (T)	0	0	0	0	0	0	1	0	0	1	7.1%
New Albion (T)	0	0	0	0	0	1	1	1	0	3	13.0%
Olean (C)	0	0	0	1	0	0	0	1	0	2	1.7%
Olean (T)	0	3	0	0	0	0	2	0	0	5	15.2%
Otto (T)	0	0	0	0	1	0	2	0	1	4	22.2%
Perrysburg (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Persia (T)	0	0	0	0	0	1	0	0	0	1	16.7%
Portville (T)	0	0	0	0	0	0	2	0	0	2	9.1%
Portville (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Randolph (T)	0	0	0	0	0	2	0	0	0	2	4.1%
Red House (T)	0	0	0	0	0	2	2	0	0	4	40.0%
Salamanca (C)	0	0	0	0	0	0	0	0	0	0	0.0%
Salamanca (T)	0	0	0	0	0	0	0	0	0	0	0.0%
South Dayton (V)	0	0	0	0	0	0	1	0	0	1	5.0%
South Valley (T)	0	0	0	0	0	0	1	0	0	1	11.1%
Yorkshire (T)	0	0	0	0	0	1	0	0	1	2	5.6%
Cattaraugus County	**0**	**6**	**0**	**9**	**2**	**25**	**63**	**7**	**4**	**116**	**9.8%**

Source: Cattaraugus County 2024; NYS GIS 2017
Note: % = Percent

8.2.4 Economy

The impact of a landslide on the economy and estimated dollar losses are difficult to measure. As stated earlier, 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 (USGS 2016). Estimated potential damage to general building stock can be quantified as discussed above.

8.2.5 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 runoff will accumulate downslope, potentially blocking waterways and roadways and impacting quality of streams and other water bodies. Additional environmental impacts include loss of forest productivity.

Furthermore, soil and sediment runoff can accumulate downslope potentially blocking waterways and roadways and impacting quality of streams and other 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.

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 especially following seismic activity.

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 especially following seismic activity.

8.3 FUTURE CHANGES THAT MAY AFFECT RISK

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The following sections examine potential conditions that may affect hazard vulnerability.

8.3.1 Potential or Planned Development

As discussed in Chapter 3 (County Profile), areas targeted for future growth and development have been identified across the County. Any areas of growth located in areas with moderate landslide incidence or susceptibility could be potentially impacted by the landslide hazard. Please refer to the specific areas of development indicated in tabular form and/or on the hazard maps included in the jurisdictional annexes in Volume II of this plan.

8.3.2 Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 4 percent since 2010. Population projections from Cornell University reveal the County's population is anticipated to continue decreasing. The population is projected to decline to 73,254 persons in 2030 and to 70,468 by 2040 (Cornell University 2018). Even though the population has decreased over the past decade, any changes in the density of population can impact the number of persons exposed to geological hazard areas. Changes in density can not only create issues for local residents during evacuation of a landslide event but can also have an effect on commuters that travel into and out of the County for work, particularly during a landslide event that breaches major transportation corridors, which are also major commuter roads.

8.3.3 Climate Change

Climate is defined not simply as average temperature and precipitation, but also by 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 extremes such as severe storms, including those that may bring intense and prolonged precipitation (EPA 2013). An increase in rainfall intensity and duration will saturate the soil and potentially erode the local landscape and impact slope stability. This may lead to an increase of landslide events in Cattaraugus County.

While predicting changes in events under a varying climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating future climate change impacts on human health, society, and the environment (EPA 2013). The potential effects of climate change on Cattaraugus County's vulnerability to landslide events shall need to be considered as a greater understanding of regional climate change impacts develop.

8.3.4 Change of Vulnerability Since 2020 Cattaraugus County HMP

For this HMP, 2017 slope data from the New York State Office of Information Technology Services (NYSOIT) were referenced to determine areas within Cattaraugus County that have slope degrees greater than 25 percent. Population statistics have also been updated using the 2020 Census and 5-year 2018–2022 American Community Survey Population Estimates. The general building stock was updated using RS Means 2024 building valuations that estimated replacement cost value for each building in the inventory.

Overall, this vulnerability assessment uses a more accurate and updated building inventory than that used in the 2020 Cattaraugus County HMP. This information provides more accurate exposure, and potential loss estimates for Cattaraugus County.

9. PANDEMIC

9.1 HAZARD PROFILE

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

9.1.1 Hazard Description

A pandemic is a global outbreak of disease that occurs when a new virus emerges in the human population, spreading easily in a sustained manner, and causing serious illness. An epidemic describes a smaller scale infectious outbreak, within a region or population, that emerges at a disproportional rate. Infectious disease outbreaks may be widely dispersed geographically, impact large numbers of the population, and could arrive in waves lasting several months at a time (Columbia University 2021).

Most pandemics occur due to respiratory viruses. A respiratory virus with pandemic potential is a highly contagious respiratory virus that spreads easily from person to person and for which there is little human immunity. This hazard includes pandemic influenza and the novel coronavirus. This hazard strains the healthcare system, requires school closures, causes high rates of illness and absenteeism that undermine critical infrastructure across the County, and decreases community trust due to social distancing measures interfering with personal movement and being perceived as being ineffectual. Previous events that exemplify this hazard include the 2019 novel coronavirus (COVID-19) pandemic, 1918 (Spanish flu) and 2009 (Swine flu) influenza pandemics and the 2003 SARS outbreak, which had pandemic potential.

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

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

Coronavirus

The novel coronavirus (COVID-19) is an infectious disease first identified in 2019. The virus rapidly spread into a global pandemic by spring of 2020. The novel coronavirus is an infectious disease caused by the SARS-CoV-2 virus. The virus can spread from an infected person's mouth or nose in small liquid particles through coughing, sneezing, speaking, singing, or breathing (WHO 2022). Most people with COVID-19 have mild symptoms, but some people become severely ill and over one million people have died in the United States from COVID-19. The flu is caused by a virus and spread mainly by coughing, sneezing or close contact (NYS DOH 2016). While flu symptoms are typically mild, vulnerable populations, older adults, younger children, pregnant persons, and people with pre-existing conditions are more likely to experience flu-related complications. Seasonal flu epidemics occur yearly, typically beginning at the end of October and continuing through the colder months (NYSDOH 2024).

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

Influenza

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

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

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

West Nile Virus

West Nile Virus (WNV) is the leading cause of mosquito-borne disease in the United States. It is most commonly spread to people who are bitten by an infected mosquito. WNV is usually diagnosed during mosquito season, starting in the summer months and continuing through the fall (CDC 2024). WNV was first found in the State of New York in 1999. Since 2000, 492 human cases and 37 deaths of WNV have been reported statewide (the data range is 2000-2023) (CDC 2023). When WNV progresses to severe infection it is called West Nile encephalitis or meningitis, which can include headache, high fever, neck stiffness, muscle weakness, stupor, disorientation, tremors, seizures, paralysis, and coma. WNV can cause serious illness, and in some cases, death. Usually, symptoms occur from 3 to 14 days after being bitten by an infected mosquito (NYS DOH 2017).

Lyme Disease

Lyme disease is the most common vector-borne disease (vectors are mosquitoes, ticks, and fleas that spread pathogens) in the United States. This disease is caused when an individual is bitten by a tick carrying a specific bacterium (either *Borrelia burgdorferi* and rarely, *Borrelia mayoni*). Typical symptoms include fever, headache, fatigue, and skin rash. If left untreated, symptoms can be severe. Most cases of Lyme disease can be treated successfully with a few weeks of antibiotics. Steps to prevent Lyme disease include using insect repellent, removing ticks promptly, applying pesticides, and reducing tick habitat (CDC 2022). In the State of New York, the commonly infected tick is the deer tick. Immature ticks become infected by feeding on infected white-footed mice and other small mammals. Deer ticks can also spread other tick-borne diseases. Anyone who is bitten by a tick carrying the bacteria can become infected (NYS DOH 2019).

9.1.2 Location

Diseases that can infect humans are variable in their nature and methods of transmission. The transmission rates of respiratory disease are often higher in more densely populated areas while the transmission rates of insect-borne disease are often higher in less densely populated areas that provide more habitat for insects. Ultimately, residents need to be vigilant about diseases altogether to better understand and respond to disease outbreaks.

Factors such as population density, visitation, and the length of time the public spends in a location all contribute to the spread of infectious diseases. Indoor areas where people are in close contact with each other appear to be significant locations for diseases that are spread through respiratory droplets, such as coronavirus and influenza.

Infectious diseases spread by insects may be subject to other types of location hazards. For example, the prevalence of standing water can provide breeding grounds for mosquitoes, and wooded areas are favored by the ticks that spread Lyme disease. Cattaraugus County has large areas that have potential to breed mosquitoes. The presence of disease-carrying mosquitoes and ticks has been reported throughout most of New York State and Cattaraugus County. These areas include farmland, private yards, stormwater facilities, and sewer plants. These areas need to be addressed as best as possible to control mosquitoes and the viruses they can spread.

9.1.3 Extent

The extent of a pandemic depends upon the preferred habitat of the species that spreads the disease, as well as the species' ease of movement and establishment. The magnitude of pandemic species ranges from nuisance to widespread. The exact size and extent of an infected population depends on how easily the illness is spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in more densely populated areas. The transmission rate of infectious diseases will depend on the mode of transmission of a given illness. The threat is typically intensified when the ecosystem or host species is already stressed, such as during periods of drought. The already weakened state of the ecosystem causes it to more easily be impacted by an infestation. The severity and length of the next pandemic cannot be predicted; however, experts anticipate that its effect on the United States could be severe.

The CDC and public health officials use the Pandemic Severity Assessment Framework (PSAF) to determine the impact of the pandemic, or how "bad" the pandemic will be; the PSAF replaced the Pandemic Severity Index (PSI) in 2014. There are two main factors that can be used to determine the impact of a pandemic. The first is clinical severity, or how serious is the illness associated with infection. The second factor is transmissibility, or how easily the pandemic virus spreads from person-to-person. These two factors combined are used to guide decisions about which actions CDC recommends at a given time during the pandemic. The results help public health officials and health care professionals make timely and informed decisions, and to take appropriate actions (CDC 2016).

In 1999, The World Health Organization (WHO) has identified the six phases of global pandemic (WHO 2009). Phases 1 to 3 and 5 to 6 have been grouped to include common action points. The WHO pandemic phases are outlined in Table 9-1 below.

The State of New York uses WHO classification system guidance to inform its activities during a pandemic event.

Table 9-1. WHO Global Pandemic Phases

Phase	Description
Preparedness and Response– Global, Regional, National, Sub-National Level	
Phase 1	No animal influenza virus circulating among animals has been reported to cause infection in humans.
Phase 2	An animal influenza virus circulating in domesticated or wild animals is known to have caused infection in humans and is therefore considered a potential pandemic threat.
Phase 3	An animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks.
Containment	

Phase 4	Human-to-human transmission (H2H) of an animal or human-animal influenza reassortant virus able to sustain community-level outbreaks has been verified.
Response – Global Level	
Phase 5	The same identified virus has caused sustained community-level outbreaks in two or more countries in one WHO region.
Phase 6	In addition to the criteria defined in Phase 5, the same virus has caused sustained community-level outbreaks in at least one other country in another WHO region.
Post-Pandemic	
Post-Peak Period	Levels of pandemic influenza in most countries with adequate surveillance have dropped below peak levels.
Possible New Wave	Level of pandemic influenza activity in most countries with adequate surveillance rising again.
Post-Pandemic Period	Levels of influenza activity have returned to the levels seen for seasonal influenza in most countries with adequate surveillance

Source: WHO 2009

9.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Between 1954 and 2024, Cattaraugus County was included in three major disaster (DR) or emergency (EM) declarations for pandemic-related events (FEMA 2024). Table 9-2 lists these declarations.

Table 9-2. FEMA Declarations for Pandemic Events in Cattaraugus County (1954 to 2024)

Event Date	Declaration Date	Declaration Number	Description
May 22, 2000 – November 1, 2000	October 11, 2000	EM-3155-NY	Outbreak of WNV
January 20, 2020 – May 11, 2023	March 13, 2020	EM-3434-NY	COVID-19 Pandemic
January 20, 2020 – May 11, 2023	March 20, 2020	DR-4480-NY	COVID-19 Pandemic

Source: FEMA 2024

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in contiguous counties. Between 2018 and 2024, Cattaraugus County was not included in any pandemic-related agricultural disaster declarations (USDA 2024).

Previous Events

Known hazard events that impacted Cattaraugus County between 2018 through 2024 are discussed in Table 9-3. For events prior to 2018, refer to the 2020 Cattaraugus County HMP.

Table 9-3. Pandemic Events in Cattaraugus County (2018 to 2024)

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
Flu Season 2018–2019	N/A	N/A	Countywide	401 cases of Influenza A and 12 cases of Influenza B confirmed in Cattaraugus County.
2018	N/A	N/A	Countywide	1 confirmed case of West Nile Virus in Cattaraugus County
2018	N/A	N/A	Countywide	17 confirmed cases of Lyme Disease in Cattaraugus County
Flu Season 2019–2020	N/A	N/A	Countywide	282 cases of Influenza A and 235 cases of Influenza B confirmed in Cattaraugus County.
2019	N/A	N/A	Countywide	0 confirmed cases of West Nile Virus in Cattaraugus County
2019	N/A	N/A	Countywide	51 confirmed cases of Lyme Disease in Cattaraugus County
Flu Season 2020–2021	N/A	N/A	Countywide	9 cases of Influenza A and 8 cases of Influenza B confirmed in Cattaraugus County.
2020	DR-4480-NY, EM-3434-NY	Yes	Countywide	Cattaraugus County has reported 2,712 positive cases of COVID-19 and 44 deaths.
2020	N/A	N/A	Countywide	0 confirmed cases of West Nile Virus in Cattaraugus County
2020	N/A	N/A	Countywide	14 confirmed cases of Lyme Disease in Cattaraugus County
Flu Season 2021–2022	N/A	N/A	Countywide	567 cases of Influenza A and 18 cases of Influenza B confirmed in Cattaraugus County.
2021	DR-4480-NY, EM-3434-NY	Yes	Countywide	Cattaraugus County has reported 9,145 positive cases of COVID-19 and 145 deaths.
2021	N/A	N/A	Countywide	0 confirmed cases of West Nile Virus in Cattaraugus County
2021	N/A	N/A	Countywide	30 confirmed cases of Lyme Disease in Cattaraugus County
Flu Season 2022–2023	N/A	N/A	Countywide	2,960 cases of Influenza A and 86 cases of Influenza B confirmed in Cattaraugus County.
2022	DR-4480-NY, EM-3434-NY	Yes	Countywide	Cattaraugus County has reported 8,252 positive cases of COVID-19 and 55 deaths.
2022	N/A	N/A	Countywide	0 confirmed cases of West Nile Virus in Cattaraugus County
2022	N/A	N/A	Countywide	114 confirmed cases of Lyme Disease in Cattaraugus County
Flu Season 2023–2024	N/A	N/A	Countywide	499 cases of Influenza A and 167 cases of Influenza B confirmed in Cattaraugus County.

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
2023	DR-4480-NY, EM-3434-NY	Yes	Countywide	Cattaraugus County has reported 1,962 positive cases of COVID-19 and 343 deaths.
2023	N/A	N/A	Countywide	0 confirmed cases of West Nile Virus in Cattaraugus County

Sources: NYSDOH 2024; CDC 2024; NYSDOH 2024; CDC 2022; NYSDOH 2024
Note: COVID deaths were calculated by county of residence, not place of death
Lyme Disease totals for 2023 were unavailable

9.1.5 Probability of Future Occurrences

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

In Cattaraugus County, the probability for a future pandemic event is dependent on several factors. One factor that influences the spread of disease is population density. Populations that live close to one another are more likely to spread diseases. As population density increases in the County, the probability of a pandemic event occurring will also increase. When there is a significant change in a circulating strain of a virus, more of the population is susceptible and the strain could rapidly spread from person to person.

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

The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Steering Committee, the probability of occurrence for pandemic in the County is considered "occasional."

Climate Change Projections

Climate change affects the State of New York's residents and resources. 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 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. Annual average precipitation is projected to decrease in the low estimate but increase in the middle range and high estimate 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 Cattaraugus County, and the southern tier region, temperatures are estimated to increase by 3.6ºF to 7.4ºF by the 2050s, 5ºF to 12.2ºF by the 2080s, and 5.5ºF to 14.1ºF by 2100, relative to the 1981–2010 base period. Precipitation totals are estimated increase by 0 to 12 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).

Some scientists anticipate an increase in WNV and other mosquito-borne diseases due to changing climate conditions creating suitable habitats for disease carriers (CDC 2013). Warmer temperatures and changing rainfall patterns provide an environment where mosquitos can remain active longer, greatly increasing the risk for animals and humans. Lyme disease could also expand throughout the United States as temperatures warm, allowing ticks to move into new areas of the country. The climate changes can also allow tropical and subtropical insects to move from regions where diseases thrive into new places (NRDC 2015). An increase in temperature and humidity may also lead to a larger number of influenza outbreaks, as studies have shown that warmer winters led to an increase in influenza cases (Towers, et al. 2013).

9.1.6 Cascading Impacts on Other Hazards

There are no known cascading impacts that disease outbreaks can cause to other hazards of concern for Cattaraugus County.

9.2 VULNERABILITY AND IMPACT ASSESSMENT

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The following discusses Cattaraugus County’s vulnerability, in a qualitative nature, to pandemics.

9.2.1 Life, Health, and Safety

The entire population of Cattaraugus County (75,690) is vulnerable to the pandemic hazard. Healthcare providers and first responders have an increased risk of exposure due to their frequent contact with infected populations. Areas with a higher population density also have an increased risk of exposure or transmission of disease to the closer proximity of the population to potentially infected people.

Overall Population

Maintaining certain key functions is important to preserve life and decrease societal disruption during disease outbreaks. Heat, clean water, waste disposal, and corpse management all contribute to public health. Ensuring functional transportation systems also protects health by making it possible for people to access medical care and by transporting food and other essential goods. Critical infrastructure groups have a responsibility to maintain public health, provide public safety, transport medical supplies and food, implement a pandemic response, and maintaining societal functions. If these workers were absent due to pandemic outbreak, these systems will fail (Cybersecurity and Infrastructure Security Agency n.d.).

Socially Vulnerable Population

Socially vulnerable populations, including Black, Indigenous, and People of Color (BIPOC) and low-income populations, are particularly vulnerable to impacts from the COVID-19 pandemic and pandemic influenzas. Recent research into COVID-19 cases and deaths demonstrated that "the disease has a disproportionate burden associated with the longstanding social determinants of health, including racial/ethnic and socioeconomic disparities" (Karmakar, Lantz and Tipirneni 2021). Additionally, the same study found that "the racial/ethnic disparities apparent in descriptive statistics are revealing underlying disparities in myriad social factors at the macro and mezzo levels known to be associated with disparities in health outcomes, including structural racism" (Karmakar, Lantz and Tipirneni 2021). For example, historically disadvantaged and low-income communities may live in more crowded housing situations where it is difficult to isolate or socially distance, and lower-income and BIPOC residents are more likely to hold essential or frontline worker positions (Karmakar, Lantz and Tipirneni 2021). Research has also found that low-income populations are less likely to be vaccinated against influenza or COVID-19 infections (Strully and Yang 2022) (CDC 2023).

As shown in Table 9-4, the City of Orleans has the highest population over 65 (2,469), the largest population under 5 (846), the greatest non-English speaking population (54), the highest population of disabled persons (2,539), and the largest number individuals living in poverty (3,266). The Town of Redhouse has the lowest population over 65 (7), the lowest population under 5 (1), the fewest number of disabled persons (2), and the lowest population living in poverty (2). Of the 43 local jurisdictions in the County, 27 have no (0) non-English speaking persons living within the jurisdiction.

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.

According to 2022 Point-in-Time-Data from ALICE, 29 percent of the 32,016 households in Cattaraugus County are ALICE households (compared to the state average of 31 percent). The median household income in Cattaraugus County is $50,508, and the County sees a labor force participation rate of 56 percent. Cattaraugus County faces a lower-than-average household income compared to the state average of $79,557 and suffers from a higher-than-average poverty rate at 19 percent (compared to the state average of 15 percent). See Table 9-5 for ALICE data by jurisdiction.

Table 9-4. Cattaraugus County Socially Vulnerable Populations by Municipality

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	American Community Survey 5-year Population Estimates (2022)									
			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
Allegany (T)	5,949	7.9%	1,183	19.9%	213	3.6%	19	0.3%	667	11.2%	640	10.8%
Allegany (V)	1,544	2.0%	401	26.0%	65	4.2%	19	1.2%	214	13.9%	313	20.3%
Ashford (T)	1,961	2.6%	468	23.9%	78	4.0%	0	0.0%	366	18.7%	107	5.5%
Carrollton (T)	1,207	1.6%	268	22.2%	57	4.7%	7	0.6%	197	16.3%	150	12.4%
Cattaraugus (V)	960	1.3%	167	17.4%	49	5.1%	31	3.2%	188	19.6%	181	18.9%
Coldspring (T)	658	0.9%	102	15.5%	17	2.6%	0	0.0%	130	19.8%	85	12.9%
Conewango (T)	1,785	2.4%	220	12.3%	352	19.7%	31	1.7%	161	9.0%	861	48.2%
Dayton (T)	1,149	1.5%	329	28.6%	46	4.0%	0	0.0%	184	16.0%	144	12.5%
Delevan (V)	1,043	1.4%	234	22.4%	62	5.9%	0	0.0%	269	25.8%	215	20.6%
East Otto (T)	974	1.3%	142	14.6%	46	4.7%	9	0.9%	145	14.9%	99	10.2%
Ellicottville (T)	1,059	1.4%	351	33.1%	14	1.3%	0	0.0%	77	7.3%	127	12.0%
Ellicottville (V)	256	0.3%	117	45.7%	40	15.6%	0	0.0%	39	15.2%	13	5.1%
Farmersville (T)	1,073	1.4%	322	30.0%	116	10.8%	0	0.0%	218	20.3%	277	25.8%
Franklinville (T)	1,150	1.5%	314	27.3%	21	1.8%	26	2.3%	135	11.7%	83	7.2%
Franklinville (V)	1,652	2.2%	273	16.5%	128	7.7%	0	0.0%	304	18.4%	274	16.6%
Freedom (T)	2,261	3.0%	393	17.4%	119	5.3%	0	0.0%	301	13.3%	243	10.7%
Gowanda (V)	1,834	2.4%	337	18.4%	256	14.0%	24	1.3%	409	22.3%	215	11.7%
Great Valley (T)	1,991	2.6%	419	21.0%	78	3.9%	12	0.6%	274	13.8%	56	2.8%
Hinsdale (T)	2,113	2.8%	448	21.2%	139	6.6%	0	0.0%	493	23.3%	308	14.6%
Humphrey (T)	703	0.9%	78	11.1%	8	1.1%	0	0.0%	60	8.5%	105	14.9%
Ischua (T)	736	1.0%	215	29.2%	5	0.7%	0	0.0%	162	22.0%	154	20.9%
Leon (T)	1,244	1.6%	137	11.0%	177	14.2%	50	4.0%	192	15.4%	192	15.4%
Little Valley (T)	617	0.8%	144	23.3%	3	0.5%	0	0.0%	255	41.3%	37	6.0%
Little Valley (V)	1,058	1.4%	171	16.2%	40	3.8%	0	0.0%	195	18.4%	295	27.9%

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	American Community Survey 5-year Population Estimates (2022)									
			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
Lyndon (T)	685	0.9%	156	22.8%	26	3.8%	0	0.0%	124	18.1%	119	17.4%
Machias (T)	2,310	3.1%	566	24.5%	77	3.3%	0	0.0%	348	15.1%	393	17.0%
Mansfield (T)	843	1.1%	127	15.1%	35	4.2%	0	0.0%	80	9.5%	36	4.3%
Napoli (T)	1,171	1.5%	241	20.6%	127	10.8%	0	0.0%	192	16.4%	169	14.4%
New Albion (T)	1,021	1.3%	160	15.7%	64	6.3%	31	3.0%	89	8.7%	108	10.6%
Olean (C)	13,937	18.4%	2,469	17.7%	846	6.1%	54	0.4%	2,539	18.2%	3,266	23.4%
Olean (T)	1,881	2.5%	491	26.1%	55	2.9%	0	0.0%	322	17.1%	262	13.9%
Otto (T)	777	1.0%	230	29.6%	11	1.4%	7	0.9%	159	20.5%	49	6.3%
Perrysburg (T)	1,518	2.0%	498	32.8%	42	2.8%	0	0.0%	430	28.3%	314	20.7%
Persia (T)	596	0.8%	143	24.0%	66	11.1%	9	1.5%	101	16.9%	66	11.1%
Portville (T)	2,612	3.5%	656	25.1%	136	5.2%	0	0.0%	269	10.3%	238	9.1%
Portville (V)	892	1.2%	156	17.5%	15	1.7%	0	0.0%	154	17.3%	86	9.6%
Randolph (T)	2,469	3.3%	476	19.3%	84	3.4%	0	0.0%	294	11.9%	222	9.0%
Red House (T)	27	<0.1%	7	25.9%	1	3.7%	0	0.0%	2	7.4%	2	7.4%
Salamanca (C)	5,929	7.8%	936	15.8%	381	6.4%	57	1.0%	1,092	18.4%	1,492	25.2%
Salamanca (T)	470	0.6%	131	27.9%	9	1.9%	2	0.4%	75	16.0%	84	17.9%
South Dayton (V)	541	0.7%	244	45.1%	20	3.7%	0	0.0%	94	17.4%	166	30.7%
South Valley (T)	250	0.3%	115	46.0%	18	7.2%	0	0.0%	55	22.0%	78	31.2%
Yorkshire (T)	2,784	3.7%	530	19.0%	157	5.6%	0	0.0%	581	20.9%	612	22.0%
Cattaraugus County	**75,690**	**100.0%**	**15,565**	**20.6%**	**4,299**	**5.7%**	**388**	**0.5%**	**12,635**	**16.7%**	**12,936**	**17.1%**

Source: U.S Census Bureau 2020; U.S. Census Bureau ACS 2023

Note: Allegany (V) is 100% within Allegany (T); Cattaraugus (V) is 100% within New Albion (T); Delevan (V) is 100% within Yorkshire (T); Ellicottville (V) is 100% within Ellicottville (T); Franklinville (V) is 100% within Franklinville (T); Little Valley (V) is 100% within Little Valley (T); Portville (V) is 100% within Portville (T); South Dayton (V) is 100% within Dayton (T). Subtracted village totals from town to assign correct town totals.

2.36 persons per household. This number was used to calculate the Non-English-speaking population.

Table 9-5. Cattaraugus County ALICE Data

Name	Total Households	% Below ALICE Threshold
Allegany (T)	2,676	39
Allegany (V)	-	-
Ashford (T)	879	30
Carrollton (T)	527	44
Cattaraugus (V)	-	-
Coldspring (T)	286	44
Conewango (T)	561	55
Dayton (T)	691	39
Delevan (V)	-	-
East Otto (T)	451	36
Ellicottville (T)	586	41
Ellicottville (V)	-	-
Farmersville (T)	480	61
Franklinville (T)	1,129	42
Franklinville (V)	-	-
Freedom (T)	939	32
Gowanda (V)	-	-
Great Valley (T)	806	40
Hinsdale (T)	939	46
Humphrey (T)	296	25
Ischua (T)	310	45
Leon (T)	354	33
Little Valley (T)	671	43
Little Valley (V)	-	-
Lyndon (T)	303	41
Machias (T)	925	44
Mansfield (T)	287	36
Napoli (T)	493	36
New Albion (T)	847	39
Olean (C)	6,142	54
Olean (T)	898	33
Otto (T)	353	40
Perrysburg (T)	694	38
Persia (T)	930	44
Portville (T)	1,405	40
Portville (V)	-	-
Randolph (T)	888	37
Red House (T)	-	-
Salamanca (C)	2,420	60

Name	Total Households	% Below ALICE Threshold
Salamanca (T)	244	53
South Dayton (V)	-	-
South Valley (T)	150	45
Yorkshire (T)	1,663	51
Cattaraugus County	**32,016**	**29**

Source: United For ALICE 2024

Note: Totals for the Town of Red House or the Villages of Alleghany, Cattaraugus, Delevan, Ellicottville, Franklinville, Gowanda, Little Valley, Portville, and South Dayton were unavailable.

9.2.2 General Building Stock

No structures are anticipated to be directly affected by pandemic.

9.2.3 Community Lifelines and Other Critical Facilities

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

9.2.4 Economy

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

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

9.2.5 Natural, Historic, and Cultural Resources

Natural

Pandemics may have an impact on the environment if the outbreaks are caused by invasive species. Invasive species tend to be competitive with native species and their habitat and can be the major transmitters of disease like Zika, dengue, and yellow fever (Placer Mosquito and Vector Control District 2019). Secondary impacts from mitigating pandemics could also have an impact on the environment. Pesticides used to control disease carrying insects like mosquitos have been reviewed by the EPA and the New York Department of Environmental Conservation. If these sprays are applied in large concentrations, they could potentially leach into waterways and harm nearby terrestrial species. As a result, pesticides must be registered before they can be sold, distributed, or used in the state (New York Department of Environmental Conservation 2020).

Historic

Pandemics may limit access to historic resources. As seen during the COVID-19 pandemic, historic monuments, facilities, and sites had imposed restricted access to minimize the spread of the disease. The limitation of access during a pandemic can assist in lowering the rate of contraction.

Cultural

Similar to historic resources, cultural resources may have limited access during a pandemic to minimize the spread of disease.

9.3 FUTURE CHANGES THAT MAY AFFECT RISK

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The following sections examine potential conditions that may affect hazard vulnerability.

9.3.1 Potential or Planned Development

As discussed in Chapter 3 (County Profile), areas targeted for future growth and development have been identified across the County. Any areas of growth could be potentially impacted by the pandemic hazard because the entire planning area is exposed and vulnerable. Additional development of structures in areas with high population density are at an increased risk. Please refer to the specific areas of development indicated in tabular form and/or on the hazard maps included in the jurisdictional annexes in Volume II of this plan.

9.3.2 Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 4 percent since 2010. Population projections from Cornell University reveal the County's population is anticipated to continue decreasing. The population is projected to decline to 73,254 persons in 2030 and to 70,468 by 2040 (Cornell University 2018). Changes in the density of population can impact the number of persons exposed to the pandemic hazard. Refer to Chapter 3 (County Profile), which includes a discussion on population trends for the County.

9.3.3 Climate Change

As discussed earlier in this section, the relationship between climate change and increase in infectious diseases is difficult to predict with certainty. However, there may be linkages between the two. Changes in the environment may create additional habitat for disease vectors (CDC 2021). For example, climate change can increase the risk of infectious diseases transmitted by ticks and mosquitos, such as Lyme disease or West Nile Virus, due to warmer temperatures and increased rainfall providing better breeding conditions for ticks and mosquitos (NYS DOH 2023). Localized changes in climate and human interaction may also be a factor in the spread of disease.

9.3.4 Change of Vulnerability Since 2020 Cattaraugus County HMP

Disease outbreak was not included as a hazard of concern in the 2020 Cattaraugus County HMP.

10. SEVERE STORM

10.1 HAZARD PROFILE

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

10.1.1 Hazard Description

Severe storm events are a common occurrence in Cattaraugus County. A variety of severe storm types, such as thunderstorms, lightning, hail, tornadoes, high winds, tropical cyclones, and extreme temperatures have damaged property and infrastructure, disrupt power, downing trees and power lines, and causing injuries and fatalities. The following section describes the different severe storm types that impact Cattaraugus County.

Hailstorms

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 frozen droplet, with many layers of ice, falls to the ground as hail (NSSL 2021).

High Winds

Wind begins with differences in air pressures. It is rough horizontal movement of air caused by uneven heating of the earth's surface. Wind occurs at all scales, from local breezes lasting a few minutes to global winds resulting from solar heating of the earth. High winds are often associated by other severe storm events such as thunderstorms, tornadoes, hurricanes, and tropical storms (NWS 2012). The following are descriptions of types of damaging winds (NOAA n.d.):

- **Straight-line Wind**: Used to define thunderstorm wind which is not linked with rotation and is mainly used to differentiate from tornadic winds
- **Down Draft**: A small-scale column of air that sinks towards the ground
- **Macroburst**: An outward burst of strong winds that are more than 2.5 miles in diameter
- **Microburst**: A small, concentrated downburst which produces an outward burst of relatively strong winds near the surface
- **Downburst:** General term to describe macro and microbursts
- **Gust Front:** Leading edge of rain-cooled air which clashes with a warm thunderstorm inflow
- **Derecho:** Long lived windstorm associated with rapidly moving precipitation or thunderstorms. If wind damage swatch is more than 240 miles and includes gusts of wind that reach 58 mph or greater, then the event can be classified as a derecho

Hurricanes/Tropical Storms

A hurricane is a tropical storm that attains hurricane status when its wind speed reaches 74 or more mph. Tropical systems may develop in the Atlantic between the Lesser Antilles and the African coast or may develop in the warm tropical waters of the Caribbean and Gulf of Mexico. These storms may move up the Atlantic coast and impact the eastern seaboard or move into the US through the states along the Gulf Coast, bringing wind and rain as far north as New England before moving offshore and heading east.

A tropical storm system is characterized by a low-pressure center and numerous thunderstorms that produce strong winds and heavy rain. Compared to a hurricane, these storms tend to have slower wind speeds. Tropical storms 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. They are fueled by a different heat mechanism than other cyclonic windstorms such as Nor'easters and polar lows. The characteristic that separates tropical cyclones from other cyclonic systems is that at any height in the atmosphere, the center of a tropical cyclone will be warmer than its surroundings, a phenomenon called "warm core" storm systems (NOAA 2023).

Lightning

Lightning is a bright flash of electrical energy produced by a thunderstorm. The resulting clap of thunder is the result of a shock wave created by the rapid heating and cooling of the air in the lightning channel. All thunderstorms produce lightning, which can be very dangerous. It ranks as one of the top weather killers in the nation and kills approximately 20 people and injures hundreds each year (NWS n.d.). Lightning can occur anywhere there is a thunderstorm.

Thunderstorms

A thunderstorm is a local storm produced by a cumulonimbus cloud and accompanied by lightning and thunder (NOAA-NSSL n.d.). A thunderstorm forms from a combination of moisture, rapidly rising warm air, and a force capable of lifting air such as a warm and cold front, a sea breeze, or a mountain. Thunderstorms form at the equator to as far north as Alaska. Although thunderstorms generally affect a small area when they occur, they have the potential to become dangerous due to their ability to generate tornadoes, hailstorms, strong winds, flash flooding, 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 or large hail 1 inch (quarter size) in diameter or larger or tornadoes (NWS n.d.). An estimated 100,000 thunderstorms occur each year in the U.S., with approximately 10 percent of them classified as severe (U.S. Department of Commerce; NOAA; NWS 1994). During the warm season, thunderstorms are responsible for most of the rainfall.

Tornadoes

NOAA defines a tornado as a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground (NOAA 2011). Because wind is invisible, it is hard to see a tornado unless it forms a condensation funnel made up of water droplets, dust, and debris. Tornadoes are the most violent of all atmospheric storms and the most hazardous when they occur in populated areas. Tornadoes can topple mobile homes, lift cars, snap trees, and turn objects into destructive missiles. Among the most unpredictable of weather phenomena, tornadoes can occur at any time of day, in any state in the union, and in any season. While the majority of tornadoes cause little or no damage, some are capable of tremendous destruction, reaching wind speeds of 200 mph or more (NOAA 2023).

Extreme Temperatures

Extreme Cold

Extreme cold events occur when temperatures drop well below normal in an area. For example, near-freezing temperatures are considered "extreme cold" in regions relatively unaccustomed to winter storms. Conversely, "extreme cold" might be used to describe temperatures below 0° F in regions that are subjected to temperatures below freezing on more of a regular basis.

For the purposes of this HMP, extreme cold temperatures are characterized when the ambient air temperature drops to approximately 0ºF or below (NWS n.d.). Extensive exposure to extreme cold temperatures can cause frostbite or hypothermia and can become life-threatening.

Several health hazards are related to extreme cold temperatures and include wind chill, frostbite, and hypothermia (CDC 2023):

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

Extreme cold also can cause emergencies in susceptible populations, such as those without shelter, those who are stranded, or those who live in a home that is poorly insulated or without heat (such as mobile homes). Infants and the elderly are most susceptible to the effects of extreme changes in temperatures and are particularly at risk, but anyone can be affected (CDC 2012).

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

Extreme Heat

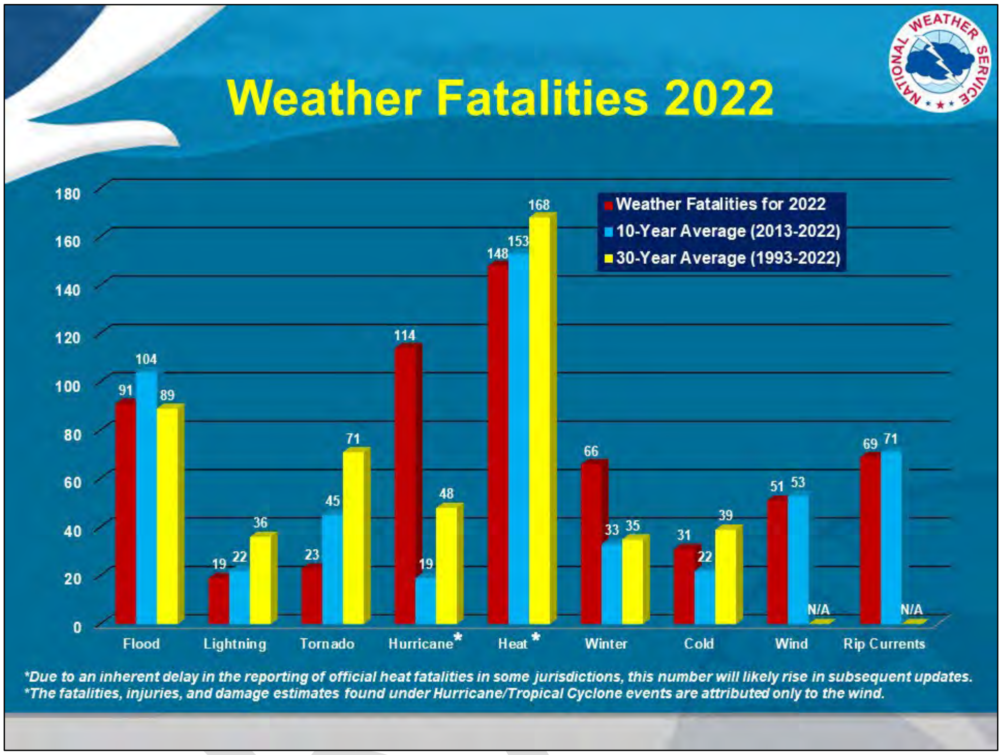
Extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for a region and that last for several weeks (CDC 2012). Humid or muggy conditions occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. A heat wave is a period of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

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

Depending on severity, duration, and location; extreme heat events can create or provoke secondary hazards including, but not limited to, dust storms, droughts, wildfires, water shortages, and power outages. These secondary hazards could result in a broad and far-reaching set of impacts throughout a local area or an entire region. Impacts could include significant loss of life and illness; economic costs in transportation, agriculture, production, energy, and infrastructure; and losses of ecosystems, wildlife habitats, and water resources (NYS DHSES 2023).

Extreme heat is the number one weather-related cause of death in the U.S. On average, nearly 150 people die each year in the United States from excessive heat (NWS 2022). Figure 10-1 shows the number of weather fatalities based on a 10-year average and a 30-year average. Heat caused the highest average of weather-related fatalities between 1993 and 2022.

Figure 10-1. Average Number of Weather-Related Fatalities in the U.S.



Source: NWS 2022

10.1.2 Location

Severe storm events occur throughout the State of New York and are not bound by geographic extent. The likelihood of these events affecting certain parts of Cattaraugus County depends on storm conditions.

Hailstorms

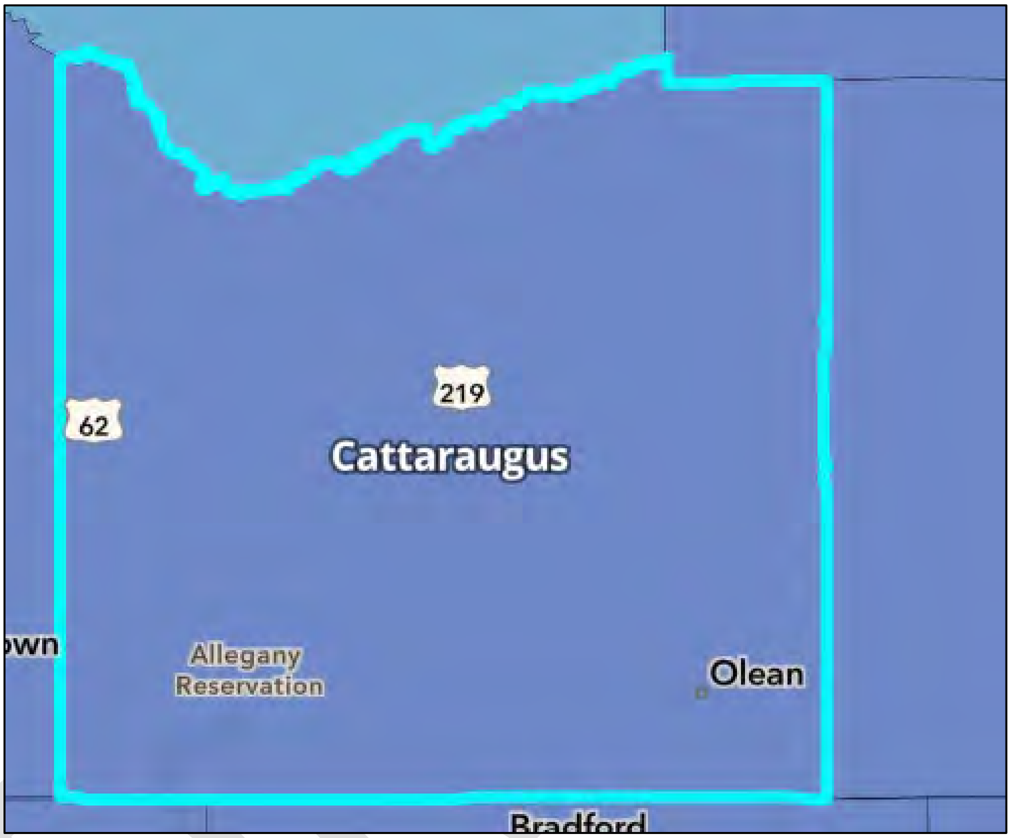
Hailstorms can form anywhere; however, they are more likely to fall in areas that have the most thunderstorms. The longer a hailstone spends in the clouds, the larger it becomes as more droplets continue to freeze. Hail falls when it becomes heavy enough to overcome the strength of the thunderstorm updraft 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.).

According to the National Risk Index, as seen in Figure 10-2, the County has a very low risk to hail (FEMA 2019).

High Winds

All of Cattaraugus County is subject to high winds from thunderstorms, hurricanes/tropical storms, tornadoes, and other severe storm events. According to the FEMA Winds Zones of the United States map, Cattaraugus County is located within Wind Zone III where wind speeds can reach up to 200 mph.

According to the National Risk Index, as seen in Figure 10-2. National Risk Index of Hail in Cattaraugus County



Source: FEMA 2019

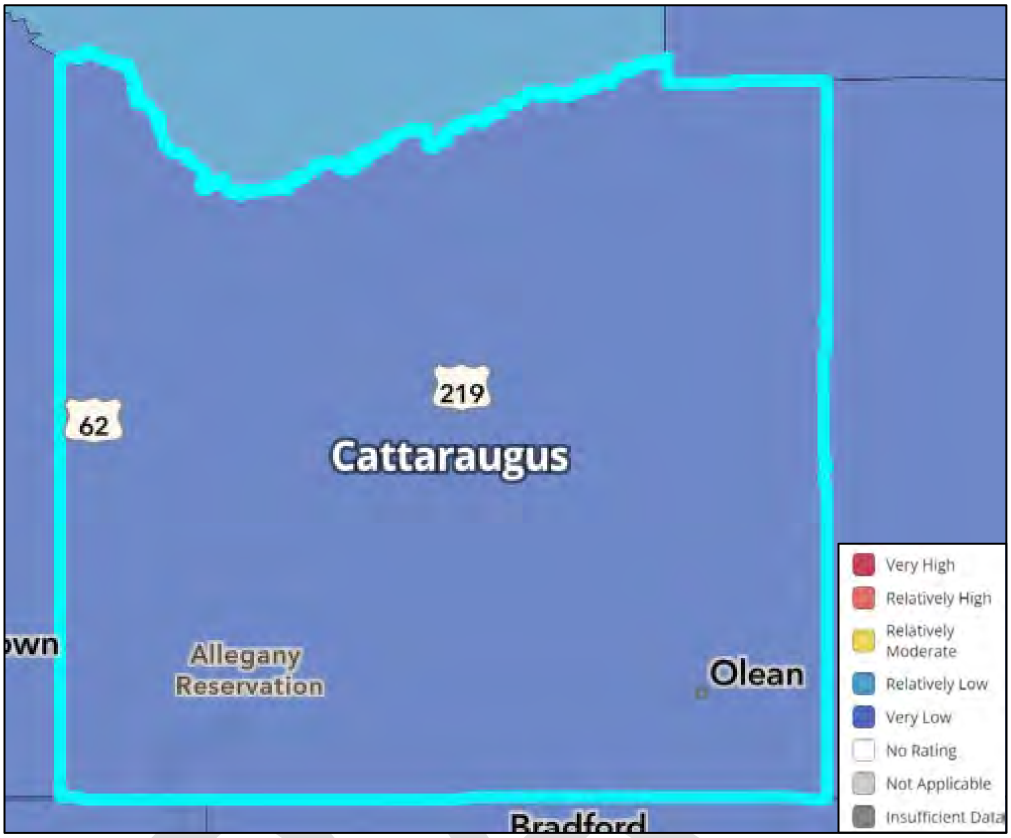
Figure 10-3, the County has a relatively low risk to strong winds (FEMA 2019).

Hurricanes/Tropical Storms

The official hurricane season for the eastern US, including the State of New York, is from June to November. Hurricanes and tropical storms are most likely to affect the state between late July to early due to the coolness of the Atlantic Ocean (NYS 2019).

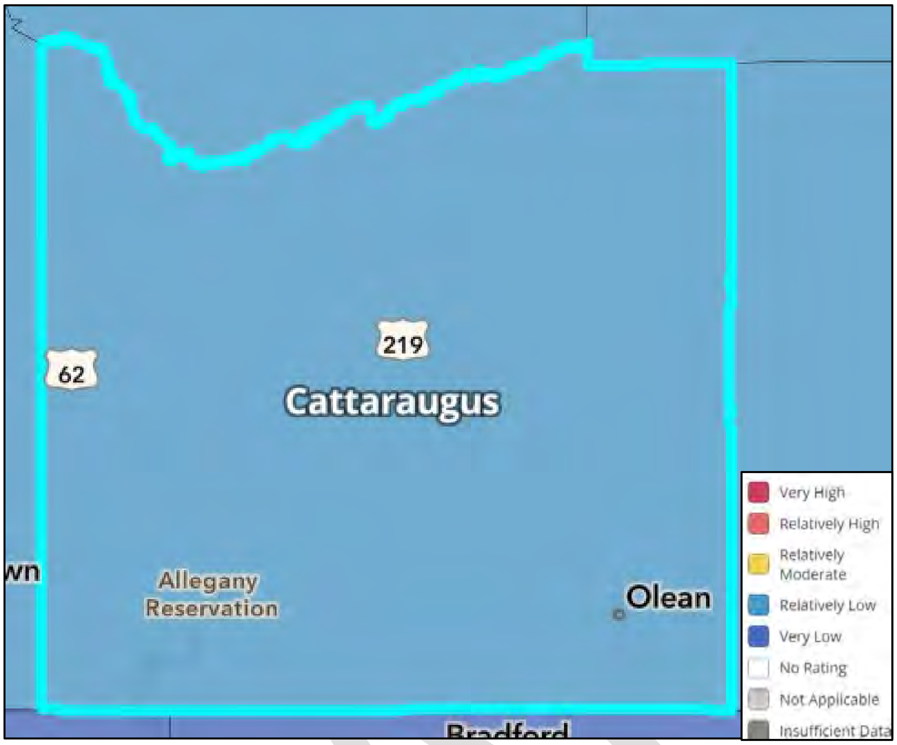
Cattaraugus County is vulnerable to some of the impacts of hurricanes and tropical storms. However, it depends on the storm's track. The majority of damage from these events often results from residual wind damage and inland flooding. According to the National Risk Index, as seen in Figure 10-4, the County has a relatively low risk to strong winds (FEMA 2019).

Figure 10-2. National Risk Index of Hail in Cattaraugus County



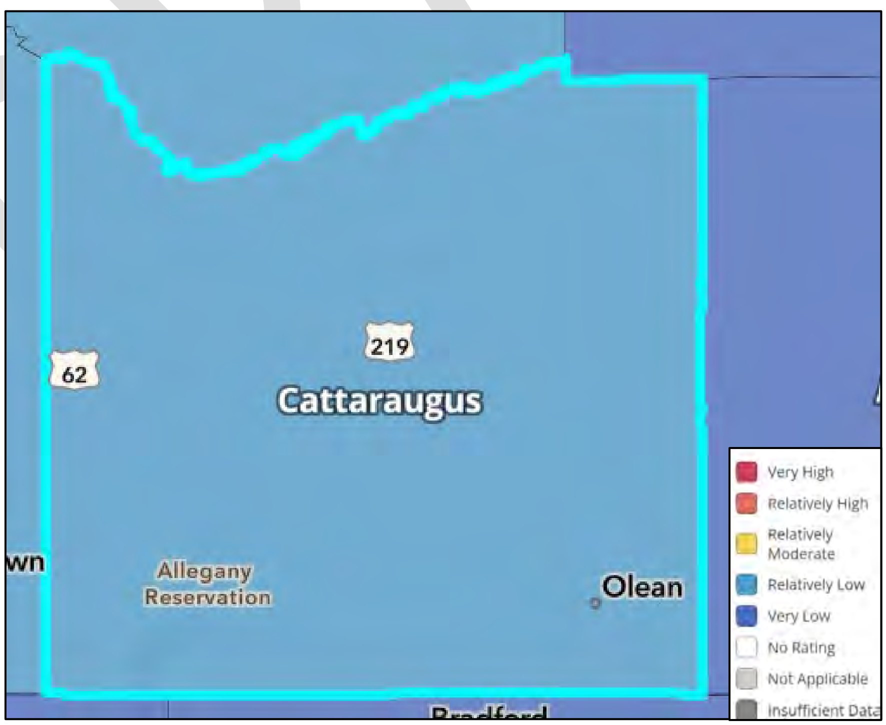
Source: FEMA 2019

Figure 10-3. National Risk Index of Strong Wind in Cattaraugus County



Source: FEMA 2019

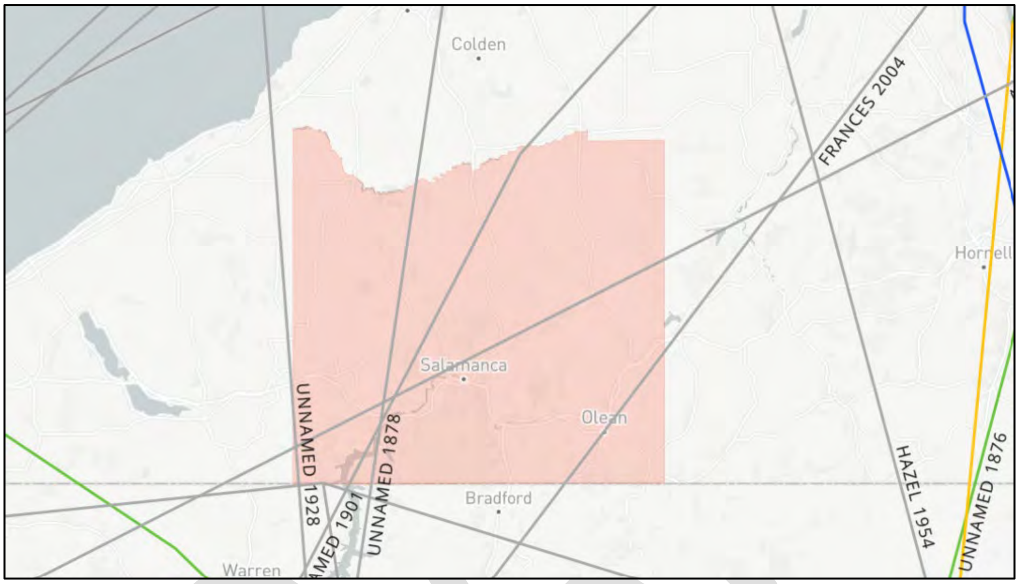
Figure 10-4. National Risk Index of Hurricanes in Cattaraugus County



Source: FEMA 2019

NOAA's Historical Hurricane Tracks tool is a public interactive mapping application that displays Atlantic Basin and East-Central Pacific Basin tropical cyclone data. This interactive tool catalogs tropical cyclones that have occurred from 1950 to 2024 (latest date available from data source). Between 1950 and 2023, 23 hurricanes and tropical storms tracked within 60 nautical miles of Cattaraugus County (NOAA 2021). Figure 10-5 displays the tropical storm and hurricane tracks for Cattaraugus County that tracked within 60 nautical miles.

Figure 10-5. Historical Tropical Storm and Hurricane Tracks 1950 to 2024



Source: NOAA NHC 2023

Lightning

Most, if not all, lightning flashes are produced by storms and start within the cloud. If a lightning flash is going to strike the ground, a channel develops downward toward the surface, and when it gets less than a hundred yards off the ground, objects like trees and bushes and buildings start sending up sparks to meet it. When one of the sparks connects to the downward developing channel, an electric current then surges rapidly down the channel to the object that produced the spark. Tall objects such as trees, mountains and skyscrapers are more likely than the surrounding ground to produce one of the connecting sparks and are more likely to be struck by lightning. However, this does not always mean tall objects will be struck. Lightning can strike the ground in an open field even if the tree line is close by (NOAA n.d.). According to the National Risk Index, as seen in Figure 10-6, the County has a relatively low risk to lightning (FEMA 2019).

Thunderstorms

Thunderstorms affect relatively small, localized areas, rather than large regions like winter storms and hurricane events. Thunderstorms can strike anywhere, but they are most common in the central and southern US. The atmospheric conditions in these regions of the country are ideal for generating these powerful storms. It is estimated that there are as many as 40,000 thunderstorms each day worldwide (NOAA 2023). The most thunderstorms are seen in the southeast United States, with Florida having the highest incidences (80 to over 100 thunderstorm days each year).

Tornadoes

Approximately 1,200 tornadoes occur in the US 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 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 seasons are generally seen June through July (NOAA-NSSL n.d.).

The entire State of New York is susceptible to tornado activity and vulnerable to tornado impacts. Based on statistics from 1996 to 2018, it was found that on average eight tornadoes ranging from F0 to F4, occurred each year in the state (NYS 2019). This resulted in an average of $6.4 million in annualized loss from tornadoes for the State of New York. Approximately 143 injuries and six fatalities were recorded from 1996 to 2018 as a result of tornado impacts (NYS 2019). The entirety of Cattaraugus County is vulnerable to tornado impacts and can experience a tornado at any time when suitable conditions are present.

According to the National Risk Index, as seen in Figure 10-7, the County has a relatively low risk to tornadoes (FEMA 2019).

Extreme Temperature

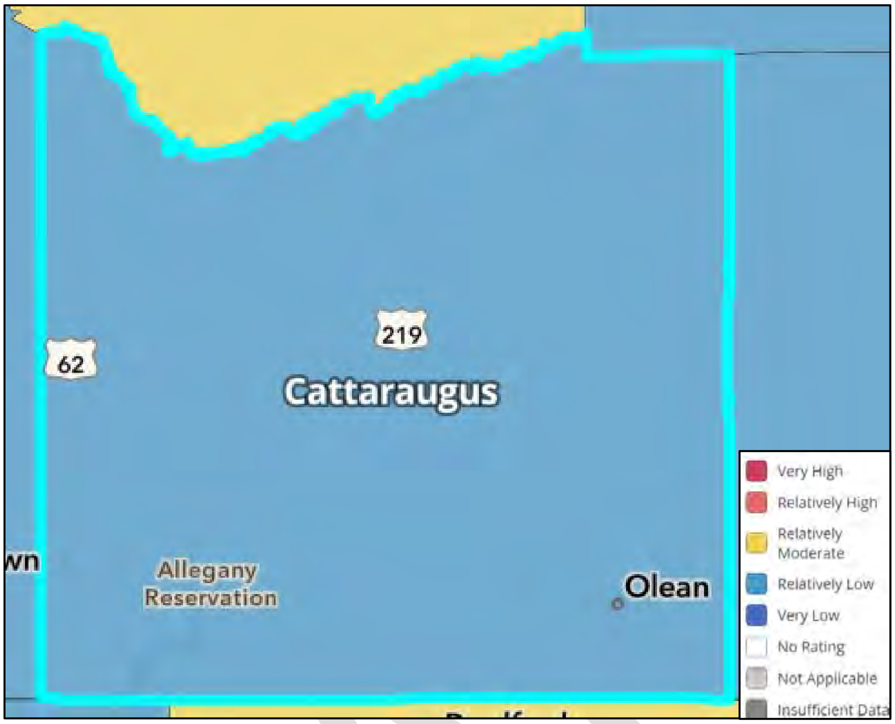
Extreme Cold

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 cause impact to 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). According to the National Risk Index, as seen in Figure 10-8, the County has a relatively high risk to cold waves (FEMA 2019).

Extreme Heat

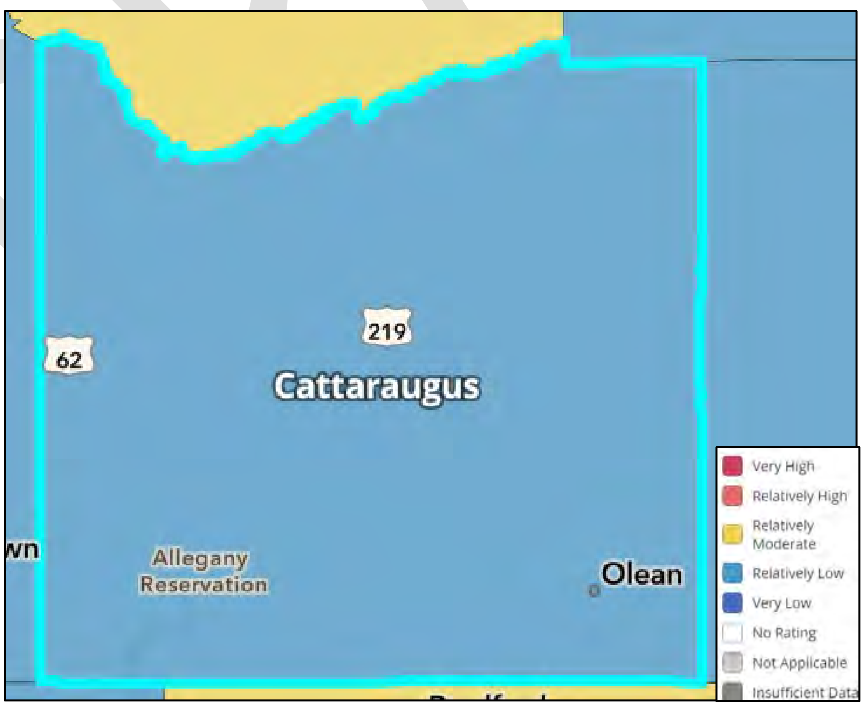
Excessive heat can occur anywhere, and occurrences of excessive heat are generally widespread and will cover an entire county. However, there can be spot locations that are somewhat cooler (e.g., a shady park near a stream) or hotter (e.g., urban areas because of their built environment holds the heat) (NYS DHSES 2023). Extreme heat temperatures of varying degrees exist throughout the state for most of the summer season, except for areas with high altitudes (Cornell University n.d.). The National Risk Index does not have a County rating for heat waves.

Figure 10-6. National Risk Index of Lightning in Cattaraugus County



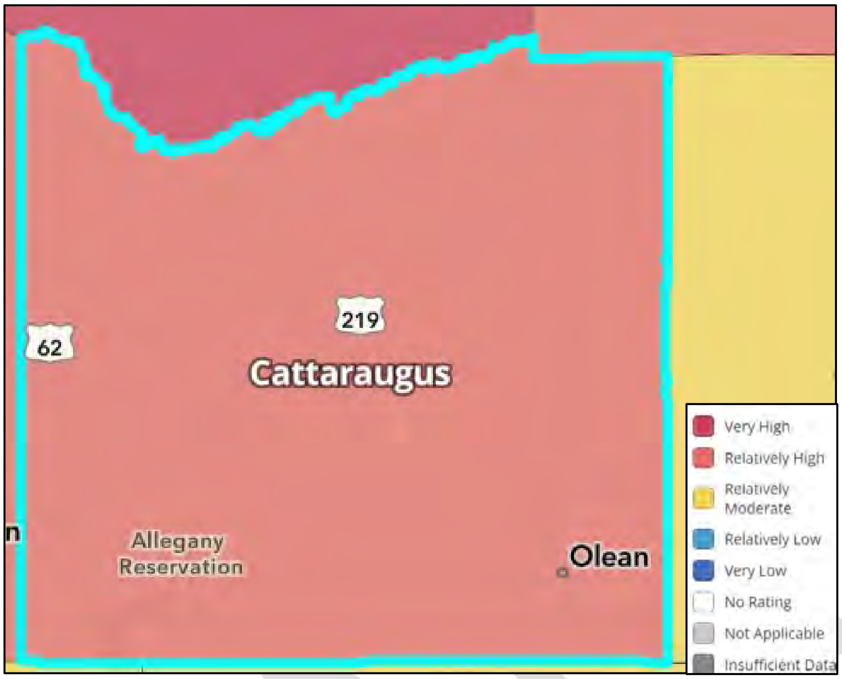
Source: FEMA 2019

Figure 10-7. National Risk Index of Tornadoes in Cattaraugus County



Source: FEMA 2019

Figure 10-8. National Risk Index of Cold Waves in Cattaraugus County



Source: FEMA 2019

10.1.3 Extent

The extent (severity or magnitude) of a severe storm is largely dependent upon the most damaging aspects of each type of severe storms. This section describes the extent of thunderstorms, lighting, hail, windstorms, tornadoes, and tropical cyclones in Cattaraugus County.

Hailstorms

The severity of hail is measured by duration, hail size, and geographic extent. Hail can exhibit a variety of sizes, though only the very largest hail stones pose serious risk to people, if exposed. It is often estimated by comparing it to a known object, such as a pea or golf ball. Most hailstorms are made up of a mix of different sizes, and only the very largest hail stones pose serious risk to people caught in the open (NSSL 2021).

High Winds

Table 10-1 provides the descriptions of winds and their associated sustained wind speed used by the NWS during wind-producing events. The Beaufort wind scale, developed in 1805, is also used today to classify wind conditions.

Table 10-1. NWS Wind Descriptions

Descriptive Term	Sustained Wind Speed (mph)
Strong, dangerous, or damaging	≥40
Very windy	30–40
Windy	20–30

Descriptive Term	Sustained Wind Speed (mph)
Breezy, brisk, or blustery	15–25
None	5–15 or 10–20
Light or light and variable wind	0–5

Source: NWS 2010
mphmiles per hour

The NWS issues advisories and warnings for winds that are typically site-specific. The NWS issues high wind advisories, watches, and warnings when wind speeds can pose a hazard or are life threatening. The criterion for each of these varies from state to state. According to the NWS, wind warnings and advisories for New York State are as follows (NWS n.d.):

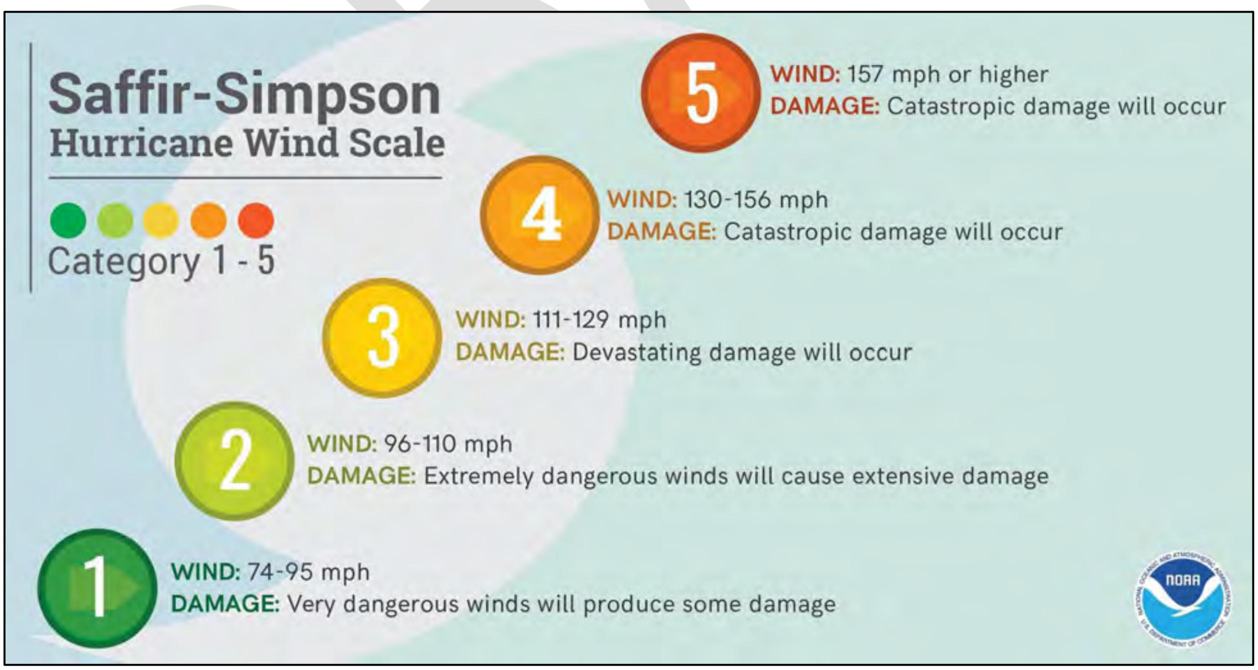
- **High Wind Warnings** are issued when sustained wind speeds of 40 mph or greater lasting for one hour or longer or for winds of 58 mph or greater for any duration or widespread damage are possible.
- **Wind Advisories** are issues when sustained winds of 30 to 39 mph are forecast for one hour or longer, or wind gusts of 46 to 57 mph for any duration.

Hurricanes/Tropical Cyclones

Hurricanes are classified according to the Saffir-Simpson Hurricane Wind Scale from a Category 1 to Category 5 by sustained wind intensity. Figure 10-9 below shows the categories and the type of damage they produce.

The NWS issues hurricane and tropical storm watches and warnings. These watches and warnings are issued or will remain in effect after a tropical cyclone becomes post-tropical, when such a storm poses a significant threat to life and property. The NWS allows the National Hurricane Center (NHC) to issue advisories during the post-tropical stage (NHC NOAA 2010).

Figure 10-9. The Saffir-Simpson Scale



Source: NOAA 2020

Mean Return Period

In evaluating the potential for hazard events of a given magnitude, a mean return period (MRP) is often used. Figure 10-12 shows the estimated maximum three-second gust wind speeds that can be anticipated in the study area associated with the 500-year MRP events. These peak wind speed projections were generated using Hazards U.S. Multi-Hazard (HAZUS-MH) model runs for the 500-year event. The maximum 3-second gust wind speeds for Cattaraugus County range from 39 to 73 mph for the 500-year MRP event. The associated impacts and losses from the 500-year MRP hurricane event model runs are reported in the Vulnerability Assessment.

Lightning

Lightning is associated with moderate to severe thunderstorms. Lightning severity is determined by the frequency of lightning strikes during a storm. The New York City Office of Emergency Management notes that lightning strikes occur with moderate frequency in the State of New York, with 3.8 strikes occurring per square mile each year. Multiple devices are available to track and monitor the frequency of lightning (NYC Emergency Management n.d.).

Thunderstorms

Severe thunderstorm watches and warnings are issued by the local NWS office and the Storm Prediction Center (SPC). The NWS and SPC will update the watches and warnings and notify the public when they are no longer in effect. NWS issues statements, watches, and warnings for thunderstorms (NWS 2020):

- **Special Weather Statement**: Issued for strong storms that are below severe levels but may have impacts. Usually reserved for the threat of wind gust of 40-58 mph or small hail <1 inch.
- **Severe Thunderstorm Watch**: Severe thunderstorms with large hail, damaging winds, and/or tornadoes are possible, but the exact time and location of storm development is still uncertain. A watch means be prepared for storms.
- **Severe Thunderstorm Warning**: A severe thunderstorm is imminent or occurring; it is either detected by weather radar or reported by storm spotters. A severe thunderstorm is one that produces winds 58 mph or stronger and/or hail 1 inch in diameter or larger. A warning means to take shelter.

The NWS has five risk categories for severe storms: marginal, slight, enhanced, moderate, and high, shown in Figure 10-10. The probabilistic forecast directly expresses the best estimate of a severe storm event occurring within 25 miles of a point (NWS 2022).

Tornadoes

The Enhanced Fujita Scale (EF-Scale) is the standard used to measure the strength of a tornado. It is used to assign tornadoes a rating based on estimated wind speeds and related damage. When tornado-related damage is surveyed, it is compared to a list of Damage Indicators (DI) and Degree of Damage (DOD), which help better estimate the range of wind speeds produced by the tornado. From that, a rating is assigned, similar to that of the F-Scale, with six categories from EF0 to EF5, representing increasing degrees of damage. The EF-Scale was revised from the original F-Scale to reflect better examinations of tornado damage surveys. This new scale considers how most structures are designed (NWS n.d.). Figure 10-11 illustrates the relationship between EF ratings, wind speed, and expected tornado damage. Cattaraugus County typically experience tornadoes ranging from EF0 to EF1.

NOAA Storm Prediction Center issues watch and warning alerts for tornado activities. A tornado watch is when conditions are favorable for a tornado to form. A watch can cover parts of a state or span several states (NOAA-

NSSL n.d.). A tornado warning is when a tornado is spotted by a radar and indicated action should we taken to ensure safety and shelter. Warnings can cover parts of counties or several counties, depending on the tornadoes path (NOAA-NSSL n.d.). The current average lead time for tornado warnings is 13 minutes. Occasionally, tornadoes develop so rapidly, that little, if any, advance warning is possible (NWS n.d.).

Extreme Cold

The extent (severity or magnitude) of extreme cold temperatures is generally measured through the Wind Chill Temperature (WCT) Index. Wind Chill is a term used to describe what the air temperature feels like to the human skin due to the combination of cold temperatures and winds blowing on exposed skin. In simple terms, the colder the air temperature and the higher the wind speeds the colder it will feel on one's skin they are outside (NOAA n.d.).The index approximates the dangers from wind chill.

Extreme Heat

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

The NWS provides alerts when Heat Indices approach hazardous levels. Table 10-2 explains these alerts. In the event of an extreme heat advisory, the NWS 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. Additionally, the NWS includes heat index values in weather forecasts and also provides assistance to the state and local health officials in preparing Civil Emergency Messages during severe heat waves (NYSDHSES n.d.).

Table 10-2. National Weather Service Alerts

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

Source: NYS DHSES n.d.

Figure 10-10. Severe Thunderstorm Risk Categories

THUNDERSTORMS (no label)	1 - MARGINAL (MRGL)	2 - SLIGHT (SLGT)	3 - ENHANCED (ENH)	4 - MODERATE (MDT)	5 - HIGH (HIGH)
No severe* thunderstorms expected	**Isolated severe thunderstorms possible**	**Scattered severe storms possible**	**Numerous severe storms possible**	**Widespread severe storms likely**	**Widespread severe storms expected**
Lightning/flooding threats exist with all thunderstorms	Limited in duration and/or coverage and/or intensity	Short-lived and/or not widespread, isolated intense storms possible	More persistent and/or widespread, a few intense	Long-lived, widespread and intense	Long-lived, very widespread and particularly intense
• Winds to 40 mph • Small hail	• Winds 40-60 mph • Hail up to 1" • Low tornado risk	• One or two tornadoes • Reports of strong winds/wind damage • Hail ~1", isolated 2"	• A few tornadoes • Several reports of wind damage • Damaging hail, 1 - 2"	• Strong tornadoes • Widespread wind damage • Destructive hail, 2"+	• Tornado outbreak • Derecho

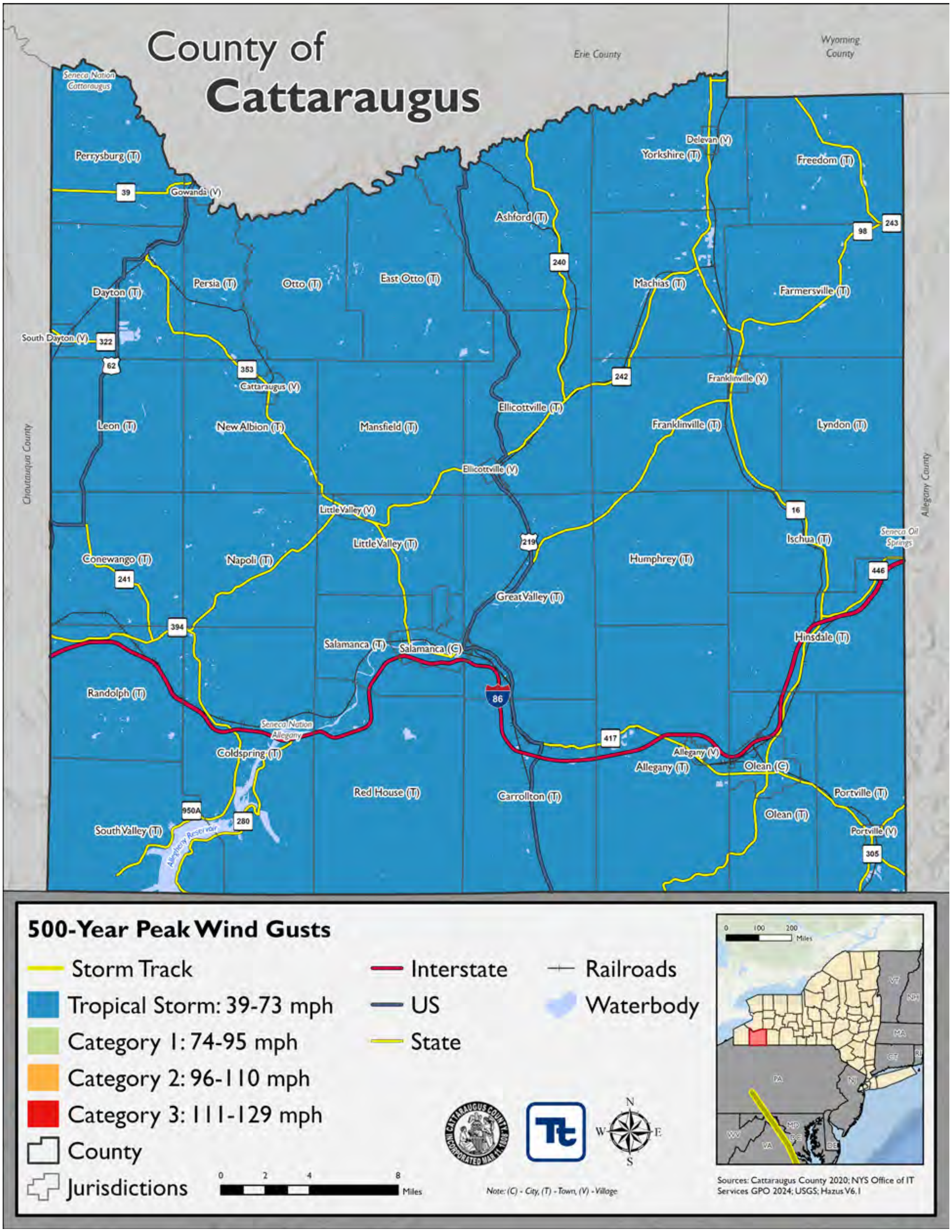
Source: NOAA 2017

Figure 10-11 Explanation of EF-Scale Ratings

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: NOAA 2020

Figure 10-12. Wind Speeds for the 500-Year Mean Return Period Event



10.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Between 1954 and 2024, Cattaraugus County was included in eight major disaster (DR) or emergency (EM) declarations for severe storm-related events (FEMA 2024). Table 10-3 lists these declarations.

Table 10-3. FEMA Declarations for Severe Storm Events in Cattaraugus County (1954 to 2024)

Event Date	Declaration Date	Declaration Number	Description
October 30, 1967	October 30, 1967	DR-233	Severe Storms and Flooding
June 23, 1972	June 23, 1972	DR-338	Tropical Storm Agnes
January 19–30, 1996	January 24, 1996	DR-1095	Severe Storms and Flooding
June 25–July 10, 1998	July 7, 1998	DR-1233	Severe Storms and Flooding
May 3–August 12, 2000	July 21, 2000	DR-1335	Severe Storms and Flooding
July 21–August 13, 2003	August 29, 2003	DR-1486	Severe Storms, Flooding, and Tornadoes
May 13–June 17, 2004	August 3, 2004	DR-1534	Severe Storms and Flooding
August 13–September 16, 2004	October 1, 2004	DR-1564	Severe Storms and Flooding
August 29–October 1, 2005	September 30, 2005	EM-3262	Hurricane Katrina Evacuation
August 8–10, 2009	September 1, 2009	DR-1857	Severe Storms and Flooding
October 27–November 8, 2012	October 28, 2012	EM-3351	Hurricane Sandy
May 13–22, 2014	July 8, 2014	DR-4180	Severe Storms and Flooding

Sources: FEMA 2024

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in contiguous counties. Between 2018 and 2024, Cattaraugus County was included in two USDA severe storm-related agricultural disaster declarations; refer to Table 10-4 (USDA 2024).

Table 10-4. USDA Declarations for Severe Storm Events in Cattaraugus County (2018 to 2024)

Event Date	USDA Declaration Number	Description
2019	S4622	Excessive Rain
2019	S4623	Excessive Rain, Flash Flooding, and Flooding
2020	S4903	Freeze and Frost
2020	S4905	Frost
2023	S5485	Freeze and Frost

Sources: USDA 2024

Previous Events

Known hazard events that impacted Cattaraugus County between 2018 and 2024 are discussed in Table 10-5. For events prior to 2018, refer to the 2020 Cattaraugus County HMP.

Table 10-5. Severe Storm Events in Cattaraugus County (2018 to 2024)

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
January 1, 2019	N/A	N/A	Cattaraugus County	High winds led to trees and wires being knocked down across the County. $10,000 in property damage was reported.
January 30–31, 2019	N/A	N/A	Cattaraugus County	Wind chills dropped below zero which resulted in one death. No property damages were reported.
February 24–25, 2019	N/A	N/A	Cattaraugus County	High winds led to trees and wires down throughout the County, which left thousands without power. $10,000 in property damages were reported.
April 14, 2019	N/A	N/A	Salamanca, Little Valley, Franklinville, Machias, Lime Lake, Elton, Delevan	Thunderstorm wind resulted in wires and trees being knocked over across the County which resulted in some structural damages to some buildings. $48,000 in property damages were reported.
May 23, 2019	N/A	N/A	Perrysburg	Thunderstorm wind knocked over a tree on Edward Corners Road which resulted in $1,000 in property damages.
May 25, 2019	N/A	N/A	Cattaraugus County	Thunderstorm wind knocked numerous trees and power lines over which resulted in $13,000 in property damages.
August 8, 2019	N/A	N/A	Olean, Portville	Thunderstorm wind led to trees and power lines be knocked over. $4,000 in property damages were reported.
August 15, 2019	N/A	N/A	Elton, Yorkshire	Thunderstorm wind led to trees knocked over which resulted in $1,000 of property damages.
September 14, 2019	N/A	N/A	Conewango, Napoli	Thunderstorm wind led to trees knocked over which resulted in $1,000 in property damages.
October 31-November 1, 2019	N/A	N/A	Cattaraugus County	A high wind event led to $520,000 in property damages.
November 27, 2019	N/A	N/A	Cattaraugus County	High wind led to trees being knocked over which resulted in $1,000 in property damages
January 12, 2020	N/A	N/A	Cattaraugus County	Post-frontal winds mixed well behind an early morning cold front. Widespread non-thunderstorm wind damage was reported. $10,000 in property damage was reported.

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
March 20, 2020	N/A	N/A	Cattaraugus County	Strong winds developed in the area due to a cold front that swept across the area. Trees were reported downed in areas throughout the County. $2,000 in property damage was reported.
May 29, 2020	N/A	N/A	Delevan	The remnants of tropical storm Bertha moved across the region bringing rounds of heavy showers and thunderstorms. Trees were reported downed and $2,000 in property damages were reported.
June 2, 2020	N/A	N/A	Yorkshire, Machias, West Vally, Elton, Ellicottville	Large thunderstorms came through the area bringing intense rain and hail that was recorded to be the size of golf balls. Intense lighting was also recorded with wind gusts hitting 70 mph documented. Multiple trees were reported downed and $4,500 in property damages were reported.
June 10, 2020	N/A	N/A	Conewango, Randolph	Thunderstorms developed over the Southern Tier area, including Cattaraugus County, which contributed to wind damages and trees that were knocked down. $1,000 in property damage was reported.
June 22, 2020	N/A	N/A	Quaker Bridge, Steamburg, Napoli	Scattered thunderstorms developed which brought strong winds, lightning and heavy rain/ Numerous trees were knocked down and $1,500 in property damage was reported.
July 16, 2020	N/A	N/A	Gowanda, Little Vally, East Randolph, Randolph, Napoli, Allegany, Salamanca, Hinsdale	Strong thunderstorms developed with precipitable water values between 1.75 and 2 inches. Trees and wires were reported down. $22,000 in property damage was reported.
July 19, 2020	N/A	N/A	Gowanda, Machias, Napoli, Portville	An intense storm developed which brought considerable wind reports across the Southern Tier. Numerous downed trees were documented and $13,000 in property damages were reported.
July 29, 2020	N/A	N/A	Delevan	A thunderstorm that produced strong winds and over 1.5 inches of rain struck the Delevan area, which knocked over numerous trees onto power lines. $2,000 in property damages were reported.
August 25, 2020	N/A	N/A	East Otto	Scattered thunderstorms hit the area and produced winds that knocked down trees along roads. $1,000 in property damages were reported.
August 27, 2020	N/A	N/A	Randolph, Olean	Summer heat created a cluster of thunderstorms which produced hail in

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
				some areas that was reported to be as large as 2 inches. Numerous trees were knocked over and $4,000 in property damages were recorded.
September 7, 2020	N/A	N/A	Delevan, Olean	A thunderstorm moving across western New York produced winds that reached 60 mph that produced downed trees and power outages throughout the Southern Tier. $25,000 in property damages were recorded.
November 15–16, 2020	N/A	N/A	Cattaraugus County	Along the cold front, shallow convection developed with widespread non-severe hail and widespread wind gusts over 60 mph. Widespread damage was reported from both the thunderstorm winds and non-thunderstorm winds. $10,000 in property damages were reported.
March 26, 2021	N/A	N/A	Cattaraugus County	Non-thunderstorm measured wind gusts included 60 mph. $1,000 in property damage was reported.
June 28, 2021	N/A	N/A	Salamanca	High dewpoints produced a strong rapidly growing storm which prompted a warning to be issued. Multiple trees and wires were reported knocked down. $5,000 in property damages were reported.
July 13, 2021	N/A	N/A	East Salamanca, Carrollton, Allegany, Olean	Severe Thunderstorms produced downpours and knocked down trees and wires. $153,000 in property damages were reported.
July 20, 2021	N/A	N/A	Olean, Portville, Sandusky, Leon,	Thunderstorms were documented developing in western New York. These storms produced numerous reports of large hail, including tennis ball sized hail as well as flash flooding and downed trees. $12,000 in property damages were reported.
August 19, 2021	N/A	N/A	Cattaraugus County	The remnants of Tropical Storm Fred led to moderate and heavy rain events which produced flooding throughout the County. Property damage amounts were unavailable.
September 12, 2021	N/A	N/A	Little Vally, East Salamanca	An approaching cold front triggered showers and thunderstorms across the area which produced wind damage reports as well as one confirmed tornado, not in Cattaraugus County. Trees and wires were knocked down and $2,000 in property damages were reported.
December 11, 2021	N/A	N/A	Cattaraugus County	A strong cold front crossed the region. Selected peak wind gusts including

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
				over 60 mph in the County. Dozens of reports of trees and powerlines down were received, resulting in $10,000 in property damage.
March 6, 2022	N/A	N/A	Cattaraugus County	Low pressure tracked from the upper Great Lakes to Quebec with a trailing cold front crossing the region. Selected wind gust reports included over 50 mph documented. $25,000 in property damage was reported.
April 25, 2022	N/A	N/A	Cattaraugus County	A cold front advanced slowly towards western New York and multiple reports of wind damage were received. Trees and powerlines were reported to be downed throughout the County. $1,000 in property damage was reported.
May 21, 2022	N/A	N/A	Little Vally, Allegany, Cadiz, Fitch	Two rounds of severe storms occurred which brought large hail, wind damage and occasional flooding. Numerous trees were brought down and $2,000 in property damages were reported.
June 22, 2022	N/A	N/A	Machias	Wind damage was reported throughout the County, including trees that were knocked over. $2,000 in property damages were recorded.
July 23–24, 2022	N/A	N/A	Little Vally, East Otto, Randolph, South Dayton	Isolated thunderstorms developed along a weak lake breeze boundary over the western Southern Tier during the peak heating of the day. One stronger thunderstorm produced several reports of wind damage in Cattaraugus County. Multiple trees and powerlines were downed and $18,000 in property damages were reported.
August 29, 2022	N/A	N/A	Cattaraugus County	A line of thunderstorms increased in coverage and intensity into the evening and knocked down numerous trees and wires. $6,000 in property damagers were reported.
September 22, 2022	N/A	N/A	Franklinville	Thunderstorms developed over the Great Lakes and resulted in isolated waterspouts which also produced damaging wind gusts that knocked trees down. $2,000 in property damages were reported.
April 1, 2023	N/A	N/A	Cattaraugus County	A line of severe thunderstorms that developed upstream swept across the area producing wind gusts over 60 mph and widespread wind damage. Another round of strong non-thunderstorm winds then occurred as the second cold front crossed the

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
				region late in the afternoon. Numerous trees and wires were knocked over and $27,000 in property damages were reported.
June 26, 2023	N/A	N/A	Allegany	Severe thunderstorms produced damaging winds, large hail, and flash flooding. No damages were reported.
July 20, 2023	N/A	N/A	Cattaraugus County	Thunderstorm wind led to large trees being knocked over which resulted in $27,500 in property damages.

Sources: NOAA-NCEI 2023; FEMA 2024

10.1.1 Probability of Future Occurrences

Information on previous severe storm occurrences in the County was used to calculate the probability of future occurrence of such events, as summarized in Table 10-6. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. In Chapter 14, the identified hazards of concern for Cattaraugus County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Steering Committee, the probability of occurrence for severe storms in the County is considered "frequent."

Table 10-6. Probability of Future Severe Storm Events in Cattaraugus County

Hazard Type	Number of Occurrences Between 1996 and 2024	Percent Chance of Occurring in Any Given Year
Cold/Wind Chill	0	0.00%
Extreme Cold/Wind Chill	3	10.71%
Extreme Heat	0	0.00%
Hail	31	100.00%
Heat	0	0.00%
High Wind	42	100.00%
Hurricane/Tropical Storm	0	0.00%
Lightning	3	10.71%
Thunderstorm Wind	142	100.00%
Tornado	2	7.14%
Total	**223**	**100.00%**

Sources: NOAA-NCEI 2023; FEMA 2024

Notes: Due to limitations in data, not all severe storm events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is calculated using the number of occurrences between 1996 and 2024.

Climate Change Projections

Climate change affects the State of New York's residents and resources. 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 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. Annual average precipitation is projected to decrease in the low estimate but increase in the middle range and high estimate 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 Cattaraugus County, and the southern tier region, temperatures are estimated to increase by 3.6ºF to 7.4ºF by the 2050s, 5ºF to 12.2ºF by the 2080s, and 5.5ºF to 14.1ºF by 2100, relative to the 1981–2010 base period. Precipitation totals are estimated to increase by 0 to 12 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).

Projected changes in storm intensity and frequency depend on the type of storm. 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 delays and hazards related to extreme weather events. 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 in the Atlantic basin 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 also 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 least expecting it (NOAA 2023).

New York State has warmed more rapidly than the national average, and winter is warming faster than other seasons. Evidence shows that extremely hot days are happening more often, and multiday heat waves are expected to occur more often and last longer in the upcoming decades. Areas such as metropolitan areas, with a lot of buildings and pavement and fewer green spaces are more affected by heat because they retain and intensify heat as "heat islands". 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 and 0°F or below are projected to decrease across the state (Stevens & Lamie 2024). Table 10-7 further looks at the prediction of extreme heat and cold days in upcoming decades.

Table 10-7. Changes in Extreme Events in the Southern Tier Region – Extreme Heat and Cold

# Days Per Year	Baseline	10th Percentile	50th Percentile	90th Percentile
2030s				
Days over 90°F	3	6	11	23
Days over 95°F	0.3	0.5	1	4
Days below 32°F	142	106	117	125
Days below 0°F	6	0.4	1	2
Number of Heat Waves	0.1	0.7	1	3
Average Length of Heat Waves	4	4	4	5

Maximum Heat Index	94	99	102	107
Days Heat Index is over 85°F	15	28	35	54
Days Heat Index is over 95°F	0.8	4	7	15
2050s				
Days over 90°F	3	8	18	35
Days over 95°F	0.3	0.7	4	13
Days below 32°F	142	8`	110	117
Days below 0°F	6	0	0.4	1
Number of Heat Waves	0.1	1	2	5
Average Length of Heat Waves	4	4	4	5
Maximum Heat Index	94	102	106	113
Days Heat Index is over 85°F	15	37	52	74
Days Heat Index is over 95°F	0.8	7	13	28
2080s				
Days over 90°F	3	14	29	73
Days over 95°F	0.3	1	8	41
Days below 32°F	142	44	89	113
Days below 0°F	6	0	0	0.4
Number of Heat Waves	0.1	2	4	9
Average Length of Heat Waves	4	4	5	6
Maximum Heat Index	94	105	113	130
Days Heat Index is over 85°F	15	46	70	113
Days Heat Index is over 95°F	0.8	11	26	69

Source: Stevens & Lamie 2024 2023

10.1.2 Cascading Impacts on Other Hazards

Severe storm events and severe wind events can escalate the impacts of flooding and utility failure. Severe winds can be destructive to the functionality of utilities by breaching power lines and disconnecting the utility systems. Severe storms may carry extreme rainfall that could exacerbate flooding. More information about flooding can be found in Chapter 7 of this HMP.

Fallen trees from severe storm events can contribute to an increase in fuel for wildfires. Not only does fallen vegetation also have the potential to fuel wildfires (refer to Chapter 13 for more information on wildfire), but it reduces the soil stability of steep slopes, which can lead to an increased risk of landslides (refer to Chapter 8 for discussion on the landslide hazard).

Extreme heat temperature events can exacerbate the drought hazard, increase the potential risk of wildfires, and escalate severe storm and severe winter storm events for the County. For example, 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 severe winter storms during freezing and thawing periods. Refer to Chapter 11 (Severe Winter Storms) for more information about this hazard of concern.

10.2 VULNERABILITY AND IMPACT ASSESSMENT

A probabilistic assessment was conducted for the 500-year MRP hurricane wind event. The probabilistic Hazus hurricane model activates a database of thousands of potential storms that have tracks and intensities reflecting the full spectrum of Atlantic hurricanes observed since 1886 and identifies those with tracks associated with Cattaraugus County. Chapter 4 includes additional details on the methodology used to assess the severe storm risk.

10.2.1 Life, Health, and Safety

The entire population of Cattaraugus County (75,690) is exposed to severe storms and extreme temperature; however, however, the impact of these events can have on life, health, and safety are dependent upon several factors, including the severity of the event and whether adequate warning time was provided to residents.

Outdoor workers are vulnerable to severe storm and extreme temperature events. Employers should prepare for the hazards associated with adverse weather conditions that may require special facilities and safety equipment being provided to employees, or in some instances, work stoppage to ensure the safety and health of workers. Wet weather and high wind conditions can pose a greater threat to employees working in the construction, and shipbuilding industries. For instance, workers in the construction industry are bound to work in open spaces, at heights, with electrical equipment and metals, in excavation areas and trenches, and may handle hazardous materials as a work task, thereby causing exposure to a myriad of safety hazards (Hazwoper OSHA 2020).

Drought, often coupled with extreme heat, can cause health risks to farmers and their workers. Workers who are exposed to extreme heat or work in hot environments may be at risk of heat stress. Heat stress can result in heat stroke, heat exhaustion, heat cramps, or heat rashes. Heat can also increase the risk of injuries in workers as it may result in sweaty palms, fogged-up safety glasses, and dizziness. Burns may also occur as a result of accidental contact with hot surfaces or steam. Sunlight exposure is highest during the summer and between 10:00 a.m. and 4:00 p.m. Working outdoors during these times increases the chances of getting sunburned. Workers at greater risk of heat stress include those who are 65 years of age or older, are overweight, have heart disease or high blood pressure, or take medications that may be affected by extreme heat (Centers for Disease Control and Prevention 2020, Centers for Disease Control and Prevention 2018).

Overall Population

For the purposes of this HMP, all of Cattaraugus County is considered vulnerable to a severe storm event and wind impacts. Hazus estimates that zero persons will be displaced from their homes or will seek shelter during a 500-year MRP hurricane wind event. Secondary impacts caused by extreme wind events include downed trees, damaged buildings, and debris carried by high winds, which can lead to injury or loss of life.

Extreme temperature events have potential health impacts including injury and death. More mild winters resulting from a warming climate can reduce illness and injuries associated with extreme cold temperatures and reallocate them to extreme heat events. Several health hazards are related to extreme heat temperatures and include heat exhaustion and heat stroke, which are defined in Table 10-8.

Table 10-8. 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

Category	Heat Index	Effects on the Body
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

Socially Vulnerable Population

Socially vulnerable populations are most susceptible to severe storm and extreme temperature events based on several factors, including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Vulnerable populations include homeless persons, elderly (over 65 years old), low income or linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. The population over the age of 65 is also more vulnerable and, physically, they may have more difficulty evacuating. They may require extra time or outside assistance during evacuations and are more likely to seek or need medical attention, which may not be available due to isolation during a storm event.

Extreme temperature and severe storm events have potential health impacts including injury and death. According to the Centers for Disease Control and Prevention, populations most at risk these events include the following: (1) the elderly, who are less able to withstand temperature extremes because of their age, health conditions, and limited mobility to access shelters; (2) infants and children up to 4 years of age; (3) individuals who are physically ill (such as with heart disease or high blood pressure), (4) low-income persons who cannot afford proper heating and cooling; and (5) members of the general public who may overexert during work or exercise during extreme heat events or experience hypothermia during extreme cold events (CDC 2022, CDC 2005). Meteorologists can accurately forecast extreme heat and cold event development and the severity of the associated conditions with several days of lead time. These forecasts provide an opportunity for public health and other officials to notify vulnerable populations, implement short-term emergency response actions, and focus on surveillance and relief efforts on those at greatest risk. Adhering to extreme temperature warnings and conducting appropriate mitigation and preparation measures can significantly reduce the risk of temperature-related deaths.

As shown in Table 10-9, the City of Olean has the highest population over 65 (2,469), the largest population under 5 (846), the greatest non-English speaking population (54), the highest population of disabled persons (2,539), and the largest number individuals living in poverty (3,266). The Town of Redhouse has the lowest population over 65 (7), the lowest population under 5 (1), the fewest number of disabled persons (2), and the lowest population living in poverty (2). Of the 43 local jurisdictions in the County, 27 have no (0) non-English speaking persons living within the jurisdiction.

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.

According to 2022 Point-in-Time-Data from ALICE, 29 percent of the 32,016 households in Cattaraugus County are ALICE households (compared to the state average of 31 percent). The median household income in Cattaraugus County is $50,508, and the County sees a labor force participation rate of 56 percent. Cattaraugus County faces a lower-than-average household income compared to the state average of $79,557 and suffers from a higher-than-average poverty rate at 19 percent (compared to the state average of 15 percent). See Table 10-10 for ALICE data by jurisdiction.

Table 10-9. Cattaraugus County Socially Vulnerable Populations by Municipality

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	American Community Survey 5-year Population Estimates (2022)									
			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
Allegany (T)	5,949	7.9%	1,183	19.9%	213	3.6%	19	0.3%	667	11.2%	640	10.8%
Allegany (V)	1,544	2.0%	401	26.0%	65	4.2%	19	1.2%	214	13.9%	313	20.3%
Ashford (T)	1,961	2.6%	468	23.9%	78	4.0%	0	0.0%	366	18.7%	107	5.5%
Carrollton (T)	1,207	1.6%	268	22.2%	57	4.7%	7	0.6%	197	16.3%	150	12.4%
Cattaraugus (V)	960	1.3%	167	17.4%	49	5.1%	31	3.2%	188	19.6%	181	18.9%
Coldspring (T)	658	0.9%	102	15.5%	17	2.6%	0	0.0%	130	19.8%	85	12.9%
Conewango (T)	1,785	2.4%	220	12.3%	352	19.7%	31	1.7%	161	9.0%	861	48.2%
Dayton (T)	1,149	1.5%	329	28.6%	46	4.0%	0	0.0%	184	16.0%	144	12.5%
Delevan (V)	1,043	1.4%	234	22.4%	62	5.9%	0	0.0%	269	25.8%	215	20.6%
East Otto (T)	974	1.3%	142	14.6%	46	4.7%	9	0.9%	145	14.9%	99	10.2%
Ellicottville (T)	1,059	1.4%	351	33.1%	14	1.3%	0	0.0%	77	7.3%	127	12.0%
Ellicottville (V)	256	0.3%	117	45.7%	40	15.6%	0	0.0%	39	15.2%	13	5.1%
Farmersville (T)	1,073	1.4%	322	30.0%	116	10.8%	0	0.0%	218	20.3%	277	25.8%
Franklinville (T)	1,150	1.5%	314	27.3%	21	1.8%	26	2.3%	135	11.7%	83	7.2%
Franklinville (V)	1,652	2.2%	273	16.5%	128	7.7%	0	0.0%	304	18.4%	274	16.6%
Freedom (T)	2,261	3.0%	393	17.4%	119	5.3%	0	0.0%	301	13.3%	243	10.7%
Gowanda (V)	1,834	2.4%	337	18.4%	256	14.0%	24	1.3%	409	22.3%	215	11.7%
Great Valley (T)	1,991	2.6%	419	21.0%	78	3.9%	12	0.6%	274	13.8%	56	2.8%
Hinsdale (T)	2,113	2.8%	448	21.2%	139	6.6%	0	0.0%	493	23.3%	308	14.6%
Humphrey (T)	703	0.9%	78	11.1%	8	1.1%	0	0.0%	60	8.5%	105	14.9%
Ischua (T)	736	1.0%	215	29.2%	5	0.7%	0	0.0%	162	22.0%	154	20.9%
Leon (T)	1,244	1.6%	137	11.0%	177	14.2%	50	4.0%	192	15.4%	192	15.4%
Little Valley (T)	617	0.8%	144	23.3%	3	0.5%	0	0.0%	255	41.3%	37	6.0%
Little Valley (V)	1,058	1.4%	171	16.2%	40	3.8%	0	0.0%	195	18.4%	295	27.9%
Lyndon (T)	685	0.9%	156	22.8%	26	3.8%	0	0.0%	124	18.1%	119	17.4%

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	American Community Survey 5-year Population Estimates (2022)									
			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
Machias (T)	2,310	3.1%	566	24.5%	77	3.3%	0	0.0%	348	15.1%	393	17.0%
Mansfield (T)	843	1.1%	127	15.1%	35	4.2%	0	0.0%	80	9.5%	36	4.3%
Napoli (T)	1,171	1.5%	241	20.6%	127	10.8%	0	0.0%	192	16.4%	169	14.4%
New Albion (T)	1,021	1.3%	160	15.7%	64	6.3%	31	3.0%	89	8.7%	108	10.6%
Olean (C)	13,937	18.4%	2,469	17.7%	846	6.1%	54	0.4%	2,539	18.2%	3,266	23.4%
Olean (T)	1,881	2.5%	491	26.1%	55	2.9%	0	0.0%	322	17.1%	262	13.9%
Otto (T)	777	1.0%	230	29.6%	11	1.4%	7	0.9%	159	20.5%	49	6.3%
Perrysburg (T)	1,518	2.0%	498	32.8%	42	2.8%	0	0.0%	430	28.3%	314	20.7%
Persia (T)	596	0.8%	143	24.0%	66	11.1%	9	1.5%	101	16.9%	66	11.1%
Portville (T)	2,612	3.5%	656	25.1%	136	5.2%	0	0.0%	269	10.3%	238	9.1%
Portville (V)	892	1.2%	156	17.5%	15	1.7%	0	0.0%	154	17.3%	86	9.6%
Randolph (T)	2,469	3.3%	476	19.3%	84	3.4%	0	0.0%	294	11.9%	222	9.0%
Red House (T)	27	<0.1%	7	25.9%	1	3.7%	0	0.0%	2	7.4%	2	7.4%
Salamanca (C)	5,929	7.8%	936	15.8%	381	6.4%	57	1.0%	1,092	18.4%	1,492	25.2%
Salamanca (T)	470	0.6%	131	27.9%	9	1.9%	2	0.4%	75	16.0%	84	17.9%
South Dayton (V)	541	0.7%	244	45.1%	20	3.7%	0	0.0%	94	17.4%	166	30.7%
South Valley (T)	250	0.3%	115	46.0%	18	7.2%	0	0.0%	55	22.0%	78	31.2%
Yorkshire (T)	2,784	3.7%	530	19.0%	157	5.6%	0	0.0%	581	20.9%	612	22.0%
Cattaraugus County	**75,690**	**100.0%**	**15,565**	**20.6%**	**4,299**	**5.7%**	**388**	**0.5%**	**12,635**	**16.7%**	**12,936**	**17.1%**

Source: U.S Census Bureau 2020; U.S. Census Bureau ACS 2023

Note: Allegany (V) is 100% within Allegany (T); Cattaraugus (V) is 100% within New Albion (T); Delevan (V) is 100% within Yorkshire (T); Ellicottville (V) is 100% within Ellicottville (T); Franklinville (V) is 100% within Franklinville (T); Little Valley (V) is 100% within Little Valley (T); Portville (V) is 100% within Portville (T); South Dayton (V) is 100% within Dayton (T). Subtracted village totals from town to assign correct town totals.

2.36 persons per household. This number was used to calculate the Non-English-speaking population.

Table 10-10. Cattaraugus County ALICE Data

Name	Total Households	% Below ALICE Threshold
Allegany (T)	2,676	39
Allegany (V)	-	-
Ashford (T)	879	30
Carrollton (T)	527	44
Cattaraugus (V)	-	-
Coldspring (T)	286	44
Conewango (T)	561	55
Dayton (T)	691	39
Delevan (V)	-	-
East Otto (T)	451	36
Ellicottville (T)	586	41
Ellicottville (V)	-	-
Farmersville (T)	480	61
Franklinville (T)	1,129	42
Franklinville (V)	-	-
Freedom (T)	939	32
Gowanda (V)	-	-
Great Valley (T)	806	40
Hinsdale (T)	939	46
Humphrey (T)	296	25
Ischua (T)	310	45
Leon (T)	354	33
Little Valley (T)	671	43
Little Valley (V)	-	-
Lyndon (T)	303	41
Machias (T)	925	44
Mansfield (T)	287	36
Napoli (T)	493	36
New Albion (T)	847	39
Olean (C)	6,142	54
Olean (T)	898	33
Otto (T)	353	40
Perrysburg (T)	694	38
Persia (T)	930	44
Portville (T)	1,405	40
Portville (V)	-	-
Randolph (T)	888	37
Red House (T)	-	-
Salamanca (C)	2,420	60

Name	Total Households	% Below ALICE Threshold
Salamanca (T)	244	53
South Dayton (V)	-	-
South Valley (T)	150	45
Yorkshire (T)	1,663	51
Cattaraugus County (Total)	**32,016**	**29**

Source: United For ALICE 2024
Note: Totals for the Town of Red House or the Villages of Alleghany, Cattaraugus, Delevan, Ellicottville, Franklinville, Gowanda, Little Valley, Portville, and South Dayton were unavailable.

10.2.2 General Building Stock

Damage to buildings is dependent upon several factors, including wind speed, storm duration, and path of the storm track. Building construction also plays a major role in the extent of damage resulting from a severe storm. 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. Furthermore, high-rise buildings are also very vulnerable structures. Hazus estimates that there will be no damages in the event of a 500-year MRP wind event.

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.

The results of potential damage states for buildings in Cattaraugus County categorized by general occupancy classes (i.e., residential, commercial, industrial, etc.) from Hazus are summarized in Table 10-13 for the 500-year MRP event. Hazus estimates that there will be $1,923,242 in damages to structures caused by the 500-year MRP event, with the estimated residential damage making up the entirety of the amount.

Potential building damage was evaluated by Hazus across the following damage categories: none, slight, moderate, extensive, and complete. Table 10-11 provides definitions of these five categories of damage for a light wood-framed building. Definitions for other building types are included in the Hazus technical manual documentation.

Table 10-11. 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.

Damage Category	Description
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: FEMA 2022

Building damage as a result of the 500-year MRP hurricanes was estimated for each municipality using Hazus. Table 10-12 summarizes estimated total building and content losses caused by the 500-year MRP events by building occupancy class. For the 500-year MRP event, up to 20 buildings will incur minor damages by the 500-year MRP event and one will be moderately damaged. The majority of the losses are estimated to the residential occupancy class.

Table 10-12. Estimated Building Damages (Structure and Contents) from the 500-Year MRP Hurricane Events

Occupancy Class	Total Number of Buildings in Occupancy	Severity of Expected Damage	500-Year Mean Return Period Hurricane	
			Building Count	Percent Buildings in Occupancy Class
Residential Exposure (Single and Multi-Family Dwellings)	38,442	NONE	38,431	100.0%
		MINOR	10	<0.1%
		MODERATE	1	<0.1%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%
Commercial Buildings	2,597	NONE	2,593	99.8%
		MINOR	4	0.2%
		MODERATE	0	0.0%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%
Industrial Buildings	182	NONE	181	99.5%
		MINOR	1	0.5%
		MODERATE	0	0.0%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%
Government, Religion, Agricultural, and Education Buildings	3,345	NONE	3,340	99.9%
		MINOR	5	0.1%
		MODERATE	0	0.0%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%

Source: Hazus V6.1

Table 10-13. Estimated Building Losses Caused by the 500-Year MRP Hurricane by Occupancy

Jurisdiction	Building Loss–500-Year Mean Return Period Hurricane				
	Estimated Building Losses (All Occupancies)	Estimated Building Losses (Residential)	Estimated Building Losses (Commercial)	Estimated Building Losses (Industrial)	Estimated Damages (All Other Occupancies)
Allegany (T)	$227,107	$227,107	$0	$0	$0
Allegany (V)	$72,292	$72,292	$0	$0	$0
Ashford (T)	$56,372	$56,372	$0	$0	$0
Carrollton (T)	$53,282	$53,282	$0	$0	$0
Cattaraugus (V)	$30,194	$30,194	$0	$0	$0
Coldspring (T)	$40,447	$40,447	$0	$0	$0
Conewango (T)	$84,250	$84,250	$0	$0	$0
Dayton (T)	$46,478	$46,478	$0	$0	$0
Delevan (V)	$8,344	$8,344	$0	$0	$0
East Otto (T)	$32,401	$32,401	$0	$0	$0
Ellicottville (T)	$3,469	$3,469	$0	$0	$0
Ellicottville (V)	$0	$0	$0	$0	$0
Farmersville (T)	$10,191	$10,191	$0	$0	$0
Franklinville (T)	$0	$0	$0	$0	$0
Franklinville (V)	$0	$0	$0	$0	$0
Freedom (T)	$31,205	$31,205	$0	$0	$0
Gowanda (V)	$34,476	$34,476	$0	$0	$0
Great Valley (T)	$49,927	$49,927	$0	$0	$0
Hinsdale (T)	$77,867	$77,867	$0	$0	$0
Humphrey (T)	$11,972	$11,972	$0	$0	$0
Ischua (T)	$0	$0	$0	$0	$0
Leon (T)	$62,991	$62,991	$0	$0	$0
Little Valley (T)	$25,516	$25,516	$0	$0	$0
Little Valley (V)	$37,606	$37,606	$0	$0	$0
Lyndon (T)	$0	$0	$0	$0	$0
Machias (T)	$26,862	$26,862	$0	$0	$0

Jurisdiction	Building Loss–500-Year Mean Return Period Hurricane				
	Estimated Building Losses (All Occupancies)	Estimated Building Losses (Residential)	Estimated Building Losses (Commercial)	Estimated Building Losses (Industrial)	Estimated Damages (All Other Occupancies)
Mansfield (T)	$30,088	$30,088	$0	$0	$0
Napoli (T)	$65,016	$65,016	$0	$0	$0
New Albion (T)	$55,523	$55,523	$0	$0	$0
Olean (C)	$201,175	$201,175	$0	$0	$0
Olean (T)	$76,877	$76,877	$0	$0	$0
Otto (T)	$29,768	$29,768	$0	$0	$0
Perrysburg (T)	$44,569	$44,569	$0	$0	$0
Persia (T)	$18,706	$18,706	$0	$0	$0
Portville (T)	$96,529	$96,529	$0	$0	$0
Portville (V)	$24,456	$24,456	$0	$0	$0
Randolph (T)	$98,284	$98,284	$0	$0	$0
Red House (T)	$23,288	$23,288	$0	$0	$0
Salamanca (C)	$14,307	$14,307	$0	$0	$0
Salamanca (T)	$19,240	$19,240	$0	$0	$0
South Dayton (V)	$18,581	$18,581	$0	$0	$0
South Valley (T)	$32,698	$32,698	$0	$0	$0
Yorkshire (T)	$50,889	$50,889	$0	$0	$0
Cattaraugus County	**$1,923,242**	**$1,923,242**	**$0**	**$0**	**$0**

Source: Cattaraugus County 2024; RS Means 2024; Hazus V6.1

10.2.3 Community Lifelines and Other Critical Facilities

Critical facilities 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. For example, vulnerable populations in Cattaraugus County are at risk if power loss results in interruption of heating and cooling services, stagnated hospital operations, and potable water supplies. Emergency personnel such as police, fire, and emergency medical services (EMS) will not be able to effectively respond in a power loss event to maintain the safety of its citizens.

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. Similarly, heavy snowfall and ice storms, associated with extreme cold temperature events, can interrupt power as well. Backup power is recommended for critical facilities and infrastructure. During extreme temperature events, facilities serving as warming or cooling shelters may be opened. Power supply is vital at these facilities.

Hazus estimates the probability that critical facilities (i.e., medical facilities, fire/EMS, police, emergency operation centers [EOC], schools, and user-defined facilities such as shelters and municipal buildings) may sustain damage as a result of the 500-year MRP hurricane wind event. Additionally, Hazus estimates the loss of use for each facility in number of days. Overall, Hazus estimates that none of the critical facilities in Cattaraugus County are estimated to experience damage or loss of functionality due to a 500-year MRP hurricane wind event as seen in Table 10-14.

Table 10-14. Estimated Damage for Critical Facilities in Cattaraugus County for the 500-Year MRP Hurricane Event

Name	Loss of Days	Average Percent Probability of Sustaining Damage 500-Year Mean Return Period Hurricane			
		Minor	Moderate	Severe	Complete
Lifelines					
Communications	0	0.3%	0.0%	0.0%	0.0%
Energy	0	0.3%	0.0%	0.0%	0.0%
Food, Hydration, Shelter	0	0.3%	0.0%	0.0%	0.0%
Hazardous Materials	0	0.3%	0.0%	0.0%	0.0%
Health and Medical	0	0.1%	0.0%	0.0%	0.0%
Safety and Security	0	0.3%	0.0%	0.0%	0.0%
Transportation	0	0.3%	0.0%	0.0%	0.0%
Water Systems	0	0.3%	0.0%	0.0%	0.0%

Source: Hazus V6.1

10.2.4 Economy

Severe storm events can have short- and long-lasting impacts on the economy. When a business is closed during storm recovery, there is lost economic activity in the form of day-to-day business and wages to employees. Overall, economic impacts include the loss of business function (e.g., tourism, recreation), damage to inventory, relocation costs, wage loss, and rental loss due to the repair/replacement of buildings.

Impacts to transportation lifelines affect both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting and goods transport) transportation needs. Utility infrastructure (power lines, gas lines, electrical systems) could suffer damage and impacts can result in the loss of power, which can impact business operations and can impact heating or cooling provision to the population.

Hazus estimates the total economic loss associated with the 500-year MRP hurricane wind events (direct building losses and business interruption losses). Direct building losses are the estimated costs to repair or replace the damage caused to the building. This is reported in the "Impact on General Building Stock" section discussed earlier. Business interruption losses are the losses associated with the inability to operate a business because of the wind damage sustained during the storm or the temporary living expenses for those displaced from their home because of the event.

Debris management can be costly and may also impact the local economy. Hazus estimates the amount of building and tree debris that may be produced as a result of the 500-year MRP hurricane wind event. Because the estimated debris production does not include flooding, this is likely a conservative estimate and may be higher if multiple impacts occur. According to the Hazus Hurricane User Manual, estimates of weight and volume of eligible tree debris consist of downed trees that would likely be collected and disposed at public expense. Hazus estimates that the 500-year MRP hurricane wind event may result in 11.9 tons of brick and wood debris and 27,584 tons of tree debris for Cattaraugus County. Table 10-15 details the estimated debris created by the 500-year MRP hurricane wind event by municipality.

Table 10-15. Estimated Debris Created During the 500-Year Mean Return Period Hurricane Wind Event

Jurisdiction	Estimated Debris Created During the 500-Year Mean Return Period Hurricane Wind Event			
	Brick and Wood (tons)	Concrete and Steel (tons)	Tree (tons)	Eligible Tree Volume (tons)
Allegany (T)	0.7	0.0	3,539.4	2,325.7
Allegany (V)	0.3	0.0	545.1	535.5
Ashford (T)	0.0	0.0	1,914.1	1,148.6
Carrollton (T)	0.0	0.0	1,794.0	747.8
Cattaraugus (V)	0.1	0.0	514.0	359.8
Coldspring (T)	0.3	0.0	663.7	449.7
Conewango (T)	0.6	0.0	1,375.1	962.6
Dayton (T)	0.2	0.0	768.2	581.6
Delevan (V)	0.0	0.0	0.0	0.0
East Otto (T)	<0.1	0.0	1,098.7	659.3
Ellicottville (T)	0.0	0.0	117.8	70.7
Ellicottville (V)	0.0	0.0	0.0	0.0
Farmersville (T)	0.0	0.0	0.0	0.0
Franklinville (T)	0.0	0.0	0.0	0.0
Franklinville (V)	0.0	0.0	0.0	0.0
Freedom (T)	0.0	0.0	0.0	0.0
Gowanda (V)	0.0	0.0	531.2	478.1
Great Valley (T)	0.6	0.0	358.5	322.6
Hinsdale (T)	0.4	0.0	898.0	987.8
Humphrey (T)	0.1	0.0	99.9	96.4

Jurisdiction	Estimated Debris Created During the 500-Year Mean Return Period Hurricane Wind Event			
	Brick and Wood (tons)	Concrete and Steel (tons)	Tree (tons)	Eligible Tree Volume (tons)
Ischua (T)	0.0	0.0	0.0	0.0
Leon (T)	0.3	0.0	1,072.3	750.6
Little Valley (T)	0.3	0.0	427.0	256.2
Little Valley (V)	0.2	0.0	637.7	382.6
Lyndon (T)	0.0	0.0	0.0	0.0
Machias (T)	0.0	0.0	137.9	82.8
Mansfield (T)	0.5	0.0	534.6	320.7
Napoli (T)	0.4	0.0	1,084.0	701.0
New Albion (T)	0.3	0.0	943.3	612.6
Olean (C)	3.0	0.0	131.2	1,032.6
Olean (T)	0.4	0.0	865.1	979.7
Otto (T)	<0.1	0.0	858.8	522.5
Perrysburg (T)	0.0	0.0	686.8	618.0
Persia (T)	0.0	0.0	301.3	243.6
Portville (T)	0.7	0.0	1,146.3	1,261.1
Portville (V)	0.2	0.0	293.6	323.0
Randolph (T)	0.8	0.0	1,580.6	1,106.4
Red House (T)	<0.1	0.0	849.5	347.1
Salamanca (C)	1.1	0.0	21.7	10.3
Salamanca (T)	0.2	0.0	386.7	209.4
South Dayton (V)	0.1	0.0	316.3	221.4
South Valley (T)	0.3	0.0	527.4	368.4
Yorkshire (T)	0.0	0.0	564.1	338.5
Cattaraugus County	11.9	0.0	27,584.0	20,414.5

Source: Hazus V6.1

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

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

Based on the 2022 Census of Agriculture, 833 farms were present in Cattaraugus County, encompassing 162,947 acres of total farmland. The average farm size was 196 acres. Cattaraugus County farms had a total market value of products sold of $144,771,000, averaging $173,795 per farm. Table 10-16 lists the acreage of agricultural land exposed to the severe storm and extreme temperature hazard (USDA 2022).

Table 10-16. Agricultural Land in Cattaraugus County in 2022

Number of Farms	Land in Farms (acres)	Total Cropland (acres)	Total Pastureland (acres)	Acres Irrigated
833	162,947	84,781	12,074	510

Source: USDA 2022

Loss of income is another factor in assessment of impacts of drought. 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. Reduced water supply affects use of rivers and other water bodies. Hydropower production may also be impacted by drought (NYS DHSES 2023).

Because agriculture and related sectors, including forestry, fisheries, and water activities, rely on surface and subsurface water supplies, they are vulnerable to numerous economic impacts. Droughts often result in loss of crop yields and livestock production, increased issues with insect infestations, increased forest diseases, and reduced growth. Forest and grass fires also increase substantially during extended drought periods, posing higher levels of risk to human and wildlife populations, as well as to property (NIDIS 2023).

10.2.5 Natural, Historic, and Cultural Resources

Natural

The impact of severe storm events on the environment varies, but researchers are finding that the long-term impacts of more severe storms can be destructive to the natural and local environment. National organizations such as USGS and NOAA have been studying and monitoring the impacts of extreme weather phenomena as it impacts long term climate change, streamflow, river levels, reservoir elevations, rainfall, floods, landslides, erosion, etc. For example, severe storms that create 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 (United States Environmental Protection Agency 2023). Researchers also believe that a greater number of diseases will spread across ecosystems because of impacts that severe storms and climate change will have on water supplies (United States Climate Resilience Toolkit 2016).

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 (United State Geological Survey 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

Winds associated with severe storms can cause damage or destruction to the County's historical infrastructure. Many historical buildings and homes which may not be built to modern building code standards to withstand such high winds and are more vulnerable than other infrastructure.

Historic sites are at risk from the extreme cold or freeze hazard. Historic buildings may be susceptible to damage from extreme temperature conditions. 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 (refer to Chapter 10 (Wildfire) for more information). 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

Winds associated with severe storms can cause damage or destruction to the County's cultural resources. Cultural resources may be located inside of historical buildings and homes, which may not be built to withstand such high winds and are more vulnerable or be located outdoors. Outdoor events are likely to be postponed or cancelled as the result of severe storm conditions.

Cultural heritage sites, particularly those exposed to the elements, are subject to weathering. Climate change is a potential threat to these sites as it exacerbates the expected rates of decay and contributes to the appearance of new decay. Climatic changes may aggravate the physical, chemical, and biological mechanisms causing degradation by affecting the structure or composition of building materials. Changes in temperature, precipitation, atmospheric moisture, and wind intensity, in addition to sea-level rise, desertification, and the interaction between climatic changes and air pollution, have been identified as concerns by the United Nations Educational, Scientific and Cultural Organization (Sesana, et al. 2021).

10.3 FUTURE CHANGES THAT MAY AFFECT RISK

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The following sections examine potential conditions that may affect hazard vulnerability.

10.3.1 Potential or Planned Development

Any areas of growth could be potentially impacted by the severe storm hazard because the entire county is exposed and vulnerable to the wind hazard associated with severe storms. However, due to increased standards and codes, new development may be less vulnerable to the severe storm hazard compared to the aging building stock in the County. Please refer to Chapter 3 and Volume II for additional information regarding the areas targeted for future growth and development in the County.

10.3.2 Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 4 percent since 2010. Population projections from Cornell University reveal the County's population is anticipated to continue decreasing. The population is projected to decline to 73,254 persons in 2030 and to 70,468 by 2040 (Cornell University 2018). Despite having a decrease in population, 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. Furthermore, changes in the density of population can create issues for residents during evacuation of a natural hazard severe storm event. Historically, flooding and debris with associated severe storm events have severely impacted transportation corridors as well as infrastructure. Refer to Chapter 3 (County Profile), which includes a discussion on population trends for the County.

10.3.3 Climate Change

As discussed previously, the entire 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 in North America 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). Chapter 7 (Flood) includes a discussion related to the impact of climate change due to increases in rainfall. An increase in storms will produce more wind events and may increase tornado activity. 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 extreme wind events.

10.3.4 Change of Vulnerability Since 2020 Cattaraugus County HMP

Overall, the County's vulnerability has not changed, and the entire County will continue to be exposed and vulnerable to severe storm events.

11. SEVERE WINTER STORM

11.1 HAZARD PROFILE

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

11.1.1 Hazard Description

A winter storm is a weather event in which the main types of precipitation are snow, sleet, or freezing rain. They can be a combination of heavy snow, blowing snow, and dangerous wind chills. According to the National Oceanic and Atmospheric Administration (NOAA) National Severe Storms Laboratory (n.d.), the three basic components needed to make a winter storm include the following (NOAA NSSL n.d.):

- Below freezing temperatures (cold air) in the clouds and near the ground to make snow and ice
- Lift, something to raise the moist air to form clouds and cause precipitation, such as warm air colliding with cold air and being forced to rise over the cold dome or air flowing up a mountainside (oleographic lifting)
- Moisture to form clouds and precipitation, such as air blowing across a large lake or the ocean

Some winter storms can immobilize an entire region, while others might only affect a single community. Winter storms typically are accompanied by low temperatures, high winds, freezing rain or sleet, and heavy snowfall. The aftermath of a winter storm can have an impact on a community or region for days, weeks, or even months; potentially causing cold temperatures, flooding, storm surge, closed and blocked roadways, downed utility lines, and power outages. Cattaraugus County's winter storms include blizzards, snowstorms, and ice storms. Extreme cold temperatures and wind chills are associated with winter storms. For more information on extreme cold temperatures, refer to the Chapter 10 (Severe Storm).

Heavy Snow

According to the National Oceanic and Atmospheric Administration (NOAA), snow is precipitation in the form of ice crystals. It originates 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 snow crystals or a snow pellet, which then falls to the earth. Snow falls in different forms: snowflakes, snow pellets, or sleet. Snowflakes are clusters of ice crystals that form from a cloud (NOAA 2024). Snow pellets are opaque ice particles in the atmosphere. They form as ice crystals fall through super-cooled cloud droplets, which are below freezing but remain a liquid. The cloud droplets then freeze to the crystals.

Sleet

Sleet is made up of drops of rain that freeze into ice as they fall through colder air layers. They are usually smaller than 0.30 inches in diameter (NSSL 2021).

Blizzards

A blizzard is a winter snowstorm with sustained or frequent wind gusts of 35 miles per hour (mph) or more, accompanied by falling or blowing snow reducing visibility to or below 0.25 mile. These conditions must be predominant over a 3-hour period to be considered a blizzard. Extremely cold temperatures often are associated with blizzard conditions but are not a formal part of the definition. The hazard, created by the combination of snow, wind, and low visibility, significantly increases when temperatures are below 20°F. A severe blizzard is categorized as having temperatures near or below 10°F, winds exceeding 45 mph, and visibility reduced by snow to near zero. 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 conditions caused by the blowing snow (Lam 2019).

Ice Storms

An ice storm describes those events when damaging accumulations of ice are expected during freezing rain situations. Significant ice accumulations are usually of 0.25 inches or greater (NWS 2013). Heavy accumulations of ice can bring down trees, power lines, utility poles, and communication towers. Ice can disrupt communications and power for days. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians (Dolce 2012).

11.1.2 Location

The climate of the State of New York is marked by abundant snowfall. Winter storms 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. Although the entire state is subject to winter storms, the easternmost and west-central portions of the state are more likely to suffer under winter storm occurrences than any other location (NYS DHSES 2023). The State of New York receives an average seasonal amount of 40 inches of snow or more, with the exception of the state's coastal region. The average annual snowfall is greater than 70 inches over 60 percent of the State of New York's area, with Cattaraugus County’s averages less than 60 to 95 inches annually with the New Albion, Napoli, and Perrysburg areas averaging 96 to 140 inches annually (NYS DHSES 2023).

11.1.3 Extent

The magnitude or severity of a severe winter storm depends on several factors, including snowfall rates, regional climatological susceptibility to snowstorms, snowfall amounts, wind speeds, temperatures, visibility, storm duration, topography, time of occurrence during the day and week (e.g., weekday versus weekend), and time of season.

The extent of a severe winter storm can be classified both by meteorological measurements and by evaluating societal impacts. The NOAA’s National Climatic Data Center (NCDC) is currently producing the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two-thirds of the United States. The RSI ranks snowstorm impacts on a scale from 1 to 5 and is based on the spatial extent of the storm, the amount of snowfall, and the interaction of the extent and snowfall totals with population. The NCDC has analyzed and assigned RSI values to over 500 storms since 1900 (NOAA n.d.). Table 11-1. presents the five RSI ranking categories.

Table 11-1. RSI Ranking Categories

Category	Description	RSI Value
1	Notable	1–3
2	Significant	3–6
3	Major	6–10
4	Crippling	10–18
5	Extreme	18.0+

Source: NOAA 2020
Note: RSI = Regional Snowfall Index

The National Weather Service (NWS) operates a widespread network of observing systems, such as geostationary satellites, Doppler radars, and automated surface observing systems that feed into the current state-of-the-art numerical computer models to provide a look into what will happen next, ranging from hours to days. The models are then analyzed by NWS meteorologists who then write and disseminate forecasts. According to NWS (NWS 2021), the magnitude of a severe winter storm can be classified into five main categories by event type, shown in Table 11-2.

Additionally, the NWS uses winter weather watches, warnings, and advisories to help people anticipate what to expect in the days and hours prior to an approaching storm (NWS 2021). Refer to Figure 11-1 for the warning thresholds.

Table 11-2. Winter Storm Category Thresholds

Winter Storm Type	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

Figure 11-1. Winter Storm Warning Thresholds

Source: NWS 2021

11.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Between 1954 and 2024, Cattaraugus County was included in nine major disaster (DR) or emergency (EM) declarations for severe winter storm-related events (FEMA 2024). Table 11-3 lists these declarations.

Table 11-3. FEMA Declarations for Severe Winter Storm Events in Cattaraugus County (1954 to 2024)

Event Date	Declaration Date	Declaration Number	Description
March 19, 1976	March 19, 1976	DR-494	New York Ice Storm, Severe Storms, Flooding
January 29, 1977	January 29, 1977	EM-3027	New York Snowstorms
February 5, 1977	February 5, 1977	DR-527	New York Snowstorms
March 13-17, 1993	March 17, 1993	EM-3107	New York Severe Blizzard
January 1-15, 1999	January 15, 1999	EM-3136	New York Winter Storms
November 19-21, 2000	December 4, 2000	EM-3157	New York Snowstorm
December 24-29, 2001	December 31, 2001	EM-3170	New York Snowstorm
November 7-26, 2014	December 22, 2014	DR-4204	New York Severe Winter Storm, Snowstorm, and Flooding
November 18-21, 2022	November 20, 2022	EM-3589	New York Severe Winter Storm and Snowstorm

Sources: FEMA 2024

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in contiguous counties. Between 2018 and 2024, Cattaraugus County was included in three USDA severe winter storm-related agricultural disaster declarations; refer to Table 11-4 (USDA 2024).

Table 11-4. USDA Declarations for Severe Winter Storm Events in Cattaraugus County (2018 to 2024)

Event Date	USDA Declaration Number	Description
April 1–June 1, 2020	S4903	Frost, Freeze
May 5–9, 2020	S4905	Frost
May 14–August 9, 2023	S5485	Frost, Freeze

Sources: USDA 2024

Previous Events

For this HMP update, known hazard events that impacted Cattaraugus County between 2018 and 2024 are discussed in Table 11-5. For events prior to 2018, refer to the 2020 Cattaraugus County HMP.

Table 11-5. Severe Winter Storm Events in Cattaraugus County (2018 to 2024)

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
February 1–2, 2015	N/A	N/A	Countywide	Low pressure tracked across Ohio and Pennsylvania to the Maryland coast. The low brought a general eight to fourteen inches of snow to the entire region. There was $20,000 of property damage reported in Cattaraugus County.
February 14–15, 2015	N/A	N/A	Countywide	A strong clipper crossed the Great Lakes and brought snow and blowing snow to the region and some of the coldest air of the season. The snowfall amounts were enhanced downwind of Lake Ontario and upslope east of Lake Erie where snowfall amounts around 1 foot were recorded. Gusty winds accompanied the system and produced reduced visibilities in blowing snow. Combined with the winds, wind chill temperatures of minus 25 to minus 35 were recorded. There was $20,000 of property damage reported in Cattaraugus County.
February 15–16, 2016	N/A	N/A	Countywide	Low pressure moved north across central Pennsylvania and central New York. The heavy snow began to fall during the early morning hours bringing the morning commute to a standstill. There was $15,000 of property damage reported in Cattaraugus County.

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
March 13–15, 2017	N/A	N/A	Countywide	Low pressure over the Great Lakes combined with low pressure lifting north along the Atlantic coast to bring significant snowfall to the entire region. Snowfall total reached 25 inches in Perrysburg and Little Valley. Most schools and some business closed, and the state enacted a travel ban on tractor trailers on major interstates. There was $75,000 of property damage reported in Cattaraugus County.
January 12–13, 2018	N/A	N/A	Countywide	A developing winter storm brought first a wintry mix of precipitation during the evening of the 12th and then heavy snow through the morning of the 13th. Snowfall totals reached 13 inches in Perrysburg. There was $25,000 in property damage reported in Cattaraugus County.
March 1–2, 2018	N/A	N/A	Countywide	A weak low pressure strengthened as it moved across Pennsylvania and merged with a low along the eastern coast. The storm brought a blanket of heavy, wet snow across the entire region during from late afternoon on the first through the late morning through early afternoon of the second. There were also several reports of downed trees and wires due to the combination of the weight of the snow and the brisk winds that accompanied the storm. Snowfall totals reached 22 inches in Perrysburg, 19 inches Franklinville, and 16 inches in Little Valley. There was $45,000 in property damage reported in Cattaraugus County.
March 9–10, 2018	N/A	N/A	Countywide	A Nor'easter tracked up the New England coast from March 7–9, 2018, bringing a long period of moderate snow across the eastern portions of the area. Snowfall totals reached 12 inches in Perrysburg. No damages were reported.
March 13–15, 2018	N/A	N/A	Countywide	Another March Nor'easter impacted the Eastern Great Lakes region. A deepening surface low 'bombed' off the Atlantic shoreline and brought a combination of synoptic and lake enhanced snow to the region. Snowfall totals reached 15.6 inches in Perrysburg. No damages were reported.
November 10, 2018	N/A	N/A	Countywide	Very cold air moved over the Great Lakes from the upper Midwest. Temperatures at 850 mb temps fell off to around -12C with deep equilibrium levels to near 15,000 feet as an upper trough passed through.

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
				Snowfall totals reached 13.8 inches in Perrysburg. No damages were reported.
November 15–16, 2018	N/A	N/A	Countywide	A complex system moved into the area with wildly varying thermal profiles. The system had very marginal cold air to work with, particularly in western New York. Snowfall totals reached 8.3 inches in Perrysburg. No damages were reported.
January 19–20, 2019	N/A	N/A	Countywide	A system tracked along the New York/Pennsylvania line and spread heavy snow across the region over the weekend. Snowfall totals reached 18 inches in Little Valley. No damages were reported.
November 11–12, 2019	N/A	N/A	Countywide	A cold front moved slowly south across the area and stalled just south of the area. Snowfall totals reached 10 inches in Perrysburg. No damages were reported.
December 14–15, 2019	N/A	N/A	Countywide	A complex scenario unfolded across the eastern Great Lakes. A southern stream shortwave moving out of the Ohio Valley phased with a northern stream trough over the western Great Lakes, and the resulting trough became negatively tiled as it crossed the eastern Great Lakes. Snowfall totals reached 9 inches in Ellicotville. No damages were reported.
February 27–28, 2020	N/A	N/A	Countywide	Surface low pressure advanced from the Ohio Valley toward central New York. There was widespread snow across the area rather than a mix, and it also yielded an extended period of west-northwesterly flow lake effect snow in its wake. There were wind gusts reported up to 60 mph. Snowfall totals reached 20.3 inches in Perrysburg. No damages were reported.
December 1–2, 2020	N/A	N/A	Countywide	Low pressure intensified as it tracked northward from Pennsylvania across west-central New York. The low then became vertically stacked and stalled out across southern Quebec. This initially brought soaking rain to the entire area, but as cold air advection developed behind the low, precipitation very gradually changed from rain to snow. Snowfall totals reached 9.2 inches in Perrysburg and 9 inches in Cattaraugus. No damages were reported.
December 25–26, 2020	N/A	N/A	Countywide	A complex evolution of a storm system moving across the area on Christmas Eve allowed for a slow encroachment of cold air into western New York. Snowfall totals

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
				reached 10 inches in Perrysburg with lake effect snow totals reaching 15.2 inches. No damages were reported.
January 16–17, 2022	N/A	N/A	Countywide	Low pressure across the Carolinas rapidly intensified to 980 hPa as it tracked across eastern Pennsylvania and New York. This brought a deepening surface low track inland of the coast and the climatologically favored baroclinic zone along the periphery of the Gulf Stream. A very strong southeasterly low-level jet supported a strong warm conveyor belt, which resulted in a clearly defined deformation zone developing northwest of the storm early on January 17 and lingering over much of western New York with extreme snowfall rates for several hours. No damages were reported.
February 2–4, 2022	N/A	N/A	Countywide	A frontal boundary slowly sagged southward through the area. This allowed for deep cold air to make its way south of the Pennsylvania state line. A series of weak disturbances then worked down this front bringing several rounds of moderate to heavy snow. Snowfall totals reached 16.8 inches in Perrysburg. No damages were reported.
March 11–12, 2022	N/A	N/A	Countywide	An unphased low pressure system advanced from south to north through New England. Snow pushed northward to the west of it through all of New York State. The system snow was supplemented by light lake effect as the low-pressure system advanced northward and colder air wrapped into the area. No damages were reported.
March 26–27, 2022	N/A	N/A	Countywide	A deep upper trough rotated through the lower Great Lakes with successive short-wave troughs running through the amplified upper-level flow. This brought a period of prolonged snows to the area with embedded heavier elements that were enhanced by lake effect and upslope snow processes. No damages were reported.
December 23–26, 2022	N/A	N/A	Countywide	A historic lake effect blizzard occurred northeast of Lake Erie and Lake Ontario during the Christmas holiday weekend. The combination of high winds in excess of 70 mph and heavy lake effect snow resulted in devastating impacts across western New York and also east of Lake

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
				Ontario from December 23 through December 27. Wind speeds gusts were reported over 70 mph. No damages were reported.

Source: NOAA NCEI 2023

11.1.5 Probability of Future Occurrences

Information on previous severe winter storm occurrences in the County was used to calculate the probability of future occurrence of such events, as summarized in Table 11-6. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. In Chapter 14, the identified hazards of concern for Cattaraugus County were ranked. Based on historical records and input from the Steering Committee, the probability of occurrence for severe winter storms in the County is considered "frequent".

Table 11-6. Probability of Future Severe Winter Storm Events in Cattaraugus County

Hazard Type	Number of Occurrences Between 1996 and 2024	Percent Chance of Occurring in Any Given Year
Blizzard	2	7.14%
Heavy Snow	85	100.00%
Ice Storm	2	7.14%
Winter Storm	33	100.00%
Winter Weather	0	0.00%
Total	**122**	**100.00%**

Sources: NOAA NCEI 2023; FEMA 2024

Notes: Due to limitations in data, not all severe winter storm events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is calculated using the number of occurrences between 1996 and 2024.

Based on historical data, it is expected that the following will occur at least once per 100 years:

- Up to 4 inches of freezing rain in the ice band near central New York State of which between 1–2 inches of accumulated ice will occur over a 24-hour period.
- Up to 2 feet of accumulated snow in the snow band in northern and western New York State over a 48-hour period.

Climate Change Projections

Climate change affects the State of New York's residents and resources. 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 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. Annual average precipitation is projected to decrease in the low estimate but increase in the middle range and high estimate 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 Cattaraugus County, and the southern tier region, temperatures are estimated to increase by 3.6ºF to 7.4ºF by the 2050s, 5ºF to 12.2ºF by the 2080s, and 5.5ºF to 14.1ºF by 2100, relative to the 1981–2010 base period. Precipitation totals are estimated increase by 0 to 12 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).

New York has also experienced a decrease in the number of cold winter days (below 32°F) and is projected to see an additional decrease in the number of cold winter days 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, for extratropical cyclones, the largest snow events of all types could grow in magnitude since a warmer atmosphere can hold more moisture (Stevens & Lamie 2024).

As the century progresses, snowfall is likely to become less frequent, with the snow season decreasing in length. Many parts of this region experience lake-effect snow coming off the Great Lakes. As winters continue to warm, ice is projected to become rarer in the upcoming decades, 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).

11.1.6 Cascading Impacts on Other Hazards

Severe winter storm events may exacerbate flooding. As discussed, the freezing and thawing of snow and ice associated with winter storm events can create major flooding issues in the County. Maintaining winter storm hazards through snow and ice removal could minimize the potential risk of flooding during a warming period. Refer to Chapter 7 (Flood) for more information about the flood hazard of concern.

11.2 VULNERABILITY AND IMPACT ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For the severe winter storm hazard, all of Cattaraugus County has been identified as the hazard area. Therefore, all assets in the County (population, structures, critical facilities, and lifelines), as described in the County Profile (Chapter 3), are vulnerable to a winter storm event.

11.2.1 Life, Health, and Safety

The entire population of Cattaraugus County (75,600) is exposed to severe winter storm events (US Census 2020).

Overall Population

According to the NOAA National Severe Storms Laboratory (NSSL); every year, winter storms indirectly and deceptively kill hundreds of people in the U.S., primarily from automobile accidents, overexertion, and exposure. Winter storms are often accompanied by strong winds creating blizzard conditions with blinding wind-driven snow, drifting snow and extreme cold temperatures and dangerous wind chill. They are considered deceptive killers because most deaths and other impacts or losses are indirectly related to the storm. People can die in traffic accidents on icy roads, heart attacks while shoveling snow, or of hypothermia from prolonged exposure to cold (NSSL 2021).

Socially Vulnerable Population

People who experience homelessness, are over the age of 65, or under the age of 5 are considered to be the most susceptible to this hazard. Older adults 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. As shown in Table 11-7, the City of Orleans has the highest population over 65 (2,469), the largest population under 5 (846), the greatest non-English speaking population (54), the highest population of disabled persons (2,539), and the largest number individuals living in poverty (3,266). The Town of Redhouse has the lowest population over 65 (7), the lowest population under 5 (1), the fewest number of disabled persons (2), and the lowest population living in poverty (2). Of the 43 local jurisdictions in the County, 27 have no (0) non-English speaking persons living within the jurisdiction.

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.

According to 2022 Point-in-Time-Data from ALICE, 29 percent of the 32,016 households in Cattaraugus County are ALICE households (compared to the state average of 31 percent). The median household income in Cattaraugus County is $50,508, and the County sees a labor force participation rate of 56 percent. Cattaraugus County faces a lower-than-average household income compared to the state average of $79,557 and suffers from a higher-than-average poverty rate at 19 percent (compared to the state average of 15 percent). See Table 11-8 for ALICE data by jurisdiction.

Table 11-7. Cattaraugus County Socially Vulnerable Populations by Municipality

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	American Community Survey 5-year Population Estimates (2022)									
			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
Allegany (T)	5,949	7.9%	1,183	19.9%	213	3.6%	19	0.3%	667	11.2%	640	10.8%
Allegany (V)	1,544	2.0%	401	26.0%	65	4.2%	19	1.2%	214	13.9%	313	20.3%
Ashford (T)	1,961	2.6%	468	23.9%	78	4.0%	0	0.0%	366	18.7%	107	5.5%
Carrollton (T)	1,207	1.6%	268	22.2%	57	4.7%	7	0.6%	197	16.3%	150	12.4%
Cattaraugus (V)	960	1.3%	167	17.4%	49	5.1%	31	3.2%	188	19.6%	181	18.9%
Coldspring (T)	658	0.9%	102	15.5%	17	2.6%	0	0.0%	130	19.8%	85	12.9%
Conewango (T)	1,785	2.4%	220	12.3%	352	19.7%	31	1.7%	161	9.0%	861	48.2%
Dayton (T)	1,149	1.5%	329	28.6%	46	4.0%	0	0.0%	184	16.0%	144	12.5%
Delevan (V)	1,043	1.4%	234	22.4%	62	5.9%	0	0.0%	269	25.8%	215	20.6%
East Otto (T)	974	1.3%	142	14.6%	46	4.7%	9	0.9%	145	14.9%	99	10.2%
Ellicottville (T)	1,059	1.4%	351	33.1%	14	1.3%	0	0.0%	77	7.3%	127	12.0%
Ellicottville (V)	256	0.3%	117	45.7%	40	15.6%	0	0.0%	39	15.2%	13	5.1%
Farmersville (T)	1,073	1.4%	322	30.0%	116	10.8%	0	0.0%	218	20.3%	277	25.8%
Franklinville (T)	1,150	1.5%	314	27.3%	21	1.8%	26	2.3%	135	11.7%	83	7.2%
Franklinville (V)	1,652	2.2%	273	16.5%	128	7.7%	0	0.0%	304	18.4%	274	16.6%
Freedom (T)	2,261	3.0%	393	17.4%	119	5.3%	0	0.0%	301	13.3%	243	10.7%
Gowanda (V)	1,834	2.4%	337	18.4%	256	14.0%	24	1.3%	409	22.3%	215	11.7%
Great Valley (T)	1,991	2.6%	419	21.0%	78	3.9%	12	0.6%	274	13.8%	56	2.8%
Hinsdale (T)	2,113	2.8%	448	21.2%	139	6.6%	0	0.0%	493	23.3%	308	14.6%
Humphrey (T)	703	0.9%	78	11.1%	8	1.1%	0	0.0%	60	8.5%	105	14.9%
Ischua (T)	736	1.0%	215	29.2%	5	0.7%	0	0.0%	162	22.0%	154	20.9%
Leon (T)	1,244	1.6%	137	11.0%	177	14.2%	50	4.0%	192	15.4%	192	15.4%
Little Valley (T)	617	0.8%	144	23.3%	3	0.5%	0	0.0%	255	41.3%	37	6.0%
Little Valley (V)	1,058	1.4%	171	16.2%	40	3.8%	0	0.0%	195	18.4%	295	27.9%

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	American Community Survey 5-year Population Estimates (2022)									
			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
Lyndon (T)	685	0.9%	156	22.8%	26	3.8%	0	0.0%	124	18.1%	119	17.4%
Machias (T)	2,310	3.1%	566	24.5%	77	3.3%	0	0.0%	348	15.1%	393	17.0%
Mansfield (T)	843	1.1%	127	15.1%	35	4.2%	0	0.0%	80	9.5%	36	4.3%
Napoli (T)	1,171	1.5%	241	20.6%	127	10.8%	0	0.0%	192	16.4%	169	14.4%
New Albion (T)	1,021	1.3%	160	15.7%	64	6.3%	31	3.0%	89	8.7%	108	10.6%
Olean (C)	13,937	18.4%	2,469	17.7%	846	6.1%	54	0.4%	2,539	18.2%	3,266	23.4%
Olean (T)	1,881	2.5%	491	26.1%	55	2.9%	0	0.0%	322	17.1%	262	13.9%
Otto (T)	777	1.0%	230	29.6%	11	1.4%	7	0.9%	159	20.5%	49	6.3%
Perrysburg (T)	1,518	2.0%	498	32.8%	42	2.8%	0	0.0%	430	28.3%	314	20.7%
Persia (T)	596	0.8%	143	24.0%	66	11.1%	9	1.5%	101	16.9%	66	11.1%
Portville (T)	2,612	3.5%	656	25.1%	136	5.2%	0	0.0%	269	10.3%	238	9.1%
Portville (V)	892	1.2%	156	17.5%	15	1.7%	0	0.0%	154	17.3%	86	9.6%
Randolph (T)	2,469	3.3%	476	19.3%	84	3.4%	0	0.0%	294	11.9%	222	9.0%
Red House (T)	27	<0.1%	7	25.9%	1	3.7%	0	0.0%	2	7.4%	2	7.4%
Salamanca (C)	5,929	7.8%	936	15.8%	381	6.4%	57	1.0%	1,092	18.4%	1,492	25.2%
Salamanca (T)	470	0.6%	131	27.9%	9	1.9%	2	0.4%	75	16.0%	84	17.9%
South Dayton (V)	541	0.7%	244	45.1%	20	3.7%	0	0.0%	94	17.4%	166	30.7%
South Valley (T)	250	0.3%	115	46.0%	18	7.2%	0	0.0%	55	22.0%	78	31.2%
Yorkshire (T)	2,784	3.7%	530	19.0%	157	5.6%	0	0.0%	581	20.9%	612	22.0%
Cattaraugus County	**75,690**	**100.0%**	**15,565**	**20.6%**	**4,299**	**5.7%**	**388**	**0.5%**	**12,635**	**16.7%**	**12,936**	**17.1%**

Source: U.S Census Bureau 2020; U.S. Census Bureau ACS 2023

Note: Allegany (V) is 100% within Allegany (T); Cattaraugus (V) is 100% within New Albion (T); Delevan (V) is 100% within Yorkshire (T); Ellicottville (V) is 100% within Ellicottville (T); Franklinville (V) is 100% within Franklinville (T); Little Valley (V) is 100% within Little Valley (T); Portville (V) is 100% within Portville (T); South Dayton (V) is 100% within Dayton (T). Subtracted village totals from town to assign correct town totals.

2.36 persons per household. This number was used to calculate the Non-English-speaking population.

Table 11-8. Cattaraugus County ALICE Data

Name	Total Households	% Below ALICE Threshold
Allegany (T)	2,676	39
Allegany (V)	-	-
Ashford (T)	879	30
Carrollton (T)	527	44
Cattaraugus (V)	-	-
Coldspring (T)	286	44
Conewango (T)	561	55
Dayton (T)	691	39
Delevan (V)	-	-
East Otto (T)	451	36
Ellicottville (T)	586	41
Ellicottville (V)	-	-
Farmersville (T)	480	61
Franklinville (T)	1,129	42
Franklinville (V)	-	-
Freedom (T)	939	32
Gowanda (V)	-	-
Great Valley (T)	806	40
Hinsdale (T)	939	46
Humphrey (T)	296	25
Ischua (T)	310	45
Leon (T)	354	33
Little Valley (T)	671	43
Little Valley (V)	-	-
Lyndon (T)	303	41
Machias (T)	925	44
Mansfield (T)	287	36
Napoli (T)	493	36
New Albion (T)	847	39
Olean (C)	6,142	54
Olean (T)	898	33
Otto (T)	353	40
Perrysburg (T)	694	38
Persia (T)	930	44
Portville (T)	1,405	40
Portville (V)	-	-
Randolph (T)	888	37
Red House (T)	-	-
Salamanca (C)	2,420	60

Name	Total Households	% Below ALICE Threshold
Salamanca (T)	244	53
South Dayton (V)	-	-
South Valley (T)	150	45
Yorkshire (T)	1,663	51
Cattaraugus County	**32,016**	**29**

Source: United For ALICE 2024
Note: Totals for the Town of Red House or the Villages of Alleghany, Cattaraugus, Delevan, Ellicottville, Franklinville, Gowanda, Little Valley, Portville, and South Dayton were unavailable.

11.2.2 General Building Stock

The entire general building stock inventory is exposed and vulnerable to the severe winter storm hazard. In general, structural impacts include damage to roofs and building frames, rather than building content. Current modeling tools are not available to estimate specific losses for this hazard. As an alternate approach, this plan considers percent damages that could result from severe winter storm conditions. This allows planners and emergency managers to select a range of potential economic impact based on an estimate of the percent of damage to the general building stock. Table 11-9 below summarizes the estimated loss based on 1 percent, 5 percent, and 10 percent losses.

Given professional knowledge and the currently available information, the potential loss for this hazard is many times considered to be overestimated because of varying factors (building structure type, age, load distribution, building codes in place, etc.). Therefore, the following information should be used as estimates only for planning purposes with the knowledge that the associated losses for severe winter storm events vary greatly.

Table 11-9. General Building Stock Exposure and Estimated Losses from Severe Winter Storm Events

Jurisdiction	Total Replacement Cost Value (RCV)	1 percent Loss	5 percent Loss	10 percent Loss
Allegany (T)	$1,828,453,626	$18,284,536	$91,422,681	$182,845,363
Allegany (V)	$534,281,350	$5,342,813	$26,714,067	$53,428,135
Ashford (T)	$981,729,710	$9,817,297	$49,086,485	$98,172,971
Carrollton (T)	$446,787,985	$4,467,880	$22,339,399	$44,678,799
Cattaraugus (V)	$413,937,573	$4,139,376	$20,696,879	$41,393,757
Coldspring (T)	$419,437,697	$4,194,377	$20,971,885	$41,943,770
Conewango (T)	$1,224,823,403	$12,248,234	$61,241,170	$122,482,340
Dayton (T)	$566,877,685	$5,668,777	$28,343,884	$56,687,768
Delevan (V)	$294,096,772	$2,940,968	$14,704,839	$29,409,677
East Otto (T)	$910,263,387	$9,102,634	$45,513,169	$91,026,339
Ellicottville (T)	$1,230,255,766	$12,302,558	$61,512,788	$123,025,577
Ellicottville (V)	$520,870,391	$5,208,704	$26,043,520	$52,087,039
Farmersville (T)	$336,948,280	$3,369,483	$16,847,414	$33,694,828
Franklinville (T)	$454,998,969	$4,549,990	$22,749,948	$45,499,897
Franklinville (V)	$458,799,506	$4,587,995	$22,939,975	$45,879,951
Freedom (T)	$1,243,878,371	$12,438,784	$62,193,919	$124,387,837
Gowanda (V)	$557,102,073	$5,571,021	$27,855,104	$55,710,207

Jurisdiction	Total Replacement Cost Value (RCV)	1 percent Loss	5 percent Loss	10 percent Loss
Great Valley (T)	$1,678,197,808	$16,781,978	$83,909,890	$167,819,781
Hinsdale (T)	$1,154,148,484	$11,541,485	$57,707,424	$115,414,848
Humphrey (T)	$770,519,047	$7,705,190	$38,525,952	$77,051,905
Ischua (T)	$941,084,197	$9,410,842	$47,054,210	$94,108,420
Leon (T)	$871,766,032	$8,717,660	$43,588,302	$87,176,603
Little Valley (T)	$669,501,134	$6,695,011	$33,475,057	$66,950,113
Little Valley (V)	$431,938,926	$4,319,389	$21,596,946	$43,193,893
Lyndon (T)	$1,218,701,662	$12,187,017	$60,935,083	$121,870,166
Machias (T)	$1,010,913,905	$10,109,139	$50,545,695	$101,091,391
Mansfield (T)	$850,358,071	$8,503,581	$42,517,904	$85,035,807
Napoli (T)	$1,038,184,870	$10,381,849	$51,909,244	$103,818,487
New Albion (T)	$412,253,447	$4,122,534	$20,612,672	$41,225,345
Olean (C)	$5,029,125,342	$50,291,253	$251,456,267	$502,912,534
Olean (T)	$711,063,289	$7,110,633	$35,553,164	$71,106,329
Otto (T)	$270,712,477	$2,707,125	$13,535,624	$27,071,248
Perrysburg (T)	$635,389,864	$6,353,899	$31,769,493	$63,538,986
Persia (T)	$193,784,098	$1,937,841	$9,689,205	$19,378,410
Portville (T)	$1,452,207,760	$14,522,078	$72,610,388	$145,220,776
Portville (V)	$292,144,939	$2,921,449	$14,607,247	$29,214,494
Randolph (T)	$893,024,995	$8,930,250	$44,651,250	$89,302,499
Red House (T)	$141,446,242	$1,414,462	$7,072,312	$14,144,624
Salamanca (C)	$3,749,213,545	$37,492,135	$187,460,677	$374,921,355
Salamanca (T)	$193,028,563	$1,930,286	$9,651,428	$19,302,856
South Dayton (V)	$203,422,751	$2,034,228	$10,171,138	$20,342,275
South Valley (T)	$607,773,120	$6,077,731	$30,388,656	$60,777,312
Yorkshire (T)	$2,733,993,018	$27,339,930	$136,699,651	$273,399,302
Cattaraugus County	**$40,577,440,127**	**$405,774,401**	**$2,028,872,006**	**$4,057,744,013**

Source: Cattaraugus County 2024; RS Means 2024

11.2.3 Community Lifelines and Other Critical Facilities

Full functionality of critical facilities such as police, fire, and medical facilities is essential for response during and after a severe winter storm event. These critical facility structures are largely constructed of concrete and masonry; therefore, they should only suffer minimal structural damage from severe winter storm events. Because power interruption can occur, backup power is recommended. Infrastructure at risk for this hazard includes roadways that could be damaged from the application of salt and intermittent freezing and warming conditions that can damage roads over time. Severe snowfall requires clearing of roadways and alerting of citizens to dangerous conditions; following the winter season, resources for road maintenance and repair are required.

11.2.4 Economy

Depending on the severity and duration of the severe winter storm event, damage to the general building stock, critical facilities, and community lifelines can include roof damage from heavy snow loads, structural damage from downed trees, and power outages.

The cost of snow and ice removal and repair of roads from the freeze/thaw process can drain local financial resources. In addition to snow removal costs, severe winter storm 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.

11.2.5 Natural, Historic, and Cultural Resources

Natural

Severe winter storms 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 flow within water resources. Not only does winter storms create changes in natural processes, the residual impacts of a community's methods to maintain its infrastructure through winter weather maintenance may also have an impact on the environment (NSIDC n.d.).

Rain-on-snow events can also exacerbate runoff rates with warming winter weather. Consequentially, these flow rates and excess volumes of water can erode banks, tear apart habitat along the banks and coastline, and disrupt terrestrial plants and animals. 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 (Tiwari and Rachlin 2018).

Historic

Historic buildings may be susceptible to damage from severe winter storm conditions, especially if they were not built to modern building standards for snow loading (CCAHA 2019).

Cultural

Cultural heritage sites, particularly those exposed to the elements, are subject to weathering. Climate change is a potential threat to these sites as it exacerbates the expected rates of decay and contributes to the appearance of new decay. Climatic changes may aggravate the physical, chemical, and biological mechanisms causing degradation by affecting the structure or composition of building materials. Changes in temperature, precipitation, atmospheric moisture, and wind intensity, in addition to the interaction between climatic changes and air pollution, have been identified as concerns by the United Nations Educational, Scientific and Cultural Organization (Sesana, et al. 2021).

11.3 FUTURE CHANGES THAT MAY AFFECT RISK

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The following sections examine potential conditions that may affect hazard vulnerability.

11.3.1 Potential or Planned Development

As discussed in Chapter 3, areas targeted for future growth and development have been identified across the County. Any areas of growth located could be potentially impacted by severe winter storm events. Current New York State land use and building codes incorporate standards that address and mitigate snow accumulation. Some local municipalities in the state have implemented the following activities to eliminate loss of life and property and infrastructure damages during winter storm events (NYS DHSES 2023):

- Removal of snow from roadways
- Removal of dead trees and trim trees/brush from roadways to lessen falling limbs and trees
- Ensure proper road signs are visible and installed properly
- Bury electrical and telephone utility lines to minimize downed lines
- Removal of debris/obstructions in waterways and develop routine inspections/maintenance plans to reduce potential flooding
- Replace substandard roofs of critical facilities to reduce exposure to airborne germs resulting from leakage
- Purchase and install backup generators in evacuation facilities and critical facilities to essential services to residents
- Install cell towers in areas where limited telecommunication is available to increase emergency response and cell phone coverage.

11.3.2 Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 4 percent since 2010. Population projections from Cornell University reveal the County's population is anticipated to continue decreasing. The population is projected to decline to 73,254 persons in 2030 and to 70,468 by 2040 (Cornell University 2018). Historically, winter storm events with associated snowfall and ice accumulation have severely impacted transportation corridors as well as infrastructure. Even though the population has decreased, 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 storm events. Refer to Chapter 3 (County Profile), which includes a more thorough discussion about population trends for the County.

11.3.3 Climate Change

As discussed above, most studies project that the State of New York will see an increase in average annual temperatures and precipitation. Annual precipitation amounts in the region are projected to increase, primarily in the form of heavy rainfalls, which have the potential to freeze into heavy snowfall and icing. This increase in snow and ice could result in an increased risk to life and health, an increase in structural losses, a diversion of additional resources to response and recovery efforts, and an increase in business closures affected by severe winter events due to loss of service or access.

11.3.4 Change of Vulnerability Since 2020 Cattaraugus County HMP

Overall, the County's exposure and vulnerability have not changed, and the entire County will continue to be exposed and vulnerable to severe winter storm events.

12. UTILITY FAILURE

12.1 HAZARD PROFILE

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

12.1.1 Hazard Description

Utility interruption is defined as any disruption or loss of a public service which includes, but is not limited to electrical service, potable water, and natural gas caused by disruption of power transmission caused by accident, sabotage, natural hazards, or equipment failure (also referred to as a utility failure or utility outage). A significant utility interruption is defined as any incident of a long duration, which would require the involvement of the local and/or state emergency management organizations to coordinate the provision of food, water, heating, cooling, and shelter.

Utility interruption is commonly caused by the impacts of natural hazard events on the utility system. For more information on extreme temperature and severe storm events, refer to Chapter 10; for more information on severe winter storm events, refer to Chapter 11.

Widespread power outages can occur without warning or as a result of a natural disaster. Generally, warning times will be short in the case of technological failures, such as a fire at a substation, traffic accidents, human error, or terrorist attacks. In cases where a power failure is caused by natural hazards, greater warning time is possible. For example, high wind events such as tornados and hurricanes often cause widespread power failure and are often forecasted before they affect a community. Additionally, severe winter storm conditions such as ice storms, blizzards, and snowstorms often cause power failure. Incidents such as these often have increased warning time, therefore, utility response crews can stage resources to prepare for utility failure.

Wastewater and potable water utility interruption may occur as a result of a power failure or equipment failure. These critical utilities are essential to community continuity, emergency services, and recovery. Their interruption of service may have cascading economic, environmental, and emergency response impacts. Interruption of water utilities can lead to disruption in daily life for the residents (i.e., loss of potable water) and can also have serious impacts on firefighting and emergency response capabilities. Failures can occur from natural hazards or due to aging utility infrastructure.

Natural gas interruption can occur due to extreme temperatures that may lead to frozen natural gas wells which would reduce or eliminate the ability of some buildings to produce heat.

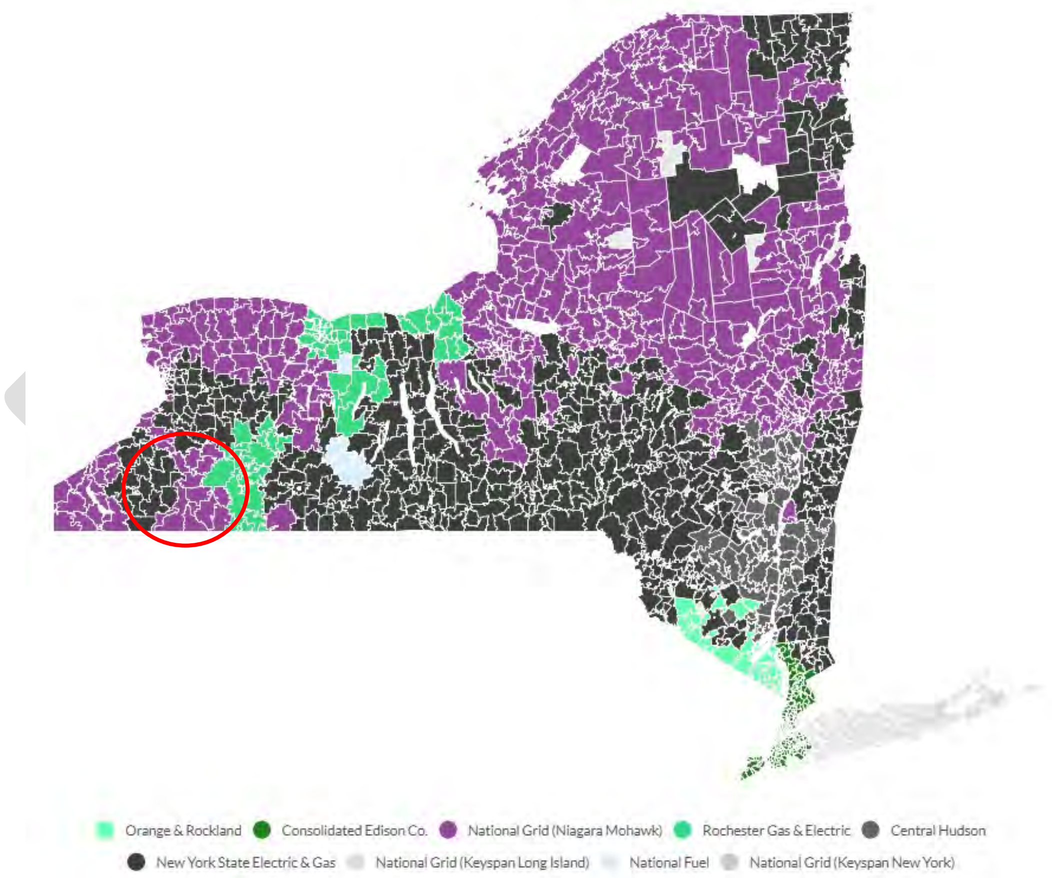
12.1.2 Location

Power failures in New York State are usually localized and are often the result of a natural hazard event involving high winds or ice storms. New Yorkers gained access to energy choices in 1998 when the state government decided to deregulate the electric portion of New York's energy market. Utility companies, such as Con Ed, National Grid, and others, no longer had a monopoly on the areas they serve, and instead, it allowed for competition among energy service companies, also called ESCOs. The deregulation system is managed by the New York State Public Service Commission (NYSPSC), which approves licenses for ESCOs and regulates utility prices (Garrison and Ritchie n.d.). Utility companies in New York include (Garrison and Ritchie n.d.):

- Central Hudson Gas & Electric
- Natural Grid Keyspan
- Consolidated Edison Co. (Con Ed)
- Rochester Gas & Electric

These service providers are responsible for maintaining power throughout their respective regions. Figure 12-1 shows the locations of electric service delivery providers across New York. This figure indicates that Cattaraugus County is serviced primarily by Central Hudson Gas & Electric with a small northwestern portion of the County serviced by New York State Electric & Gas. Widespread power outages during the winter months can directly impact vulnerable populations such as the elderly and medically frail. According to the 2022 5-Year American Community Survey, 4,564 homes across Cattaraugus County are heated with electricity (5-Year American Community Survey 2022). This represents 14.5 percent of the total homes in the County.

Figure 12-1. Electric Service Delivery Companies in New York



Source: Garrison & Ritchie
Note: Red Circle shows the approximate location of Cattaraugus County

Wastewater treatment for most municipalities is provided by municipal or private treatment facilities. Municipal wastewater treatment services are provided by wastewater treatment plants, wastewater treatment facilities, and sewage treatment plants. Private wastewater treatment within Cattaraugus County includes septic systems and sand filters. Where municipal sewage treatment is not available, on-site septic systems are used. Soil quality in the County is variable, resulting in many parts of the County which are unsuitable for on-site wastewater treatment. Undersized or unmaintained on-site septic systems can be an issue, particularly in the drinking watersheds, where exposure and runoff can impair water quality. During the planning process, the Steering Committee identified 26 wastewater facilities in Cattaraugus County. These facilities and pump stations are displayed in Figure 3-20 in Chapter 3, County Profile.

Cattaraugus County is served by a variety of communications systems, including traditional land line and cellular service provided by multiple companies, such as Verizon, AT&T, Sprint, and T-Mobile. Wireless Broadband internet service is provided by Southern Tier Wireless, DFT, and Spectrum. Plans to provide the County with fiber-optic Internet by Armstrong Communications are currently in the Engineering and Design phase. In addition to land line, fiber optic and cellular communications systems, Cattaraugus County has an extensive radio communications network that is utilized by emergency services agencies, hospitals, law enforcement, public works, transportation, and other supporting organizations.

Because of the rural nature of the County, the most common sources of potable water within Cattaraugus County are municipal and private sources. Private sources of water include drilled wells, driven point wells, and springs. Municipal water supplies (provided by towns and cities) include community water systems, noncommunity water systems, non-transient noncommunity water systems, and water systems regulated as a condition of a “Permit to Operate” issued by the Department of Health. The Cattaraugus County Environmental Health Division is responsible for ensuring compliance with treatment, reporting, and water quality standards for all public water systems. The New York State Department of Environmental Conservation (NYSDEC) Water Well Information database has begun to document potable water wells as of the year 2000, and currently reports 386 within the County new wells drilled since that date.

12.1.3 Extent

The extent and severity of a utility interruption depends on the cause, location, duration, and time of year. It can range from a small, localized event to a countywide power outage. Impacts from a utility failure can be significant to the County and its residents. Utility interruptions typically occur because of, or in combination with, aging infrastructure, and other emergency or disaster incidents, such as severe storms and flooding, and can exacerbate such emergencies.

Power failures lead to the inability to use electric-powered equipment, such as lighting; heating, ventilation, and air conditioning (HVAC) and necessary equipment; communication equipment (telephones, computers, etc.); fire and security systems; small appliances such as refrigerators, sterilizers, etc.; and medical equipment. This can lead to food spoilage, loss of heating, and cooling, basement flooding due to sump pump failure, and loss of water due to well pump failure.

Utility gas failures can lead to a drastic reduction for residents of Cattaraugus County to heat their homes as previously mentioned. Current procedures of shutting off utility gas distribution before severe storm events could also hinder the ability to provide backup power if residents have generators powered by utility gas. Interruptions of the water supply can lead to decreased potable water supply and a decreased firefighting capability.

12.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Between 1954 and 2024, Cattaraugus County was included in one major disaster (DR) or emergency (EM) declarations for utility failure-related events (FEMA 2024). Table 12-1 lists these declarations.

Table 12-1. FEMA Declarations for Utility Failure Events in Cattaraugus County (1954 to 2024)

Event Date	Declaration Date	Declaration Number	Description
August 14–August 16, 2003	August 23, 2003	EM-3186-NY	New York Power Outage

Sources: FEMA 2024

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in contiguous counties. Between 2018 and 2024, Cattaraugus County was not included in any USDA utility failure-related agricultural disaster declarations (USDA 2024).

Previous Events

Known hazard events that impacted Cattaraugus County between 2018 through 2024 are discussed in Table 12-2. For events prior to 2018, refer to the 2020 Cattaraugus County HMP.

Table 12-2. Utility Failure Events in Cattaraugus County (2018 to 2024)

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
October 31–November 1, 2019	N/A	N/A	Countywide	Record breaking rains, damaging wind gusts causing thousands of power outages across the area. Wind-related damages closed hundreds of roads and did countless tree damage across the area. Heavy rain also brought flooding concerns.
September 7, 2020	N/A	N/A	Delevan, Olean	Steady, light rain moved through the area causing winds to ramp up with gusts of 40–50 mph. Winds brought down some trees and caused power outages.
December 23, 2022	N/A	N/A	Countywide	A historic lake effect blizzard occurred northeast of Lake Erie and Lake Ontario. Which caused high drifts of snow, ongoing power outages, untouched roads, closed interstates, and hundreds of stranded cars.

Sources:NOAA NCEI n.d.

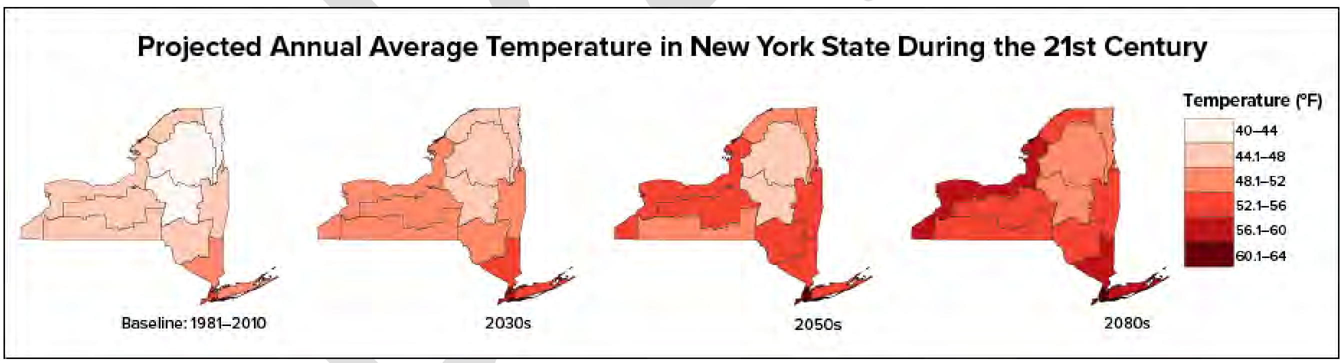
12.1.5 Probability of Future Occurrences

While the probability of future utility interruption incidents in Cattaraugus County is difficult to predict, the historic record indicates that significant failures have occurred as a result of high winds, lightning, severe storms, winter storms, technological failures, and the age of utility infrastructure. As infrastructure ages beyond its intended lifespan, it is likely to become less reliable, leading to a higher likelihood of failure. Data were not readily available on the frequency of smaller utility interruptions across the County; however, it is reasonable to assume that utility failure events of shorter duration will continue to occur in the future. In addition, future changes in climate may also impact the frequency and probability of future utility failure occurrences. In Chapter 14, the identified hazards of concern for Cattaraugus County were ranked. Based on historical records and input from the Steering Committee, the probability of occurrence for utility hazards in the County is considered "occasional".

Climate Change Projections

Climate change affects the State of New York's residents and resources. 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 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. Figure 12-2 depicts the average temperature increase in New York State. Annual average precipitation is projected to decrease in the low estimate but increase in the middle range and high estimate 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).

Figure 12-2. Projected Annual Average Temperature in New York State



Source: Stevens & Lamie 2024 2023

In Cattaraugus County, and the southern tier region, temperatures are estimated to increase by 3.6ºF to 7.4ºF by the 2050s, 5ºF to 12.2ºF by the 2080s, and 5.5ºF to 14.1ºF by 2100, relative to the 1981–2010 base period. Precipitation totals are estimated increase by 0 to 12 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).

New York State has warmed more rapidly than the national average, and winter is warming faster than other seasons. Evidence shows that extremely hot days are happening more often, and multiday heat waves are expected to occur more often and last longer in the upcoming decades which may impact utilities in the County. Areas such as metropolitan areas, with more buildings and pavement and fewer green spaces are more affected by heat because they retain and intensify heat as “heat islands” (Stevens & Lamie 2024).

12.1.6 Cascading Impacts on Other Hazards

Utility failure, specifically downed powerlines, can spur fires that can spread and impact the rest of the County. Additionally, utility failure can increase vulnerability to temperature-related illnesses during extreme temperature events, as well as the loss of food, water, and medical resources that may put vulnerable populations at a greater risk. Traffic accidents also may increase because of the lack of traffic control devices such as stoplights and railroad crossing advisory signals. Power outages lasting a long duration will force law enforcement officials to man traffic control points to prevent accidents. Utility failure can also affect communication lines that may limit connectivity to emergency responders which would negatively affect any member of the population that would need their services.

Power failures can cause secondary hazards and can influence the health of residents. One potential secondary hazard is chemical accidents that occur after power is restored to industrial facilities. Power interruptions at chemical handling plants are of particular concern because of the potential for a chemical spill during a restart (EPA 2001). Chemical spills in turn can have significant health and environmental impacts.

Wastewater and potable water utility interruption may occur as a result of a power failure. These critical utilities are essential to community continuity and recovery. Their interruption of service may have cascading economic and environmental impacts. Lack of power can prevent fuel pumps from operating and lead to fuel shortages.

12.2 VULNERABILITY AND IMPACT ASSESSMENT

To understand risk, a community must evaluate the assets that are exposed or vulnerable within the identified hazard area. For the utility failure hazard, all of Cattaraugus County has been identified as the hazard area. Therefore, all assets in the County (population, structures, critical facilities, and lifelines), as described in the County Profile, Chapter 3, are vulnerable to utility failure. This section discusses the potential impact of the utility failure hazard on the County.

Data were collected from Cattaraugus County and the Planning Partnership. Insufficient data were available to model the long-term potential impacts of a utility failure on the County. Over time, additional data will be collected to allow for better analysis of this hazard. Available information and a preliminary assessment are provided below.

12.2.1 Life, Health, and Safety

The entire population in Cattaraugus County is vulnerable to utility interruption events. Refer to Chapter 3 (County Profile) for a summary of population statistics for the County.

Overall Population

Utility failure is particularly problematic for homes that are heated with electricity. According to the 2018–2022 5-Year American Community Survey, 1,838 (5.8 percent) homes across Cattaraugus County are heated with fuel oil and kerosene, 16,663 (52.9 percent) homes are heated with utility gas, and 4,564 (14.5 percent) are heated by electricity (5-Year American Community Survey 2022). Utility interruption events have potential health impacts including injury and death. Other issues from power outages include food safety from the lack of refrigeration and carbon monoxide poisoning from misuse of generators.

During power failure events, water purification systems may not be functioning and populations on private wells will not have access to potable water. Many power outage events are caused by storm events that can lead to flooding. Without electricity, residents would be unable to pump water from their basements potentially causing structural and content damage to their homes.

As noted above, interruptions of water supply can lead to decreased potable water supply and a decreased firefighting capability. The interruption of potable water distribution also has a considerable impact on the firefighting capabilities of many fire departments within Cattaraugus County. Should frequent or widespread water interruption occur, there will be an increased risk for structural fire and wildfire occurrence within the County.

Socially Vulnerable Population

Loss of power can exert serious impacts on the health and welfare of residents, the continuity of businesses, and the ability of public safety agencies to respond to emergencies. Individuals with medical needs are vulnerable to power failures because medical equipment, such as oxygen concentrators, requires electricity to operate. Elderly residents (persons over 65 years old) and low-income populations are also vulnerable to the effects of power failure, as power failure could expose older residents to extreme heat or extreme cold.

As shown in Table 12-3, the City of Orleans has the highest population over 65 (2,469), the largest population under 5 (846), the greatest non-English speaking population (54), the highest population of disabled persons (2,539), and the largest number individuals living in poverty (3,266). The Town of Redhouse has the lowest population over 65 (7), the lowest population under 5 (1), the fewest number of disabled persons (2), and the lowest population living in poverty (2). Of the 43 local jurisdictions in the County, 27 have no (0) non-English speaking persons living within the jurisdiction.

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.

According to 2022 Point-in-Time-Data from ALICE, 29 percent of the 32,016 households in Cattaraugus County are ALICE households (compared to the state average of 31 percent). The median household income in Cattaraugus County is $50,508, and the County sees a labor force participation rate of 56 percent. Cattaraugus County faces a lower-than-average household income compared to the state average of $79,557 and suffers from a higher-than-average poverty rate at 19 percent (compared to the state average of 15 percent). See Table 12-4 for ALICE data by jurisdiction.

Table 12-3. Cattaraugus County Socially Vulnerable Populations by Municipality

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	American Community Survey 5-year Population Estimates (2022)									
			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
Allegany (T)	5,949	7.9%	1,183	19.9%	213	3.6%	19	0.3%	667	11.2%	640	10.8%
Allegany (V)	1,544	2.0%	401	26.0%	65	4.2%	19	1.2%	214	13.9%	313	20.3%
Ashford (T)	1,961	2.6%	468	23.9%	78	4.0%	0	0.0%	366	18.7%	107	5.5%
Carrollton (T)	1,207	1.6%	268	22.2%	57	4.7%	7	0.6%	197	16.3%	150	12.4%
Cattaraugus (V)	960	1.3%	167	17.4%	49	5.1%	31	3.2%	188	19.6%	181	18.9%
Coldspring (T)	658	0.9%	102	15.5%	17	2.6%	0	0.0%	130	19.8%	85	12.9%
Conewango (T)	1,785	2.4%	220	12.3%	352	19.7%	31	1.7%	161	9.0%	861	48.2%
Dayton (T)	1,149	1.5%	329	28.6%	46	4.0%	0	0.0%	184	16.0%	144	12.5%
Delevan (V)	1,043	1.4%	234	22.4%	62	5.9%	0	0.0%	269	25.8%	215	20.6%
East Otto (T)	974	1.3%	142	14.6%	46	4.7%	9	0.9%	145	14.9%	99	10.2%
Ellicottville (T)	1,059	1.4%	351	33.1%	14	1.3%	0	0.0%	77	7.3%	127	12.0%
Ellicottville (V)	256	0.3%	117	45.7%	40	15.6%	0	0.0%	39	15.2%	13	5.1%
Farmersville (T)	1,073	1.4%	322	30.0%	116	10.8%	0	0.0%	218	20.3%	277	25.8%
Franklinville (T)	1,150	1.5%	314	27.3%	21	1.8%	26	2.3%	135	11.7%	83	7.2%
Franklinville (V)	1,652	2.2%	273	16.5%	128	7.7%	0	0.0%	304	18.4%	274	16.6%
Freedom (T)	2,261	3.0%	393	17.4%	119	5.3%	0	0.0%	301	13.3%	243	10.7%
Gowanda (V)	1,834	2.4%	337	18.4%	256	14.0%	24	1.3%	409	22.3%	215	11.7%
Great Valley (T)	1,991	2.6%	419	21.0%	78	3.9%	12	0.6%	274	13.8%	56	2.8%
Hinsdale (T)	2,113	2.8%	448	21.2%	139	6.6%	0	0.0%	493	23.3%	308	14.6%
Humphrey (T)	703	0.9%	78	11.1%	8	1.1%	0	0.0%	60	8.5%	105	14.9%
Ischua (T)	736	1.0%	215	29.2%	5	0.7%	0	0.0%	162	22.0%	154	20.9%
Leon (T)	1,244	1.6%	137	11.0%	177	14.2%	50	4.0%	192	15.4%	192	15.4%
Little Valley (T)	617	0.8%	144	23.3%	3	0.5%	0	0.0%	255	41.3%	37	6.0%
Little Valley (V)	1,058	1.4%	171	16.2%	40	3.8%	0	0.0%	195	18.4%	295	27.9%

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	American Community Survey 5-year Population Estimates (2022)									
			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
Lyndon (T)	685	0.9%	156	22.8%	26	3.8%	0	0.0%	124	18.1%	119	17.4%
Machias (T)	2,310	3.1%	566	24.5%	77	3.3%	0	0.0%	348	15.1%	393	17.0%
Mansfield (T)	843	1.1%	127	15.1%	35	4.2%	0	0.0%	80	9.5%	36	4.3%
Napoli (T)	1,171	1.5%	241	20.6%	127	10.8%	0	0.0%	192	16.4%	169	14.4%
New Albion (T)	1,021	1.3%	160	15.7%	64	6.3%	31	3.0%	89	8.7%	108	10.6%
Olean (C)	13,937	18.4%	2,469	17.7%	846	6.1%	54	0.4%	2,539	18.2%	3,266	23.4%
Olean (T)	1,881	2.5%	491	26.1%	55	2.9%	0	0.0%	322	17.1%	262	13.9%
Otto (T)	777	1.0%	230	29.6%	11	1.4%	7	0.9%	159	20.5%	49	6.3%
Perrysburg (T)	1,518	2.0%	498	32.8%	42	2.8%	0	0.0%	430	28.3%	314	20.7%
Persia (T)	596	0.8%	143	24.0%	66	11.1%	9	1.5%	101	16.9%	66	11.1%
Portville (T)	2,612	3.5%	656	25.1%	136	5.2%	0	0.0%	269	10.3%	238	9.1%
Portville (V)	892	1.2%	156	17.5%	15	1.7%	0	0.0%	154	17.3%	86	9.6%
Randolph (T)	2,469	3.3%	476	19.3%	84	3.4%	0	0.0%	294	11.9%	222	9.0%
Red House (T)	27	<0.1%	7	25.9%	1	3.7%	0	0.0%	2	7.4%	2	7.4%
Salamanca (C)	5,929	7.8%	936	15.8%	381	6.4%	57	1.0%	1,092	18.4%	1,492	25.2%
Salamanca (T)	470	0.6%	131	27.9%	9	1.9%	2	0.4%	75	16.0%	84	17.9%
South Dayton (V)	541	0.7%	244	45.1%	20	3.7%	0	0.0%	94	17.4%	166	30.7%
South Valley (T)	250	0.3%	115	46.0%	18	7.2%	0	0.0%	55	22.0%	78	31.2%
Yorkshire (T)	2,784	3.7%	530	19.0%	157	5.6%	0	0.0%	581	20.9%	612	22.0%
Cattaraugus County	75,690	100.0%	15,565	20.6%	4,299	5.7%	388	0.5%	12,635	16.7%	12,936	17.1%

Source: U.S Census Bureau 2020; U.S. Census Bureau ACS 2023

Note: Allegany (V) is 100% within Allegany (T); Cattaraugus (V) is 100% within New Albion (T); Delevan (V) is 100% within Yorkshire (T); Ellicottville (V) is 100% within Ellicottville (T); Franklinville (V) is 100% within Franklinville (T); Little Valley (V) is 100% within Little Valley (T); Portville (V) is 100% within Portville (T); South Dayton (V) is 100% within Dayton (T). Subtracted village totals from town to assign correct town totals.

2.36 persons per household. This number was used to calculate the Non-English-speaking population.

Table 12-4. Cattaraugus County ALICE Data

Name	Total Households	% Below ALICE Threshold
Allegany (T)	2,676	39
Allegany (V)	-	-
Ashford (T)	879	30
Carrollton (T)	527	44
Cattaraugus (V)	-	-
Coldspring (T)	286	44
Conewango (T)	561	55
Dayton (T)	691	39
Delevan (V)	-	-
East Otto (T)	451	36
Ellicottville (T)	586	41
Ellicottville (V)	-	-
Farmersville (T)	480	61
Franklinville (T)	1,129	42
Franklinville (V)	-	-
Freedom (T)	939	32
Gowanda (V)	-	-
Great Valley (T)	806	40
Hinsdale (T)	939	46
Humphrey (T)	296	25
Ischua (T)	310	45
Leon (T)	354	33
Little Valley (T)	671	43
Little Valley (V)	-	-
Lyndon (T)	303	41
Machias (T)	925	44
Mansfield (T)	287	36
Napoli (T)	493	36
New Albion (T)	847	39
Olean (C)	6,142	54
Olean (T)	898	33
Otto (T)	353	40
Perrysburg (T)	694	38
Persia (T)	930	44
Portville (T)	1,405	40
Portville (V)	-	-
Randolph (T)	888	37
Red House (T)	-	-

Name	Total Households	% Below ALICE Threshold
Salamanca (C)	2,420	60
Salamanca (T)	244	53
South Dayton (V)	-	-
South Valley (T)	150	45
Yorkshire (T)	1,663	51
Cattaraugus County (Total)	**32,016**	**29**

Source: United For ALICE 2024

Note: Totals for the Town of Red House or the Villages of Alleghany, Cattaraugus, Delevan, Ellicottville, Franklinville, Gowanda, Little Valley, Portville, and South Dayton were unavailable.

12.2.2 General Building Stock

All of the building stock in the County is exposed to the utility interruption hazard. Refer to Chapter 3 (County Profile) which summarizes the building inventory in Cattaraugus County. Impacts sustained from utility interruption are likely to be secondary impacts. Should potable water distribution be reduced or not available, then structures could be at increased risk for structural fire since current fire suppression is dependent on accessing water supply from hydrants. Further, households that rely on electricity to power in-home heating and cooling systems will be exposed to significantly colder or hotter indoor temperatures during a utility failure in the winter and summer months, respectively. Households that use utility gas for home heating will be less vulnerable.

Populations relying on private wells may also not have access to potable water. Many power outages are caused by storm events that can lead to flooding. Without electricity, residents would be unable to pump water from their basements, potentially causing structural and content damage to their homes. Chapter 7 (Flood) includes a more detailed discussion of the County's vulnerability to the flood hazard.

12.2.3 Community Lifelines and Other Critical Facilities

All critical facilities in the County are exposed to the utility interruption hazard. Critical facilities must remain operational during natural hazard events. Backup power is recommended for critical facilities and infrastructure so that continuity of operations can take place during hazardous events. Loss of power can have serious impacts on the health and welfare of residents, the continuity of business, and the ability of public safety agencies to respond to emergencies. Additionally, during power failure events, water purification systems and gas may not function properly which could reduce the effectiveness of critical facilities operating at full capacity.

12.2.4 Economy

During a utility interruption event, the County may experience losses because of an interruption of critical services. Further, increased costs such as providing shelters, and costs related to cooling and heating centers may be incurred. Extended power outages will require officials to shelter victims who require heat and power for activities of daily living.

Power interruptions can cause economic impacts stemming from lost income, spoiled food, and other goods, costs to the owners/operators of the utility facilities, and costs to government and community service groups. FEMA's benefit-cost analysis methodology measures the loss of electrical service on a per-person-per-day-of-lost-service basis for the service area affected.

Interruption of utility gas or potable water distribution could also cause significant economic impacts such as: additional costs for bringing in water tenders to maintain fire suppression capabilities; opening additional warming centers should electric and utility gas utility be interrupted to residential areas; and distribution of potable water for public consumption. There could be significant costs associated with reimbursing fire departments from other counties within New York to travel, staff, and maintain water tenders within Cattaraugus County during the duration of a water outage event.

Potential modeling of economic impacts from utility interruption would be calculating interruption of service costs which is derived from a standard value per person per day multiplied by the number of customers served. This would help to provide an estimate of the impact of the interrupted utility service but may not be representative of the complete economic impact of a prolonged utility interruption.

The FEMA BCA Toolkit version 6.0 uses the following standard values to estimate the cost of utility usage per person per day (FEMA 2022):

- Electric: $174.00
- Potable Water: $114.00
- Wastewater: $58.00

12.2.5 Natural, Historic, and Cultural Resources

Natural

At this time, there are no direct known impacts on the environment caused by utility failures. Some indirect impacts to the environment are potential wildfires sparked from downed electric wires which could go on to burn an entire forest, which would affect animals that rely on the forest as a habitat.

Historic

Historic structures may be vulnerable to the effects of utility failure due to the need for electricity to power heating and air conditioning. Historic structures may be more structurally sensitive to extreme temperatures due to the fragility of their structure, as these buildings were constructed before modern building codes and materials existed. Many of the losses that are caused by the loss of a historic building or site are of cultural significance, including museum collections, archival documents, and family or cultural heirlooms (US DOI n.d.).

Cultural

Cultural resources may be located inside of historical buildings and homes, which may be more structurally sensitive to extreme temperatures due to the fragility of their structure, as these buildings were constructed before modern building codes and materials existed. Outdoor events may be likely to be postponed or cancelled as the result of a utility failure event, as such events could require hardened electrical power, and not power produced by a generator. Furthermore, outdoor events may be interrupted should downed wires pose a threat.

12.3 FUTURE CHANGES THAT MAY AFFECT RISK

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The following sections examine potential conditions that may affect hazard vulnerability.

12.3.1 Potential or Planned Development

Areas targeted for potential future growth and development within the next 5 years have been identified across Cattaraugus County at the jurisdiction level. Refer to the jurisdictional annexes in Volume II of this HMP. Any new development and new residents within the County are expected to be exposed to the utility failure hazard. Refer to the jurisdictional annexes in Volume II of this HMP for maps that include new development project areas.

12.3.2 Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 4 percent since 2010. Population projections from Cornell University reveal the County's population is anticipated to continue decreasing. The population is projected to decline to 73,254 persons in 2030 and to 70,468 by 2040 (Cornell University 2018). Changes in the density of the population can impact the number of persons exposed to utility failure. As severe storm and severe winter storm events continue, the population in the County will remain exposed to this hazard.

12.3.3 Climate Change

Climate is defined not simply as average temperature and precipitation but also by 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 utility failures. While predicting changes of utility failure under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating future climate change impacts on human health, society, and the environment (EPA 2023). Ultimately, warmer temperatures may lead to an increase in the frequency of storms, thus leading to more weather events with potentially increased severity, that cause utility failure.

12.3.4 Change of Vulnerability Since 2020 Cattaraugus County HMP

Since the 2020 analysis, population statistics have been updated using the 2020 Census and 2018–2022 American Community Survey 5-Year Estimates. Overall, this vulnerability assessment uses a more accurate and updated building inventory than that used in the 2020 Cattaraugus County HMP. This information provides more accurate exposure, and potential loss estimates for Cattaraugus County.

13. WILDFIRE

13.1 HAZARD PROFILE

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

13.1.1 Hazard Description

According to the New York State HMP, a wildfire is any fire that is not planned, controlled, or supervised in a natural area such as a forest, grassland, or prairie (MitigateNY 2023). Wildfires that burn or threaten to burn buildings and other structures are referred to as wildland urban interface fires. Wildfires include common terms such as forest fires, brush fires, grass fires, wildland urban interface fires (previously mentioned), range fires or ground fires. Wildfires do not include those fires, either naturally or purposely ignited, that are controlled for a defined purpose of managing vegetation for one or more benefits (MitigateNY 2023). These events often begin unnoticed and spread quickly. A fire needs all of the following three elements in the right combination (Figure 13-1) to start and grow: a heat source, fuel, and oxygen.

Figure 13-1. Fire Triangle

Source: National Park Service 2020

The interaction of three conditions determines how a wildfire will grow once ignited: fuel, weather, and topography (MitigateNY 2023). Fuels are anything that will burn and include vegetation and structures. The weather such as high temperatures, low humidity, and high winds increase the likelihood that a wildfire will spread. Topography affects speed at which a wildfire will spread. A fire will move more quickly uphill which causes hot gases to rise in front of it. These gases, in turn, pre-heat and dry vegetation ahead of the wildfire causing it to catch fire more rapidly (MitigateNY 2023).

The National Park Service (NPS) has identified four categories of wildfires that are experienced throughout the US. These categories are defined as follows (NPS 2020):

- **Wildland fires** are fueled almost exclusively by natural vegetation. They typically occur in national forests and parks, where federal agencies are responsible for fire management and suppression.
- **Interface or intermix fires** are urban/wildland fires in which vegetation and the built environment provide fuel.
- **Firestorms** are events of such extreme intensity that effective suppression is virtually impossible. Firestorms occur during extreme weather and generally burn until conditions change or the available fuel is exhausted.
- **Prescribed fires and prescribed natural burns** are fires that are intentionally set or selected natural fires that are allowed to burn for beneficial purposes.

Wildfires cause both short-term and long-term losses. Short-term losses can include destruction of timber, wildlife habitat, scenic vistas, and watersheds. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, and the destruction of cultural and economic resources and community infrastructure.

There are three different classes of wildfires: surface fires, ground fires, and crown fires. Surface fires are the most common type and burns along the forest floor, moving slowly and killing or damaging trees. Ground fires are usually started by lightning and burns on or below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees.

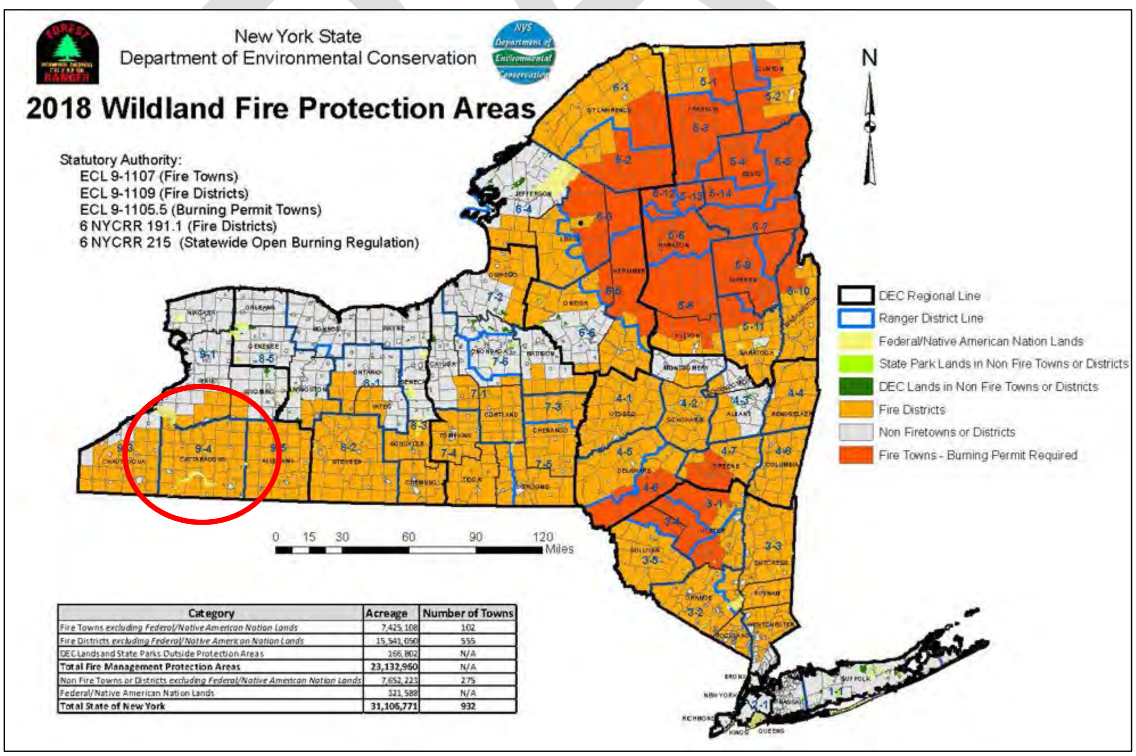
13.1.2 Location

While they are not confined to any specific geographic location and can vary greatly in terms of size, location, intensity, and duration, wildfires are most likely to occur in open grasslands. The threat to people and property is greater in the fringe areas where developed areas meet open grasslands (U.S. Forest Service 2020). Many areas in the state, particularly those that are heavily forested or contain large tracts of brush and shrubs, are prone to fires.

Figure 13-2 indicates that, as of 2018, Cattaraugus County is included in fire districts. Figure 13-3 shows the Forest Ranger Divisions in New York State. Cattaraugus County is part of Forest Ranger Division 9 (NYS DHSES 2022).

The State of New York is divided into 10 fire danger rating areas (FDRAs). FDRAs are defined by areas of similar vegetation, climate, and topography in conjunction with agency regional boundaries, National Weather Service (NWS) fire weather zones, political boundaries, fire occurrence history, and other influences. The Forest Ranger Division issues daily fire danger warnings when the fire danger rating is at high or above in one or more FDRAs. Cattaraugus County is part of the Southern Tier FDRA. This is discussed further in in the Extent section of this profile. A current fire danger rating map is updated daily on the NYSDEC website, refer to Figure 13-3 as an example.

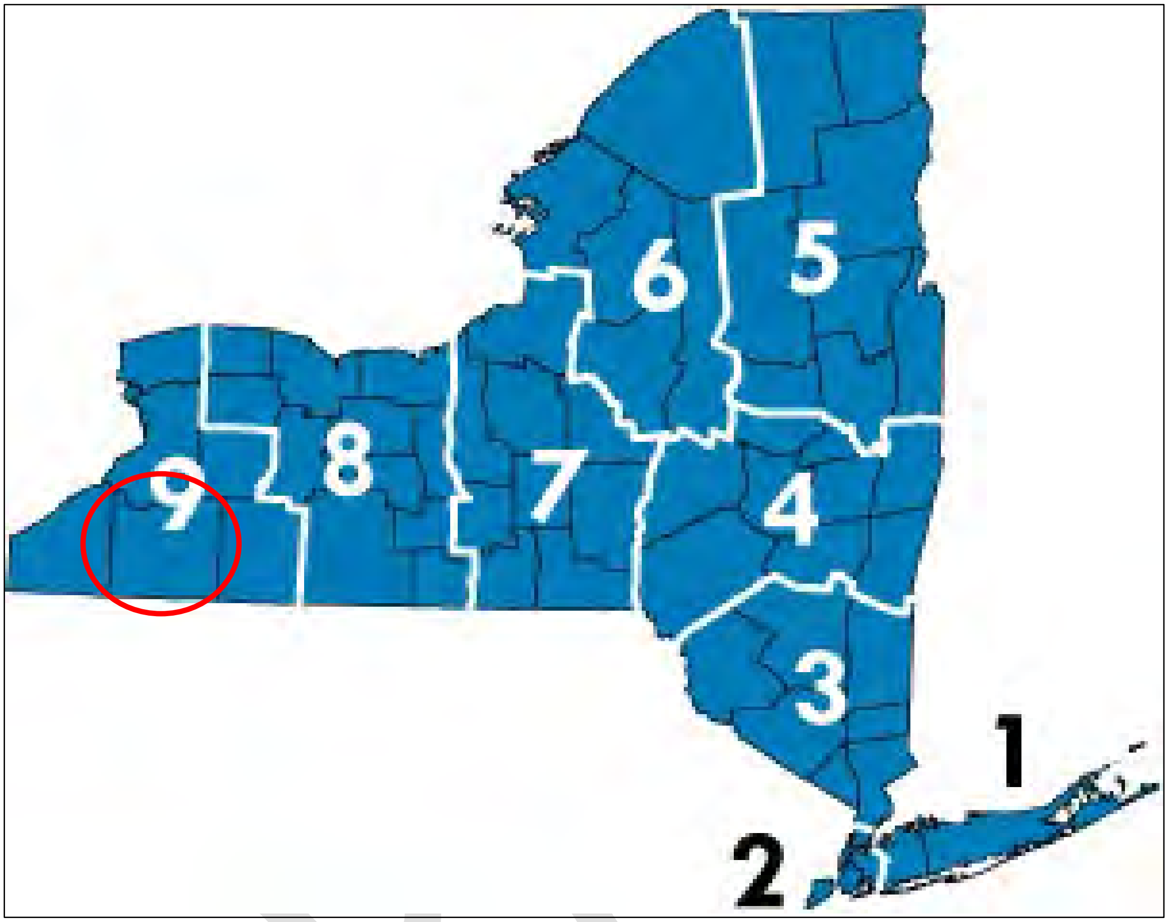
Figure 13-2. Forest Ranger Division Wildfire Protection Areas



Category	Acreage	Number of Towns
Fire Towns *excluding Federal/Native American Nation Lands*	7,425,108	102
Fire Districts *excluding Federal/Native American Nation Lands*	15,541,050	555
DEC Lands and State Parks Outside Protection Areas	166,802	N/A
Total Fire Management Protection Areas	**23,132,960**	N/A
Non Fire Towns or Districts *excluding Federal/Native American Nation Lands*	7,652,223	275
Federal/Native American Nation Lands	321,588	N/A
Total State of New York	**31,106,771**	**932**

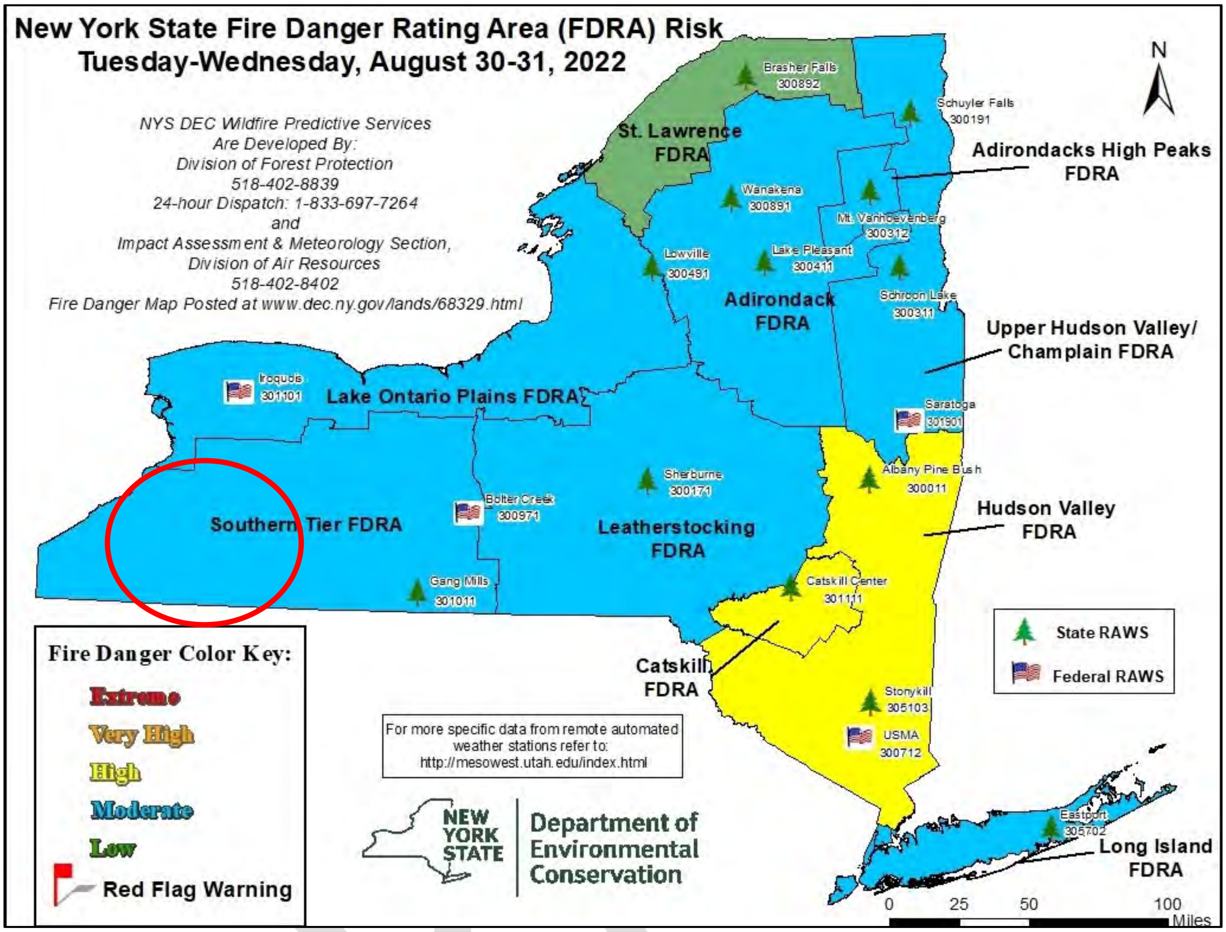
Source: NYSDEC 2018
Note: The red circle indicates the approximate location of Cattaraugus County.

Figure 13-3. Forest Ranger Divisions in New York State



Source: NYSDEC 2022
Note: The red circle indicates the approximate location of Cattaraugus County.

Figure 13-4. New York State Fire Danger Rating Areas



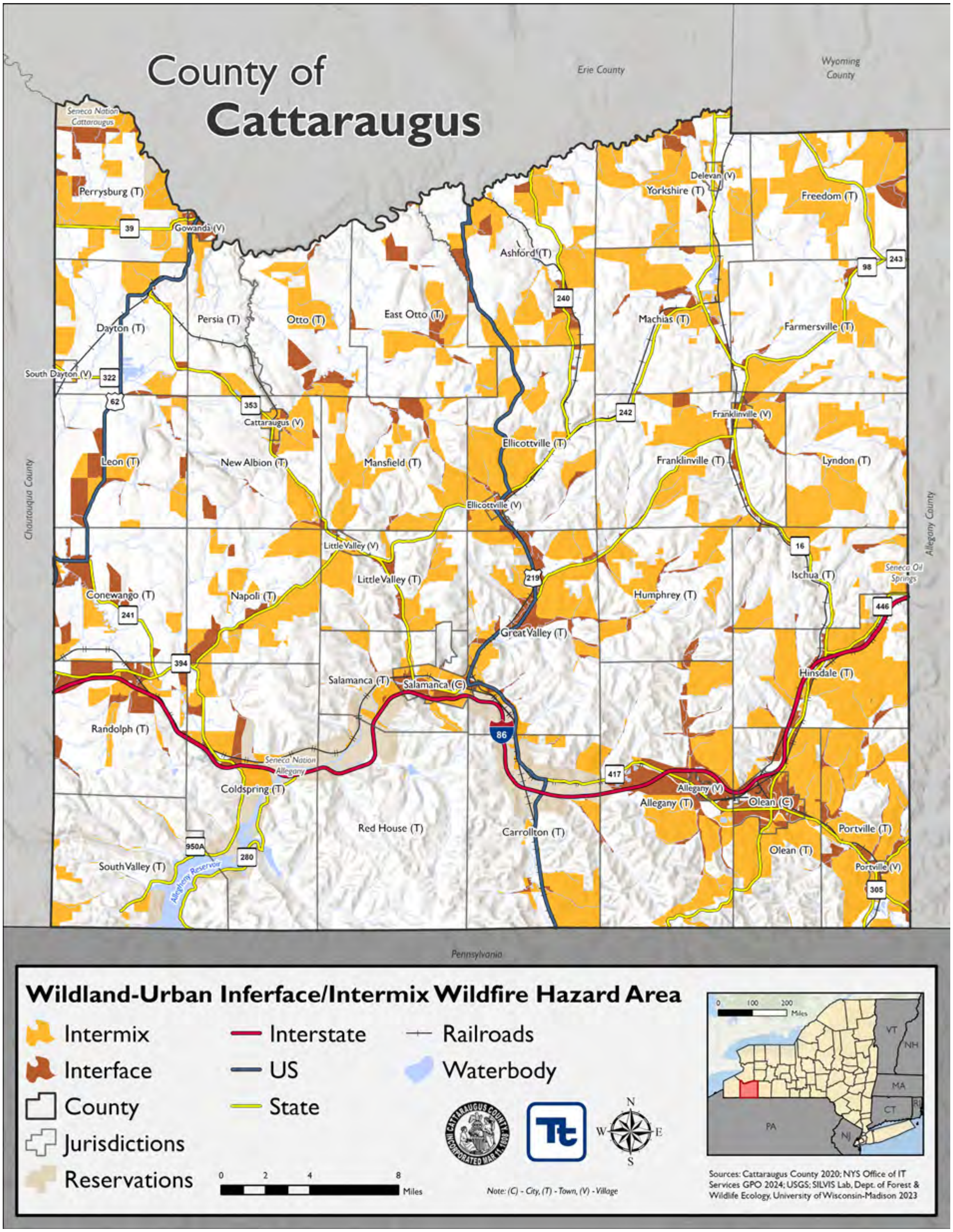
Source: NYSDEC 2022
Note: The red circle indicates the approximate location of Cattaraugus County.

Wildfire/Urban Interface (WUI)

Wildland urban interface (WUI) is the area where natural areas and development meet. From 1990 to 2010, the WUI in the United States by 41 percent in terms of new housing, and by 33 percent in terms of land area. 97 percent of this increase in WUI area is due to the construction of new housing, and not related to an increase in wildland vegetation (V. Radeloff, et al. 2018). These homes are at risk of structure loss, injury, and death from a wildfire. All states have at least a small amount of land classified as WUI, and up to 18.8 percent of all US land may be classified as WUI (USGS 2022). The WUI is divided into two categories: intermix and interface. Intermix WUI refers to areas where housing and wildland vegetation intermingle, while interface WUI refers to areas where housing is in the vicinity of a large area of dense wildland vegetation (C. Radeloff, et al. 2020). Intermix areas have more than one house per 40 acres and have more than 50 percent vegetation. Interface areas have more than one house per 40 acres, have less than 50 percent vegetation, and are within 1.5 miles of an area over 1,235 acres that is more than 75 percent vegetated (Stewart, et al. 2006). In the State of New York, 27.2 percent (38,489 square miles) is located in the WUI. with 5.4 percent (7,599 square miles) located in the WUI interface and 21.9 percent (30,890 square miles) located in the WUI intermix (C. Radeloff, et al. 2020).

In Cattaraugus County, 48.5 percent of the County is in the WUI Interface hazard area and 27.4 percent is located in the WUI Intermix (C. Radeloff, et al. 2020). Refer to Figure 13-5 for WUI areas in Cattaraugus County.

Figure 13-5. Wildland-Urban Interface and Intermix Areas in Cattaraugus County



13.1.3 Extent

The extent (that is, magnitude or severity) of wildfires depends on weather and human activity. There are several tools available to estimate fire potential, extent, danger, and growth, several of which are described in the following section.

The Wildland Fire Assessment System (WFAS) is an internet-based information system that provides a national view of weather and fire potential, including national fires danger, weather maps and satellite-derived "greenness" maps. It was developed by the Fire Behavior unit at the Fire Sciences Laboratory in Missoula, Montana and is currently supported and maintained at the National Interagency Fire Center (NIFC) in Boise, Idaho (WFAS 2023).

Each day during the fire season, national maps of selected fire weather and fire danger components of the ***National Fire Danger Rating System (NFDRS)*** are produced by the WFAS. Fire Danger Rating level considers current and antecedent weather, fuel types, and both live and dead fuel moisture. This information is provided by local station managers (WFAS 2023). Table 11-1 shows the fire danger rating and color code, which is also used by the NYSDEC to update their fire danger rating maps, which is identified later in this section.

Table 13-1. Description of Fire Danger Ratings in New York State

Adjective Rating Class and Color Code	Class Description
Red Flag	A short-term, temporary warning, indicating the presence of a dangerous combination of temperature, wind, relative humidity, fuel, or drought conditions that can contribute to new fires or rapid spread of existing fires. A Red Flag Warning can be issued at any Fire Danger level.
Extreme (Red)	Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous, except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks until the weather changes, or the fuel supply lessens.
Very High (orange)	Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.
High (yellow)	All fine dead fuels ignite readily, and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly, and short-distance spotting is common. High intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small.
Moderate (blue)	Fires can start from most accidental causes but, with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur but is not persistent. Fires are not likely to become serious and control is relatively easy.
Low (green)	Fuels do not ignite readily from small firebrands, although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering and burn in irregular fingers. There is little danger of spotting.

Source: NYS DHSES 2022

The ***Fire Potential Index (FPI)*** is a moisture-based vegetation flammability indicator. The FPI indicates the estimated proportion (percentage) of the vegetation that is dry enough to burn, thus the FPI is highest when dead fuel moistures and vegetation greenness are low. The FPI is calculated once daily for the continental US at a resolution of 1 square kilometer. Although these maps provide a relative measure of fuel flammability across the nation, they do not indicate the chance that a large fire will occur (USFS 2016) (USGS 2023).

Fuel Moisture (FM) is a measure of the amount of water in a fuel (vegetation) available to a fire and is expressed as a percent of the dry weight of that specific fuel. When fuel moisture content is high, fires do not ignite readily, or at all, because heat energy must be used to evaporate and drive water from the plant before it can burn. When the fuel moisture content is low, fires start easily and will spread rapidly because all the heat energy goes directly into the burning flame itself. When the fuel moisture content is less than 30 percent, that fuel is essentially considered to be dead. Dead fuels respond solely to current environmental conditions and are critical in determining fire potential (NOAA 2023).

Fuels are classified into four categories which respond to changes in moisture. This response time is referred to as a time lag. A fuel's time lag is based upon how long it would take for two-thirds of the dead fuel to respond to atmospheric moisture. Table 13-2 below outlines these four fuel classifications.

Table 13-2. Fuel Moisture Classifications

1-hour fuels	10-hour fuels	100-hour fuels	1000-hour fuels
Up to ¼-inch diameter–fine, flashy fuels that respond quickly to weather changes. Computed from observation time, temperature, humidity, and cloudiness.	¼-inch to 1-inch in diameter–computed from observation time, temperature, humidity, and cloudiness or can be an observed value.	1-inch to 3-inch in diameter–computed from 24-hour average boundary condition composed of day length (daylight hours), hours of rain, and daily temperature/humidity ranges.	3-inch to 8-inch in diameter–computed from a 7-day average boundary condition composed of day length, hours of rain, and daily temperature/humidity ranges.

Source: NPS 2023

The ***Keetch-Byram Drought Index (KBDI)*** assesses the risk of fire by representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency in deep duff and upper soil layers. The KBDI attempts to measure the amount of precipitation necessary to return the soil to full field capacity. The index ranges from 0, the point of no moisture deficiency, to 800, the maximum drought that is possible, and represents a moisture regime from 0 to 8 inches of water through the soil layer. At 8 inches of water, the KBDI assumes saturation. At any point along the scale, the index number indicates the amount of net rainfall that is required to reduce the index to zero, or saturation (NIDIS 2023).

The ***Haines Index***, also known as the Lower Atmosphere Stability Index, was developed for fire use. It is used to indicate the potential for wildfire growth by measuring the stability and dryness of the air over a fire. It is calculated by combining the stability and moisture content of the lower atmosphere into a number that correlates well with large fire growth. The stability term is determined by the temperature difference between two atmospheric layers; the moisture term is determined by the temperature and dew point difference. This index has been shown to be correlated with large fire growth on initiating and existing fires where surface winds do not dominate fire behavior. The drier and more unstable the lower atmosphere is, the higher the index. See Table 13-3 below.

Table 13-3. Haines Index

Haines Index	Potential for Large Fire Growth
2 or 3	Very Low
4	Low
5	Moderate
6	High

Source: NOAA n.d.

13.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Between 1954 and 2024, Cattaraugus County was not included in any major disaster (DR) or emergency (EM) declarations for wildfire-related events (FEMA 2024).

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in contiguous counties. Between 2018 and 2024, Cattaraugus County was not included in any USDA wildfire-related agricultural disaster declarations (USDA 2024).

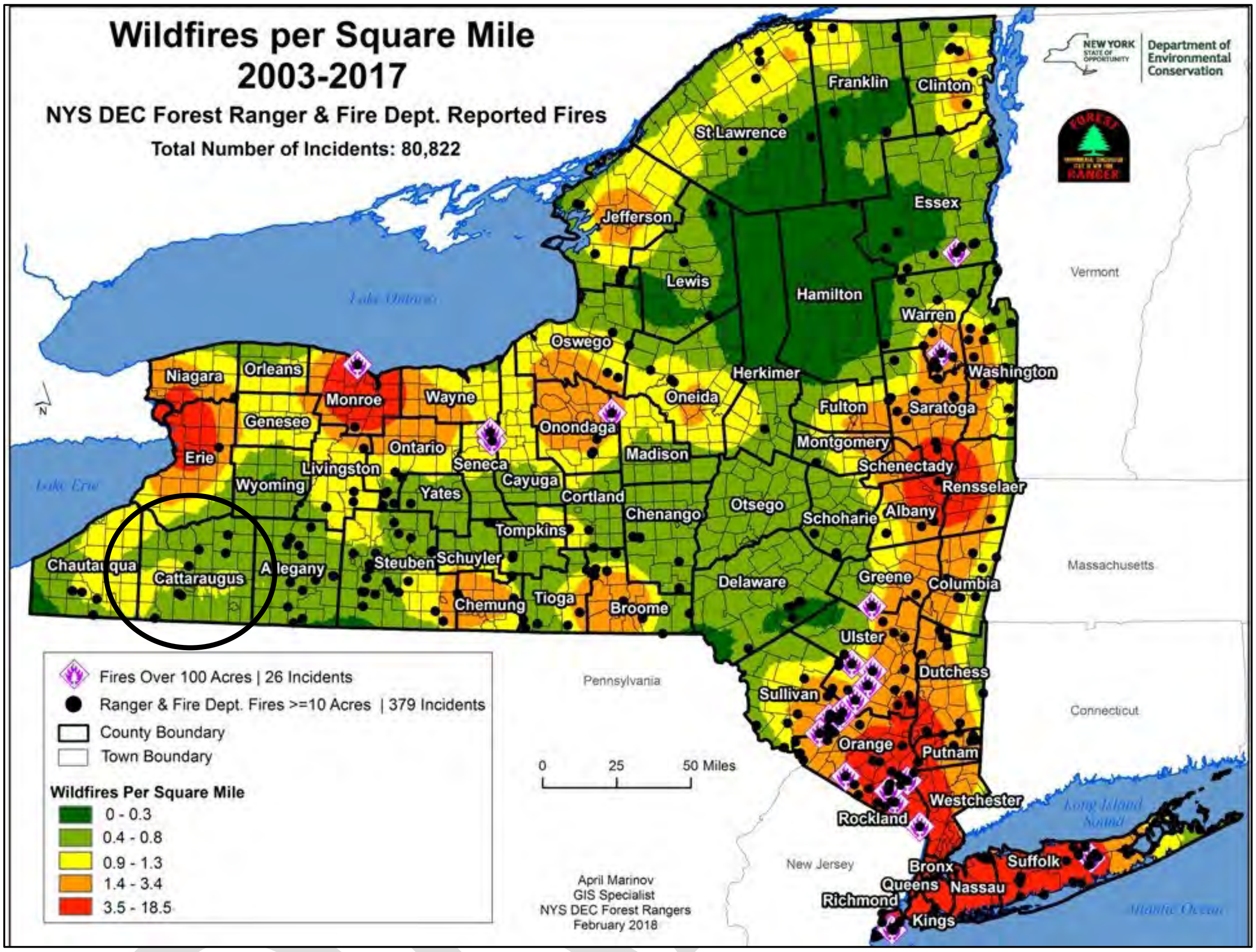
The USDA crop loss data provide another indicator of the severity of previous events. Additionally, crop losses can have a significant impact on the economy by reducing produce sales and purchases. Such impacts may have long-term consequences, particularly if crop yields are low the following years as well. USDA records indicate that Cattaraugus County did not have crop losses specifically attributed to wildfire.

Previous Events

Short-term effects of wildfires can include destruction of timber, forest, wildlife habitats, scenic vistas, and watersheds. Business and transportation can also be disrupted in the short term. Long-term effects can include reduced access to recreational areas and destruction of community infrastructure and cultural and economic resources (USDA n.d.).

According to Ranger Division wildfire occurrence data from 1993 through 2017, 95 percent of wildfires in the state were human caused; the remaining 5 percent are the result of lightning. With regards to human-caused fires, debris burning accounted for 33 percent; arson accounted for 16 percent; campfires accounted for 16 percent; children accounted for 4 percent; and smoking, equipment, and railroads accounted for 25 percent (NYSDEC 2022). Figure 13-6 illustrates occurrences of natural vegetation wildfires in New York State between 2003 and 2017. This figure reveals occurrences of between 0 and 0.8 wildfires per square mile within Cattaraugus County municipalities with the highest number focused on the northern and southern areas of the County.

Figure 13-6. Wildfire Occurrences in New York State, 2003-2017



Source: NYSDEC 2022
Note: The black oval indicates the location of Cattaraugus County.

Known hazard events that impacted Cattaraugus County between 2018 and 2024 are discussed in Table 13-4. For events prior to 2018, refer to the 2020 Cattaraugus County HMP.

Table 13-4. Wildfire Events in Cattaraugus County (2018 to 2024)

Event Date	FEMA Declaration or State Proclamation Number	Cattaraugus County included in declaration?	Location Impacted	Description
April 12, 2023	N/A	N/A	Lyndon	A wildfire detected in the Town of Lyndon which evolved into a 10-acre fire that spread from a pasture into pine woods.

Sources: NASA FIRMS 2015; Cattaraugus County Fire Wire 2015; NOAA 2023
Note: Monetary figures within this table were U.S. Dollar (USD) figures calculated during or after the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of inflation.

13.1.5 Probability of Future Occurrences

According to the New York State Forest Ranger Division, wildfire occurrence data from 1993 to 2017 have shown that New York State, including Cattaraugus County, is susceptible to wildfires. Beginning in 2010, New York State enacted revised open burning regulations that ban brush burning statewide during this time period. Forest ranger data indicate that this new statewide ban resulted in 74 percent fewer wildfires caused by debris burning in upstate New York from 2010 to 2012. Forest ranger and fire department historical fire occurrence data recorded after the new burn ban regulations were enacted in 2010 will serve as a benchmark for analysis of wildfire occurrence (NYSDEC 2022).

Fire probability depends on local weather conditions, outdoor activities (such as camping, debris burning, and construction) and the degree of public cooperation with fire prevention measures. Dry weather, such as drought, can increase the likelihood of wildfire events. Lightning can also trigger wildfire and urban fire events. Other natural disasters can increase the probability of wildfires by producing fuel in both urban and rural areas. Forest damage from hurricanes and tornadoes may block interior access roads and fire breaks, pull down overhead power lines, or damage pavement and underground utilities.

Wildfire experts point to four reasons why wildfire risks are increasing (NYS DHSES 2011):

- Fuel, in the form of fallen leaves, branches, and plant growth, has accumulated over time on the forest floor. Now, this fuel has the potential to "feed" a wildfire.
- Increasingly hot, dry weather has occurred and will occur within the United States.
- Weather patterns across the country are changing.
- More homes are built within areas of WUI, meaning that homes are built closer to wildland areas where wildfires can occur.

Annual small wildfires likely will occur throughout New York State (as the state has regularly undergone in the past). However, advanced methods of wildfire management and control and a better understanding of the fire ecosystems should reduce the number of devastating fires in the future. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Steering Committee, the probability of occurrence for wildfires in the County is considered "occasional".

Climate Change Projections

Climate change affects the State of New York's residents and resources. 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 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. Annual average precipitation is projected to decrease in the low estimate but increase in the middle range and high estimate 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 Cattaraugus County, and the southern tier region, temperatures are estimated to increase by 3.6ºF to 7.4ºF by the 2050s, 5ºF to 12.2ºF by the 2080s, and 5.5ºF to 14.1ºF by 2100, relative to the 1981–2010 base period. Precipitation totals are estimated increase by 0 to 12 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).

New York State experiences fire every year, especially in the spring and nearly all wildfires that occur are started by humans. From 1919 to 2018, the number and size of fires in the state has declined due to improving efforts to prevent, detect, and extinguish fires. However, 'fire weather' conditions, including high temperature, low humidity, and high wind, have increased from 1919 to 2018 (Stevens & Lamie 2024).

Climate change will lead to more frequent and intense wildfires in many states. Some studies project that the Northeast's fire season may start earlier and last longer due to warming temperatures. The risk of air quality impacts from wildfire smoke from local and regional wildfire events will increase if the fire season starts earlier and lasts longer (Stevens & Lamie 2024).

13.1.6 Cascading Impacts on Other Hazards

Wildfires result in the uncontrolled destruction of forests, brush, field crops, grasslands, real estate, and personal property, and have secondary impacts on other hazards such as flooding, by removing vegetation and destroying watersheds. Additionally, wildfires can increase because of rising temperatures and increased droughts.

Following wildfires, cascading hazards such as debris flow, landslides, and flooding may occur due to loss of stabilizing vegetation, resulting in potentially catastrophic sequences. For more information on landslides, refer to Chapter 8. When wildfire hits in drought-stricken areas, watersheds and reservoirs can be further impacted by ash and debris flows, water treatment facilities may shut down with damage or loss of power, crops can be destroyed, and smoke can affect animal and human health (NIDIS 2023).

Flooding after a wildfire is often more severe, as debris and ash left from the fire can form mudflows. During and after a rain event, as water moves across charred and denuded ground, it can also pick up soil and sediment and carry it in a stream of floodwaters. These mudflows have the potential to cause significant damage to impacted areas. Areas directly affected by fires and those located below or downstream of burn areas are most at risk for flooding (FEMA 2020). For detailed information regarding flooding, see Chapter 7 (Flood).

13.2 VULNERABILITY AND IMPACT ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable within the hazard area identified. The following discusses Cattaraugus County's vulnerability to the wildfire hazard.

13.2.1 Life, Health, and Safety

Smoke generated by wildfire consists of visible and invisible emissions that contain particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, nitrogen oxides), and toxics (formaldehyde, benzene). Emissions from wildfires depend on the type of fuel, the moisture content of the fuel, the efficiency (or temperature) of combustion, and the weather. Public health impacts associated with wildfire include difficulty in breathing, odor, and reduction in visibility.

Overall Population

Wildfires have the potential to impact human health and life of residents and responders, structures, infrastructure, and natural resources. The most vulnerable populations include emergency responders and those within a short distance of the interface between the built environment and the wildland environment. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke.

Table 13-5 summarizes the estimated population exposed to the wildfire hazard by jurisdiction. Based on the analysis, an estimated 36,689 residents, or 48.5 percent of the County's population, are in the wildfire interface hazard area. Overall, the City of Olean has the greatest number of individuals located in the wildfire interface hazard area (13,415 persons). Similarly, an estimated 20,709 residents, or 27.4 percent of the County's population, are in the wildfire intermix hazard area. Overall, the Town of Allegany has the greatest number of individuals located in the wildfire intermix hazard area (1,714 persons).

Socially Vulnerable Population

Social vulnerability is defined as the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood. Social vulnerability considers the social, economic, demographic, and housing characteristics of a community that influence its ability to prepare for, respond to, cope with, recover from, and adapt to environmental hazards.

Of the population exposed, the most vulnerable include the economically disadvantaged and the population over age 65. Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on net economic impacts on their families. The population over age 65 is also more vulnerable because they are more likely to seek or need medical attention that may not be available due to isolation during a wildfire event, and they may have more difficulty evacuating. Smoke and air pollution from wildfires can be a severe health hazard, especially for sensitive populations, including children, the elderly, and those with respiratory and cardiovascular diseases. Smoke generated by wildfire consists of visible and invisible emissions that contain particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, and nitrogen oxides), and toxics (formaldehyde and benzene). Emissions from wildfires depend on the type of fuel, the moisture content of the fuel, the efficiency (or temperature) of combustion, and the weather. Public health impacts associated with wildfire include difficulty in breathing, odor, and reduction in visibility.

As shown in Table 13-6, the City of Orleans has the highest population over 65 (2,469), the largest population under 5 (846), the greatest non-English speaking population (54), the highest population of disabled persons (2,539), and the largest number individuals living in poverty (3,266). The Town of Redhouse has the lowest population over 65 (7), the lowest population under 5 (1), the fewest number of disabled persons (2), and the lowest population living in poverty (2). Of the 43 local jurisdictions in the County, 27 have no (0) non-English speaking persons living within the jurisdiction.

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.

According to 2022 Point-in-Time-Data from ALICE, 29 percent of the 32,016 households in Cattaraugus County are ALICE households (compared to the state average of 31 percent). The median household income in Cattaraugus County is $50,508, and the County sees a labor force participation rate of 56 percent. Cattaraugus County faces a lower-than-average household income compared to the state average of $79,557 and suffers from a higher-than-average poverty rate at 19 percent (compared to the state average of 15 percent). See Table 13-7 for ALICE data by jurisdiction.

Table 13-8 presents the estimated socially vulnerable populations located in the wildfire interface hazard area. Of the 36,689 persons located in the wildfire interface hazard area, there are 6,976 persons over the age of 65 years, 2,173 persons under 5 years, 197 non-English speakers, 6,222 persons with a disability, and 6,894 living in poverty.

Table 13-9 presents the estimated socially vulnerable populations located in the wildfire intermix hazard area. Of the 20,709 persons located in the wildfire intermix hazard area, there are 4,507 persons over the age of 65 years, 1,053 persons under 5 years, 88 non-English speakers, 3,373 persons with a disability, and 3,008 living in poverty.

Table 13-5. Estimated Population Located Within the Wildfire Threat Hazard Areas

Jurisdiction	Total Population (American Community Survey 2022)	Population in the Wildland Urban Interface (WUI) Hazard Area		Population in the Wildland Urban Intermix (WUI) Hazard Area	
		Number of Persons	% of Jurisdiction Total	Number of Persons	% of Jurisdiction Total
Allegany (T)	5,949	3,300	55.5%	1,714	28.8%
Allegany (V)	1,544	1,536	99.5%	0	0.0%
Ashford (T)	1,961	446	22.7%	892	45.5%
Carrollton (T)	1,207	274	22.7%	628	52.0%
Cattaraugus (V)	960	445	46.4%	514	53.5%
Coldspring (T)	658	169	25.7%	154	23.4%
Conewango (T)	1,785	380	21.3%	476	26.7%
Dayton (T)	1,149	63	5.5%	409	35.6%
Delevan (V)	1,043	0	0.0%	328	31.4%
East Otto (T)	974	89	9.1%	299	30.7%
Ellicottville (T)	1,059	428	40.4%	469	44.3%
Ellicottville (V)	256	203	79.3%	51	19.9%
Farmersville (T)	1,073	139	13.0%	307	28.6%
Franklinville (T)	1,150	252	21.9%	483	42.0%
Franklinville (V)	1,652	1,488	90.1%	163	9.9%
Freedom (T)	2,261	183	8.1%	965	42.7%
Gowanda (V)	1,834	1,742	95.0%	88	4.8%
Great Valley (T)	1,991	817	41.0%	733	36.8%
Hinsdale (T)	2,113	618	29.2%	1,074	50.8%
Humphrey (T)	703	96	13.7%	245	34.9%
Ischua (T)	736	87	11.8%	240	32.6%
Leon (T)	1,244	356	28.6%	361	29.0%
Little Valley (T)	617	153	24.8%	248	40.2%
Little Valley (V)	1,058	750	70.9%	299	28.3%
Lyndon (T)	685	9	1.3%	328	47.9%

Jurisdiction	Total Population (American Community Survey 2022)	Population in the Wildland Urban Interface (WUI) Hazard Area		Population in the Wildland Urban Intermix (WUI) Hazard Area	
		Number of Persons	% of Jurisdiction Total	Number of Persons	% of Jurisdiction Total
Machias (T)	2,310	109	4.7%	584	25.3%
Mansfield (T)	843	108	12.8%	444	52.7%
Napoli (T)	1,171	145	12.4%	547	46.7%
New Albion (T)	1,021	104	10.2%	351	34.4%
Olean (C)	13,937	13,415	96.3%	518	3.7%
Olean (T)	1,881	523	27.8%	1,146	60.9%
Otto (T)	777	148	19.0%	303	39.0%
Perrysburg (T)	1,518	255	16.8%	800	52.7%
Persia (T)	596	2	0.3%	220	36.9%
Portville (T)	2,612	761	29.1%	1,577	60.4%
Portville (V)	892	793	88.9%	98	11.0%
Randolph (T)	2,469	1,167	47.3%	497	20.1%
Red House (T)	27	0	0.0%	0	0.0%
Salamanca (C)	5,929	5,008	84.5%	912	15.4%
Salamanca (T)	470	51	10.9%	159	33.8%
South Dayton (V)	541	0	0.0%	26	4.8%
South Valley (T)	250	3	1.2%	94	37.6%
Yorkshire (T)	2,784	74	2.7%	965	34.7%
Cattaraugus County (Total)	**75,690**	**36,689**	**48.5%**	**20,709**	**27.4%**

Source: Cattaraugus County 2024; U.S. Census Bureau, 5-Year American Community Survey 2022; SILVIS Lab, Dept of Forest & Wildlife Ecology, University of Wisconsin-Madison 2020
Note: % = Percent
Note: Values are Rounded Down

Table 13-6. Cattaraugus County Socially Vulnerable Populations by Municipality

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	American Community Survey 5-year Population Estimates (2022)									
			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
Allegany (T)	5,949	7.9%	1,183	19.9%	213	3.6%	19	0.3%	667	11.2%	640	10.8%
Allegany (V)	1,544	2.0%	401	26.0%	65	4.2%	19	1.2%	214	13.9%	313	20.3%
Ashford (T)	1,961	2.6%	468	23.9%	78	4.0%	0	0.0%	366	18.7%	107	5.5%
Carrollton (T)	1,207	1.6%	268	22.2%	57	4.7%	7	0.6%	197	16.3%	150	12.4%
Cattaraugus (V)	960	1.3%	167	17.4%	49	5.1%	31	3.2%	188	19.6%	181	18.9%
Coldspring (T)	658	0.9%	102	15.5%	17	2.6%	0	0.0%	130	19.8%	85	12.9%
Conewango (T)	1,785	2.4%	220	12.3%	352	19.7%	31	1.7%	161	9.0%	861	48.2%
Dayton (T)	1,149	1.5%	329	28.6%	46	4.0%	0	0.0%	184	16.0%	144	12.5%
Delevan (V)	1,043	1.4%	234	22.4%	62	5.9%	0	0.0%	269	25.8%	215	20.6%
East Otto (T)	974	1.3%	142	14.6%	46	4.7%	9	0.9%	145	14.9%	99	10.2%
Ellicottville (T)	1,059	1.4%	351	33.1%	14	1.3%	0	0.0%	77	7.3%	127	12.0%
Ellicottville (V)	256	0.3%	117	45.7%	40	15.6%	0	0.0%	39	15.2%	13	5.1%
Farmersville (T)	1,073	1.4%	322	30.0%	116	10.8%	0	0.0%	218	20.3%	277	25.8%
Franklinville (T)	1,150	1.5%	314	27.3%	21	1.8%	26	2.3%	135	11.7%	83	7.2%
Franklinville (V)	1,652	2.2%	273	16.5%	128	7.7%	0	0.0%	304	18.4%	274	16.6%
Freedom (T)	2,261	3.0%	393	17.4%	119	5.3%	0	0.0%	301	13.3%	243	10.7%
Gowanda (V)	1,834	2.4%	337	18.4%	256	14.0%	24	1.3%	409	22.3%	215	11.7%
Great Valley (T)	1,991	2.6%	419	21.0%	78	3.9%	12	0.6%	274	13.8%	56	2.8%
Hinsdale (T)	2,113	2.8%	448	21.2%	139	6.6%	0	0.0%	493	23.3%	308	14.6%
Humphrey (T)	703	0.9%	78	11.1%	8	1.1%	0	0.0%	60	8.5%	105	14.9%
Ischua (T)	736	1.0%	215	29.2%	5	0.7%	0	0.0%	162	22.0%	154	20.9%
Leon (T)	1,244	1.6%	137	11.0%	177	14.2%	50	4.0%	192	15.4%	192	15.4%
Little Valley (T)	617	0.8%	144	23.3%	3	0.5%	0	0.0%	255	41.3%	37	6.0%
Little Valley (V)	1,058	1.4%	171	16.2%	40	3.8%	0	0.0%	195	18.4%	295	27.9%
Lyndon (T)	685	0.9%	156	22.8%	26	3.8%	0	0.0%	124	18.1%	119	17.4%
Machias (T)	2,310	3.1%	566	24.5%	77	3.3%	0	0.0%	348	15.1%	393	17.0%

Jurisdiction	Total Population (Decennial 2020)	Percent of County Total	American Community Survey 5-year Population Estimates (2022)									
			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
Mansfield (T)	843	1.1%	127	15.1%	35	4.2%	0	0.0%	80	9.5%	36	4.3%
Napoli (T)	1,171	1.5%	241	20.6%	127	10.8%	0	0.0%	192	16.4%	169	14.4%
New Albion (T)	1,021	1.3%	160	15.7%	64	6.3%	31	3.0%	89	8.7%	108	10.6%
Olean (C)	13,937	18.4%	2,469	17.7%	846	6.1%	54	0.4%	2,539	18.2%	3,266	23.4%
Olean (T)	1,881	2.5%	491	26.1%	55	2.9%	0	0.0%	322	17.1%	262	13.9%
Otto (T)	777	1.0%	230	29.6%	11	1.4%	7	0.9%	159	20.5%	49	6.3%
Perrysburg (T)	1,518	2.0%	498	32.8%	42	2.8%	0	0.0%	430	28.3%	314	20.7%
Persia (T)	596	0.8%	143	24.0%	66	11.1%	9	1.5%	101	16.9%	66	11.1%
Portville (T)	2,612	3.5%	656	25.1%	136	5.2%	0	0.0%	269	10.3%	238	9.1%
Portville (V)	892	1.2%	156	17.5%	15	1.7%	0	0.0%	154	17.3%	86	9.6%
Randolph (T)	2,469	3.3%	476	19.3%	84	3.4%	0	0.0%	294	11.9%	222	9.0%
Red House (T)	27	<0.1%	7	25.9%	1	3.7%	0	0.0%	2	7.4%	2	7.4%
Salamanca (C)	5,929	7.8%	936	15.8%	381	6.4%	57	1.0%	1,092	18.4%	1,492	25.2%
Salamanca (T)	470	0.6%	131	27.9%	9	1.9%	2	0.4%	75	16.0%	84	17.9%
South Dayton (V)	541	0.7%	244	45.1%	20	3.7%	0	0.0%	94	17.4%	166	30.7%
South Valley (T)	250	0.3%	115	46.0%	18	7.2%	0	0.0%	55	22.0%	78	31.2%
Yorkshire (T)	2,784	3.7%	530	19.0%	157	5.6%	0	0.0%	581	20.9%	612	22.0%
Cattaraugus County (Total)	**75,690**	**100.0%**	**15,565**	**20.6%**	**4,299**	**5.7%**	**388**	**0.5%**	**12,635**	**16.7%**	**12,936**	**17.1%**

Source: U.S Census Bureau 2020; 5-Year American Community Survey 2022

Note: Allegany (V) is 100% within Allegany (T); Cattaraugus (V) is 100% within New Albion (T); Delevan (V) is 100% within Yorkshire (T); Ellicottville (V) is 100% within Ellicottville (T); Franklinville (V) is 100% within Franklinville (T); Little Valley (V) is 100% within Little Valley (T); Portville (V) is 100% within Portville (T); South Dayton (V) is 100% within Dayton (T). Subtracted village totals from town to assign correct town totals.

2.36 persons per household. This number was used to calculate the Non-English-speaking population.

Table 13-7. Cattaraugus County ALICE Data

Name	Total Households	% Below ALICE Threshold
Allegany (T)	2,676	39
Allegany (V)	-	-
Ashford (T)	879	30
Carrollton (T)	527	44
Cattaraugus (V)	-	-
Coldspring (T)	286	44
Conewango (T)	561	55
Dayton (T)	691	39
Delevan (V)	-	-
East Otto (T)	451	36
Ellicottville (T)	586	41
Ellicottville (V)	-	-
Farmersville (T)	480	61
Franklinville (T)	1,129	42
Franklinville (V)	-	-
Freedom (T)	939	32
Gowanda (V)	-	-
Great Valley (T)	806	40
Hinsdale (T)	939	46
Humphrey (T)	296	25
Ischua (T)	310	45
Leon (T)	354	33
Little Valley (T)	671	43
Little Valley (V)	-	-
Lyndon (T)	303	41
Machias (T)	925	44
Mansfield (T)	287	36
Napoli (T)	493	36
New Albion (T)	847	39
Olean (C)	6,142	54
Olean (T)	898	33
Otto (T)	353	40
Perrysburg (T)	694	38
Persia (T)	930	44
Portville (T)	1,405	40
Portville (V)	-	-
Randolph (T)	888	37
Red House (T)	-	-
Salamanca (C)	2,420	60

Name	Total Households	% Below ALICE Threshold
Salamanca (T)	244	53
South Dayton (V)	-	-
South Valley (T)	150	45
Yorkshire (T)	1,663	51
Cattaraugus County (Total)	32,016	29

Source: United For ALICE 2024

Note: Totals for the Town of Red House or the Villages of Alleghany, Cattaraugus, Delevan, Ellicottville, Franklinville, Gowanda, Little Valley, Portville, and South Dayton were unavailable.

Table 13-8. Vulnerable Populations Located in the WUI Interface Hazard Area

Jurisdiction	Estimated Number of Vulnerable Persons Located in the Wildland Urban Interface (WUI) Hazard Area									
	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English-Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Allegany (T)	656	55.5%	118	55.4%	10	52.6%	370	55.5%	355	55.5%
Allegany (V)	399	99.5%	64	98.5%	18	94.7%	212	99.1%	311	99.4%
Ashford (T)	106	22.6%	17	21.8%	0	0.0%	83	22.7%	24	22.4%
Carrollton (T)	60	22.4%	12	21.1%	1	14.3%	44	22.3%	34	22.7%
Cattaraugus (V)	77	46.1%	22	44.9%	14	45.2%	87	46.3%	83	45.9%
Coldspring (T)	26	25.5%	4	23.5%	0	0.0%	33	25.4%	21	24.7%
Conewango (T)	46	20.9%	75	21.3%	6	19.4%	34	21.1%	183	21.3%
Dayton (T)	18	5.5%	2	4.3%	0	0.0%	10	5.4%	7	4.9%
Delevan (V)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
East Otto (T)	13	9.2%	4	8.7%	0	0.0%	13	9.0%	9	9.1%
Ellicottville (T)	142	40.5%	5	35.7%	0	0.0%	31	40.3%	51	40.2%
Ellicottville (V)	93	79.5%	31	77.5%	0	0.0%	31	79.5%	10	76.9%
Farmersville (T)	41	12.7%	15	12.9%	0	0.0%	28	12.8%	36	13.0%
Franklinville (T)	68	21.7%	4	19.0%	5	19.2%	29	21.5%	18	21.7%
Franklinville (V)	246	90.1%	115	89.8%	0	0.0%	273	89.8%	246	89.8%
Freedom (T)	31	7.9%	9	7.6%	0	0.0%	24	8.0%	19	7.8%
Gowanda (V)	320	95.0%	243	94.9%	22	91.7%	388	94.9%	204	94.9%
Great Valley (T)	172	41.1%	32	41.0%	4	33.3%	112	40.9%	22	39.3%
Hinsdale (T)	131	29.2%	40	28.8%	0	0.0%	144	29.2%	90	29.2%
Humphrey (T)	10	12.8%	1	12.5%	0	0.0%	8	13.3%	14	13.3%
Ischua (T)	25	11.6%	0	0.0%	0	0.0%	19	11.7%	18	11.7%
Leon (T)	39	28.5%	50	28.2%	14	28.0%	55	28.6%	55	28.6%
Little Valley (T)	35	24.3%	0	0.0%	0	0.0%	63	24.7%	9	24.3%
Little Valley (V)	121	70.8%	28	70.0%	0	0.0%	138	70.8%	209	70.8%
Lyndon (T)	2	1.3%	0	0.0%	0	0.0%	1	0.8%	1	0.8%
Machias (T)	26	4.6%	3	3.9%	0	0.0%	16	4.6%	18	4.6%
Mansfield (T)	16	12.6%	4	11.4%	0	0.0%	10	12.5%	4	11.1%

Jurisdiction	Estimated Number of Vulnerable Persons Located in the Wildland Urban Interface (WUI) Hazard Area									
	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English-Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Napoli (T)	30	12.4%	15	11.8%	0	0.0%	23	12.0%	21	12.4%
New Albion (T)	16	10.0%	6	9.4%	3	9.7%	9	10.1%	11	10.2%
Olean (C)	2,376	96.2%	814	96.2%	51	94.4%	2,444	96.3%	3,143	96.2%
Olean (T)	136	27.7%	15	27.3%	0	0.0%	89	27.6%	72	27.5%
Otto (T)	43	18.7%	2	18.2%	1	14.3%	30	18.9%	9	18.4%
Perrysburg (T)	83	16.7%	7	16.7%	0	0.0%	72	16.7%	52	16.6%
Persia (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Portville (T)	191	29.1%	39	28.7%	0	0.0%	78	29.0%	69	29.0%
Portville (V)	138	88.5%	13	86.7%	0	0.0%	137	89.0%	76	88.4%
Randolph (T)	225	47.3%	39	46.4%	0	0.0%	139	47.3%	104	46.8%
Red House (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Salamanca (C)	790	84.4%	321	84.3%	48	84.2%	922	84.4%	1,260	84.5%
Salamanca (T)	14	10.7%	0	0.0%	0	0.0%	8	10.7%	9	10.7%
South Dayton (V)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
South Valley (T)	1	0.9%	0	0.0%	0	0.0%	0	0.0%	1	1.3%
Yorkshire (T)	14	2.6%	4	2.5%	0	0.0%	15	2.6%	16	2.6%
Cattaraugus County (Total)	**6,976**	**44.8%**	**2,173**	**50.5%**	**197**	**50.8%**	**6,222**	**49.2%**	**6,894**	**53.3%**

Source: Cattaraugus County 2024; U.S. Census Bureau, 5-Year American Community Survey 2022; SILVIS Lab, Dept of Forest & Wildlife Ecology, University of Wisconsin-Madison 2020
Note: % = Percent
Note: Values are Rounded Down

Table 13-9. Vulnerable Populations Located in the WUI Intermix Hazard Area

Jurisdiction	Estimated Number of Vulnerable Persons Located in the Wildland Urban Intermix (WUI) Hazard Area									
	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English-Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Allegany (T)	341	28.8%	61	28.6%	5	26.3%	192	28.8%	184	28.8%
Allegany (V)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Ashford (T)	213	45.5%	35	44.9%	0	0.0%	166	45.4%	48	44.9%
Carrollton (T)	139	51.9%	29	50.9%	3	42.9%	102	51.8%	78	52.0%
Cattaraugus (V)	89	53.3%	26	53.1%	16	51.6%	100	53.2%	97	53.6%
Coldspring (T)	23	22.5%	3	17.6%	0	0.0%	30	23.1%	19	22.4%
Conewango (T)	58	26.4%	93	26.4%	8	25.8%	42	26.1%	229	26.6%
Dayton (T)	117	35.6%	16	34.8%	0	0.0%	65	35.3%	51	35.4%
Delevan (V)	73	31.2%	19	30.6%	0	0.0%	84	31.2%	67	31.2%

Jurisdiction	Estimated Number of Vulnerable Persons Located in the Wildland Urban Intermix (WUI) Hazard Area									
	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English-Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
East Otto (T)	43	30.3%	14	30.4%	2	22.2%	44	30.3%	30	30.3%
Ellicottville (T)	155	44.2%	6	42.9%	0	0.0%	34	44.2%	56	44.1%
Ellicottville (V)	23	19.7%	8	20.0%	0	0.0%	7	17.9%	2	15.4%
Farmersville (T)	92	28.6%	33	28.4%	0	0.0%	62	28.4%	79	28.5%
Franklinville (T)	132	42.0%	8	38.1%	10	38.5%	56	41.5%	34	41.0%
Franklinville (V)	26	9.5%	12	9.4%	0	0.0%	30	9.9%	27	9.9%
Freedom (T)	167	42.5%	50	42.0%	0	0.0%	128	42.5%	103	42.4%
Gowanda (V)	16	4.7%	12	4.7%	1	4.2%	19	4.6%	10	4.7%
Great Valley (T)	154	36.8%	28	35.9%	4	33.3%	100	36.5%	20	35.7%
Hinsdale (T)	227	50.7%	70	50.4%	0	0.0%	250	50.7%	156	50.6%
Humphrey (T)	27	34.6%	2	25.0%	0	0.0%	20	33.3%	36	34.3%
Ischua (T)	70	32.6%	1	20.0%	0	0.0%	52	32.1%	50	32.5%
Leon (T)	39	28.5%	51	28.8%	14	28.0%	55	28.6%	55	28.6%
Little Valley (T)	58	40.3%	1	33.3%	0	0.0%	102	40.0%	14	37.8%
Little Valley (V)	48	28.1%	11	27.5%	0	0.0%	55	28.2%	83	28.1%
Lyndon (T)	74	47.4%	12	46.2%	0	0.0%	59	47.6%	57	47.9%
Machias (T)	143	25.3%	19	24.7%	0	0.0%	88	25.3%	99	25.2%
Mansfield (T)	66	52.0%	18	51.4%	0	0.0%	42	52.5%	18	50.0%
Napoli (T)	112	46.5%	59	46.5%	0	0.0%	89	46.4%	79	46.7%
New Albion (T)	55	34.4%	22	34.4%	10	32.3%	30	33.7%	37	34.3%
Olean (C)	91	3.7%	31	3.7%	2	3.7%	94	3.7%	121	3.7%
Olean (T)	299	60.9%	33	60.0%	0	0.0%	196	60.9%	159	60.7%
Otto (T)	89	38.7%	4	36.4%	2	28.6%	62	39.0%	19	38.8%
Perrysburg (T)	262	52.6%	22	52.4%	0	0.0%	226	52.6%	165	52.5%
Persia (T)	52	36.4%	24	36.4%	3	33.3%	37	36.6%	24	36.4%
Portville (T)	396	60.4%	82	60.3%	0	0.0%	162	60.2%	143	60.1%
Portville (V)	17	10.9%	1	6.7%	0	0.0%	16	10.4%	9	10.5%
Randolph (T)	95	20.0%	16	19.0%	0	0.0%	59	20.1%	44	19.8%
Red House (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Salamanca (C)	144	15.4%	58	15.2%	8	14.0%	168	15.4%	229	15.3%
Salamanca (T)	44	33.6%	3	33.3%	0	0.0%	25	33.3%	28	33.3%
South Dayton (V)	12	4.9%	0	0.0%	0	0.0%	4	4.3%	8	4.8%
South Valley (T)	43	37.4%	6	33.3%	0	0.0%	20	36.4%	29	37.2%
Yorkshire (T)	183	34.5%	54	34.4%	0	0.0%	201	34.6%	212	34.6%
Cattaraugus County (Total)	**4,507**	**29.0%**	**1,053**	**24.5%**	**88**	**22.7%**	**3,373**	**26.7%**	**3,008**	**23.3%**

Source: Cattaraugus County 2024; U.S. Census Bureau, 5-Year American Community Survey 2022; SILVIS Lab, Dept of Forest & Wildlife Ecology, University of Wisconsin-Madison 2020
Note: % = Percent
Note: Values are Rounded Down

13.2.2 General Building Stock

Buildings located within the wildfire intermix and interface hazard areas are exposed and considered vulnerable to the wildfire hazard. Buildings constructed of wood or vinyl siding are generally more likely to be impacted by the fire hazard than buildings constructed of brick or concrete.

The potential damage is the modeled loss that could occur to the exposed inventory measured by the structural and content replacement cost value. There are an estimated 18,024 buildings in the wildfire interface hazard area, representing approximately 40.4 percent of the County's total general building stock inventory replacement cost value. The City of Olean has the greatest number of its buildings located in the wildfire interface hazard area (5,360 buildings or 95.9 percent of its total building stock). There are an estimated 13,028 buildings in the wildfire intermix hazard area, representing approximately 29.2 percent of the County's total general building stock inventory replacement cost value. The Town of Ellicottville has the greatest number of its buildings located in the wildfire intermix hazard area (1,036 buildings or 44.7 percent of its total building stock). Refer to Table 13-11 for the estimated exposure of the wildfire hazard areas by jurisdiction. Table 13-10 shows the buildings that are located in the Wildland Urban Interface and Intermix hazard areas. The occupancy class with the most buildings located in the WUI hazard areas is residential for both interface and intermix.

Table 13-10. Buildings In the Wildland Urban Interface and Intermix Hazard Areas

Jurisdiction	Buildings in the Wildland Urban Interface (WUI) Hazard Area by General Occupancy Class				Buildings in the Wildland Urban Intermix (WUI) Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education
Allegany (T)	1,276	147	4	32	663	18	2	64
Allegany (V)	601	75	0	8	0	0	0	0
Ashford (T)	255	27	0	20	510	7	0	10
Carrollton (T)	151	11	0	3	346	16	0	7
Cattaraugus (V)	174	18	1	16	201	15	1	2
Coldspring (T)	114	9	0	5	104	1	0	5
Conewango (T)	135	20	0	61	169	1	0	12
Dayton (T)	33	0	0	7	212	3	0	19
Delevan (V)	0	0	0	0	117	9	0	0
East Otto (T)	57	2	0	17	190	3	0	12
Ellicottville (T)	894	10	0	1	978	51	1	6
Ellicottville (V)	409	50	13	4	104	3	0	0
Farmersville (T)	89	7	0	2	196	14	1	2
Franklinville (T)	181	5	3	23	347	62	0	7
Franklinville (V)	529	61	4	12	58	0	3	0

Jurisdiction	Buildings in the Wildland Urban Interface (WUI) Hazard Area by General Occupancy Class				Buildings in the Wildland Urban Intermix (WUI) Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education
Freedom (T)	93	2	0	2	489	34	2	37
Gowanda (V)	608	65	9	9	31	3	2	0
Great Valley (T)	581	34	0	27	521	13	1	39
Hinsdale (T)	343	10	0	16	596	18	1	30
Humphrey (T)	72	2	0	20	183	0	0	14
Ischua (T)	70	3	0	4	193	0	0	1
Leon (T)	142	9	0	110	144	1	0	43
Little Valley (T)	99	7	0	15	161	20	0	10
Little Valley (V)	276	46	3	5	110	9	0	1
Lyndon (T)	9	0	0	1	296	13	0	5
Machias (T)	66	9	5	6	352	11	0	15
Mansfield (T)	97	2	0	23	399	5	0	22
Napoli (T)	85	3	0	4	319	14	0	14
New Albion (T)	63	1	0	19	211	10	0	7
Olean (C)	4,815	435	41	69	186	4	0	1
Olean (T)	286	25	0	7	626	37	1	7
Otto (T)	92	4	0	14	188	3	0	12
Perrysburg (T)	136	5	0	26	426	17	0	21
Persia (T)	1	0	0	0	103	1	0	8
Portville (T)	399	32	6	8	827	51	5	14
Portville (V)	307	32	2	8	38	2	0	0
Randolph (T)	472	39	3	43	201	24	0	19
Red House (T)	0	0	0	0	0	0	0	1
Salamanca (C)	1,773	146	23	27	323	9	0	1
Salamanca (T)	33	0	0	0	103	9	0	9
South Dayton (V)	0	0	0	0	11	3	0	0
South Valley (T)	5	5	0	0	135	2	0	0
Yorkshire (T)	48	0	0	6	620	10	0	18
Cattaraugus County	**15,869**	**1,358**	**117**	**680**	**11,987**	**526**	**20**	**495**

Source: Cattaraugus County 2024; SILVIS Lab, Dept of Forest & Wildlife Ecology, University of Wisconsin-Madison 2020

Table 13-11. Building Stock within the WUI in Cattaraugus County

Jurisdiction	Total Number of Buildings	Total RCV	Estimated Number and Total Replacement Cost Value of Structures Located in the Wildfire Threat Hazard Areas							
			Number of Buildings in the Wildfire Interface Threat Hazard Area	Percent of Total	Total RCV of Buildings Located in the Wildfire Interface Threat Hazard Area	Percent of Total	Number of Buildings in the Wildfire Intermix Threat Hazard Area	Percent of Total	Total RCV of Buildings Located in the Wildfire Intermix Threat Hazard Area	Percent of Total
Allegany (T)	2,633	$1,828,453,626	1,459	55.4%	$881,772,646	48.2%	747	28.4%	$395,239,176	21.6%
Allegany (V)	694	$534,281,350	684	98.6%	$487,447,123	91.2%	0	0.0%	$0	0.0%
Ashford (T)	1,255	$981,729,710	302	24.1%	$242,258,245	24.7%	527	42.0%	$301,952,515	30.8%
Carrollton (T)	716	$446,787,985	165	23.0%	$75,931,989	17.0%	369	51.5%	$212,162,021	47.5%
Cattaraugus (V)	429	$413,937,573	209	48.7%	$271,722,069	65.6%	219	51.0%	$141,963,231	34.3%
Coldspring (T)	509	$419,437,697	128	25.1%	$64,854,982	15.5%	110	21.6%	$49,444,858	11.8%
Conewango (T)	1,092	$1,224,823,403	216	19.8%	$141,286,950	11.5%	182	16.7%	$408,228,291	33.3%
Dayton (T)	760	$566,877,685	40	5.3%	$20,424,321	3.6%	234	30.8%	$107,314,886	18.9%
Delevan (V)	398	$294,096,772	0	0.0%	$0	0.0%	126	31.7%	$112,511,355	38.3%
East Otto (T)	726	$910,263,387	76	10.5%	$91,613,589	10.1%	205	28.2%	$179,193,004	19.7%
Ellicottville (T)	2,319	$1,230,255,766	905	39.0%	$391,934,507	31.9%	1,036	44.7%	$615,792,337	50.1%
Ellicottville (V)	594	$520,870,391	476	80.1%	$419,350,176	80.5%	107	18.0%	$52,314,342	10.0%
Farmersville (T)	773	$336,948,280	98	12.7%	$51,975,503	15.4%	213	27.6%	$84,115,081	25.0%
Franklinville (T)	1,019	$454,998,969	212	20.8%	$91,344,579	20.1%	416	40.8%	$161,972,227	35.6%
Franklinville (V)	667	$458,799,506	606	90.9%	$431,169,522	94.0%	61	9.1%	$27,629,984	6.0%
Freedom (T)	1,381	$1,243,878,371	97	7.0%	$44,929,059	3.6%	562	40.7%	$573,716,075	46.1%
Gowanda (V)	731	$557,102,073	691	94.5%	$523,147,387	93.9%	36	4.9%	$32,519,889	5.8%
Great Valley (T)	1,563	$1,678,197,808	642	41.1%	$324,603,346	19.3%	574	36.7%	$630,451,366	37.6%
Hinsdale (T)	1,265	$1,154,148,484	369	29.2%	$165,505,519	14.3%	645	51.0%	$708,794,787	61.4%
Humphrey (T)	567	$770,519,047	94	16.6%	$126,243,105	16.4%	197	34.7%	$213,395,753	27.7%
Ischua (T)	596	$941,084,197	77	12.9%	$33,681,757	3.6%	194	32.6%	$257,651,505	27.4%
Leon (T)	895	$871,766,032	261	29.2%	$233,439,877	26.8%	188	21.0%	$189,391,249	21.7%
Little Valley (T)	496	$669,501,134	121	24.4%	$76,698,360	11.5%	191	38.5%	$367,911,015	55.0%
Little Valley (V)	469	$431,938,926	330	70.4%	$274,324,449	63.5%	120	25.6%	$84,262,240	19.5%

Jurisdiction	Total Number of Buildings	Total RCV	Estimated Number and Total Replacement Cost Value of Structures Located in the Wildfire Threat Hazard Areas							
			Number of Buildings in the Wildfire Interface Threat Hazard Area	Percent of Total	Total RCV of Buildings Located in the Wildfire Interface Threat Hazard Area	Percent of Total	Number of Buildings in the Wildfire Intermix Threat Hazard Area	Percent of Total	Total RCV of Buildings Located in the Wildfire Intermix Threat Hazard Area	Percent of Total
Lyndon (T)	668	$1,218,701,662	10	1.5%	$4,406,448	0.4%	314	47.0%	$586,369,911	48.1%
Machias (T)	1,593	$1,010,913,905	86	5.4%	$55,999,594	5.5%	378	23.7%	$166,130,626	16.4%
Mansfield (T)	869	$850,358,071	122	14.0%	$189,650,010	22.3%	426	49.0%	$335,382,336	39.4%
Napoli (T)	828	$1,038,184,870	92	11.1%	$39,876,787	3.8%	347	41.9%	$371,028,777	35.7%
New Albion (T)	740	$412,253,447	83	11.2%	$39,570,798	9.6%	228	30.8%	$144,663,664	35.1%
Olean (C)	5,590	$5,029,125,342	5,360	95.9%	$4,776,546,000	95.0%	191	3.4%	$87,375,342	1.7%
Olean (T)	1,122	$711,063,289	318	28.3%	$174,385,083	24.5%	671	59.8%	$351,890,454	49.5%
Otto (T)	575	$270,712,477	110	19.1%	$54,439,957	20.1%	203	35.3%	$87,398,204	32.3%
Perrysburg (T)	945	$635,389,864	167	17.7%	$102,048,813	16.1%	464	49.1%	$302,928,499	47.7%
Persia (T)	340	$193,784,098	1	0.3%	$353,134	0.2%	112	32.9%	$48,068,111	24.8%
Portville (T)	1,490	$1,452,207,760	445	29.9%	$393,554,576	27.1%	897	60.2%	$856,812,080	59.0%
Portville (V)	390	$292,144,939	349	89.5%	$272,959,339	93.4%	40	10.3%	$18,437,613	6.3%
Randolph (T)	1,232	$893,024,995	557	45.2%	$366,010,441	41.0%	244	19.8%	$159,114,728	17.8%
Red House (T)	328	$141,446,242	0	0.0%	$0	0.0%	1	0.3%	$893,213	0.6%
Salamanca (C)	2,320	$3,749,213,545	1,969	84.9%	$3,252,014,860	86.7%	333	14.4%	$227,565,765	6.1%
Salamanca (T)	331	$193,028,563	33	10.0%	$11,705,469	6.1%	121	36.6%	$56,532,574	29.3%
South Dayton (V)	264	$203,422,751	0	0.0%	$0	0.0%	14	5.3%	$13,810,513	6.8%
South Valley (T)	410	$607,773,120	10	2.4%	$54,695,953	9.0%	137	33.4%	$138,076,626	22.7%
Yorkshire (T)	1,985	$2,733,993,018	54	2.7%	$33,913,150	1.2%	648	32.6%	$1,372,520,541	50.2%
Cattaraugus County (Total)	**44,567**	**$40,577,440,127**	**18,024**	**40.4%**	**$15,287,789,467**	**37.7%**	**13,028**	**29.2%**	**$11,232,926,763**	**27.7%**

Source: Cattaraugus County 2024; RS Means 2024; SILVIS Lab, Dept of Forest & Wildlife Ecology, University of Wisconsin-Madison 2020

Note: % = Percent

13.2.3 Community Lifelines and Other Critical Facilities

Wildfires can have an impact on the water supplies throughout the County because of residual pollutants like char or debris landing in water resources which can clog wastewater pipes, culverts, etc. Wildfires may also impact transportation routes, blocking residents and commuters from getting in and out of the County during a wildfire event because of char and debris polluting the air making it difficult to drive, or the flames having proximity to the roadways making the route an unsafe passageway. In general, roads and bridges surrounding the areas of fire risk are important because they provide ingress and egress to large areas and, in some cases, to isolated neighborhoods. Fires can create conditions that block or prevent access and can isolate residents and emergency service providers. If a wildfire reached the following critical facilities, their vulnerability could complicate response and recovery efforts during and following an event:

- **Hazardous Materials and Fuel Storage**—During a wildfire event, these materials could rupture due to excessive heat and act as fuel for the fire, causing rapid spreading and escalating the fire to unmanageable levels. In addition, they could leak into surrounding areas, saturating soils, and seeping into surface waters, and have a disastrous effect on the environment.
- **Communication Facilities**—If these facilities are damaged and become inoperable, it would exacerbate already difficult communication in the planning area.
- **Fire Stations**—If fire stations were compromised during a wildfire event, it would make fire suppression and support services even more challenging.

Table 13-12 summarizes the number of community lifelines exposed to the wildland urban interface hazard area by lifeline category. Of the 484 facilities located in the wildfire interface area, other critical facilities have the majority of facilities (153). Table 13-13 summarizes the number of community lifelines exposed to the wildland urban intermix hazard area by lifeline category. Of the 251 facilities located in the wildfire intermix area, transportation has the majority of facilities (54).

13.2.4 Economy

Wildfire events can have major economic impacts on a community from the initial loss of structures and the subsequent loss of revenue from destroyed businesses and decreases in tourism. Wildfires can cost thousands of taxpayer dollars to suppress and control and can involve hundreds of operating hours on fire apparatus and thousands of volunteer man hours from the volunteer firefighters. There are also many direct and indirect costs to local businesses that provide employees with time off to volunteer to fight these fires.

Table 13-12. Facilities within the WUI Interface in Cattaraugus County

Jurisdiction	Number of Facilities in Wildland Urban Interface (WUI) 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	Count	% of Jurisdiction Total
Allegany (T)	0	0	0	5	2	4	5	1	5	22	38.6%
Allegany (V)	0	1	0	0	1	8	0	1	7	18	100.0%
Ashford (T)	0	1	0	0	0	3	3	1	4	12	28.6%
Carrollton (T)	0	0	0	0	1	2	1	1	3	8	18.6%
Cattaraugus (V)	0	0	1	1	0	4	1	0	6	13	61.9%
Coldspring (T)	0	0	0	0	1	3	1	0	2	7	38.9%
Conewango (T)	0	0	0	0	0	0	1	0	2	3	11.1%
Dayton (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Delevan (V)	0	0	0	0	0	0	0	0	0	0	0.0%
East Otto (T)	0	0	0	0	0	1	3	0	0	4	14.8%
Ellicottville (T)	0	0	0	0	0	0	1	0	0	1	4.0%
Ellicottville (V)	0	0	0	1	0	1	2	0	3	7	41.2%
Farmersville (T)	0	1	0	0	0	2	1	0	1	5	25.0%
Franklinville (T)	0	1	0	0	0	2	3	0	2	8	36.4%
Franklinville (V)	0	4	0	4	2	8	1	1	7	27	96.4%
Freedom (T)	0	0	0	0	0	0	5	0	1	6	16.2%
Gowanda (V)	0	3	0	2	2	4	3	5	6	25	89.3%
Great Valley (T)	0	1	0	1	1	4	5	1	4	17	58.6%
Hinsdale (T)	0	1	0	1	0	4	4	1	3	14	35.9%
Humphrey (T)	0	1	0	0	0	0	3	0	1	5	31.3%
Ischua (T)	0	0	0	0	0	2	1	0	2	5	27.8%
Leon (T)	0	0	0	0	1	2	4	0	2	9	28.1%
Little Valley (T)	0	0	0	0	0	0	3	0	0	3	25.0%
Little Valley (V)	0	0	0	1	2	7	3	0	5	18	66.7%
Lyndon (T)	0	0	0	0	0	0	1	0	0	1	8.3%
Machias (T)	0	0	0	0	0	3	0	0	0	3	10.0%

Jurisdiction	Number of Facilities in Wildland Urban Interface (WUI) 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	Count	% of Jurisdiction Total
Mansfield (T)	0	0	0	0	0	1	1	0	3	5	26.3%
Napoli (T)	0	0	0	0	0	2	1	1	1	5	35.7%
New Albion (T)	0	0	0	0	0	0	2	3	0	5	21.7%
Olean (C)	0	18	1	15	7	12	0	6	40	99	83.2%
Olean (T)	0	1	0	1	0	1	1	0	2	6	18.2%
Otto (T)	0	0	0	1	1	1	4	0	0	7	38.9%
Perrysburg (T)	0	0	0	0	0	5	0	0	2	7	30.4%
Persia (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Portville (T)	0	2	0	0	0	3	2	0	2	9	40.9%
Portville (V)	0	0	0	1	1	8	1	1	8	20	95.2%
Randolph (T)	0	2	0	0	1	8	3	3	7	24	49.0%
Red House (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Salamanca (C)	0	3	2	2	4	10	0	8	21	50	72.5%
Salamanca (T)	0	0	0	0	0	0	0	0	0	0	0.0%
South Dayton (V)	0	0	0	0	0	0	0	0	0	0	0.0%
South Valley (T)	0	0	0	0	0	1	2	0	1	4	44.4%
Yorkshire (T)	0	0	0	0	0	0	2	0	0	2	5.6%
Cattaraugus County	**0**	**40**	**4**	**36**	**27**	**116**	**74**	**34**	**153**	**484**	**40.9%**

Source: Cattaraugus County 2024; SILVIS Lab, Dept of Forest & Wildlife Ecology, University of Wisconsin-Madison 2022
Note: % = Percent

Table 13-13. Facilities within the WUI Intermix in Cattaraugus County

Jurisdiction	Number of Facilities in Wildland Urban Intermix (WUI) 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	Count	% of Jurisdiction Total
Allegany (T)	0	1	0	2	0	0	1	2	4	10	17.5%
Allegany (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Ashford (T)	0	1	0	3	2	3	7	0	2	18	42.9%
Carrollton (T)	0	0	0	17	0	3	4	1	1	26	60.5%
Cattaraugus (V)	0	0	0	0	1	3	1	2	1	8	38.1%
Coldspring (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Conewango (T)	0	0	0	0	0	0	3	0	1	4	14.8%
Dayton (T)	0	0	0	0	0	0	1	0	2	3	12.5%
Delevan (V)	0	0	0	0	0	1	2	0	2	5	27.8%
East Otto (T)	0	0	0	0	1	3	1	0	0	5	18.5%
Ellicottville (T)	0	1	0	0	1	1	1	4	2	10	40.0%
Ellicottville (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Farmersville (T)	0	0	0	0	0	3	1	0	1	5	25.0%
Franklinville (T)	0	1	0	0	0	1	6	2	0	10	45.5%
Franklinville (V)	0	0	0	0	0	0	0	0	0	0	0.0%
Freedom (T)	0	0	0	1	0	3	1	2	2	9	24.3%
Gowanda (V)	0	0	0	0	0	1	0	1	0	2	7.1%
Great Valley (T)	0	0	0	0	0	1	0	1	0	2	6.9%
Hinsdale (T)	0	2	0	5	2	0	4	2	3	18	46.2%
Humphrey (T)	0	0	0	0	0	1	2	0	1	4	25.0%
Ischua (T)	0	0	0	0	1	1	0	0	0	2	11.1%
Leon (T)	0	0	0	0	0	1	0	0	1	2	6.3%
Little Valley (T)	0	0	0	0	0	0	2	0	1	3	25.0%
Little Valley (V)	0	0	0	0	0	2	2	2	1	7	25.9%

Jurisdiction	Number of Facilities in Wildland Urban Intermix (WUI) 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	Count	% of Jurisdiction Total
Lyndon (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Machias (T)	1	1	0	0	1	1	0	1	2	7	23.3%
Mansfield (T)	0	0	0	0	0	1	6	0	0	7	36.8%
Napoli (T)	0	0	0	0	0	0	1	0	1	2	14.3%
New Albion (T)	0	1	0	0	0	0	0	0	1	2	8.7%
Olean (C)	0	1	0	1	1	0	0	3	1	7	5.9%
Olean (T)	0	10	0	3	0	2	1	0	2	18	54.5%
Otto (T)	0	0	0	0	0	2	0	0	1	3	16.7%
Perrysburg (T)	0	0	0	0	0	3	0	2	2	7	30.4%
Persia (T)	0	0	0	0	0	1	0	0	0	1	16.7%
Portville (T)	0	0	0	1	1	3	3	0	2	10	45.5%
Portville (V)	0	0	0	0	0	0	0	1	0	1	4.8%
Randolph (T)	0	2	0	1	1	3	0	2	2	11	22.4%
Red House (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Salamanca (C)	0	3	0	0	0	0	0	3	1	7	10.1%
Salamanca (T)	0	1	0	0	1	2	0	0	1	5	83.3%
South Dayton (V)	0	0	0	0	0	0	0	2	0	2	10.0%
South Valley (T)	0	0	0	0	0	0	0	0	0	0	0.0%
Yorkshire (T)	0	1	0	2	0	1	4	0	0	8	22.2%
Cattaraugus County	**1**	**26**	**0**	**36**	**13**	**47**	**54**	**33**	**41**	**251**	**21.2%**

Source: Cattaraugus County 2024; SILVIS Lab, Dept of Forest & Wildlife Ecology, University of Wisconsin-Madison 2022

Note: % = Percent

13.2.5 Natural, Historic, and Cultural Resources

Natural

Wildfire can lead to ancillary impacts such as landslides in steep ravine areas and flooding caused by the impacts of silt in local watersheds. According to the USGS, post-fire runoff polluted with debris and contaminants can be extremely harmful to ecosystem and aquatic life. Studies show that urban fires in particular are more harmful to the environment compared to forest fires (USGS 2018). The age and density of infrastructure within Cattaraugus County can exacerbate consequences of fires on the environment because of the increased amount of chemicals and contaminants that would be released from burning infrastructure. These chemicals, such as iron, lead, and zinc, may leach into the storm water, contaminate nearby streams, and impair aquatic life.

Historic

Wildfires are a major threat to historic resources, with the potential to cause extensive damage, and in some cases, complete destruction. The potential impacts on historic resources, particularly infrastructure, from wildfire depend heavily on the materials used for construction. Many historic structures are made of wood, which is a highly flammable material.

Cultural

Wildfires are a major threat to cultural resources, with the potential to cause extensive damage, and in some cases, complete destruction. The potential impacts on cultural resources from wildfire depend heavily on the materials used to construct the facility in which cultural resources are located. In many instances, historic structures house cultural resources and artifacts; many historic structures are made of wood, which is a highly flammable material. Outdoor events are likely to be postponed or cancelled as the result of wildfire conditions, as smoke conditions can have harmful impacts to the human body.

13.3 FUTURE CHANGES THAT MAY AFFECT RISK

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The following sections examine potential conditions that may affect hazard vulnerability.

13.3.1 Potential or Planned Development

Areas targeted for potential future growth and development within the next 5 years have been identified across Cattaraugus County at the jurisdiction level. Refer to the jurisdictional annexes in Volume II of this HMP. Any new development and new residents within the WUI are expected to be exposed to the wildfire hazard. Refer to the jurisdictional annexes in Volume II of this HMP for maps which include new development project areas and their proximity to the wildland-urban interface/intermix hazard areas.

13.3.2 Projected Changes in Population

According to the 2020 Census, the population of the County has decreased by approximately 4 percent since 2010. Population projections from Cornell University reveal the County's population is anticipated to continue decreasing.

The population is projected to decline to 73,254 persons in 2030 and to 70,468 by 2040 (Cornell University 2018). Even though the population has decreased, any changes in the density of population can impact the number of persons exposed to the wildfire hazard. Fire suppression capabilities are high at the state and local levels. However, new development and changes in population with a mix of additional structures, ornamental vegetation, and wildland fuels will require continued assessment of the hazard and mitigation risk.

13.3.3 Climate Change

According to the USDA Forest Service, climate change will likely alter the atmospheric patterns that affect fire weather. Changes in fire patterns will, in turn, impact carbon cycling, forest structure, and species composition (US EPA 2020). Climate change associated with warmer temperatures, changes in rainfall, and increased periods of drought may create an atmospheric and fuel environment that is more conductive to large, severe fires. Under a changing climate, wildfires exceeding 50,000 acres have increased over the past 30 years (USDA 2012a). Understanding the climate/fire/vegetation interactions is essential for addressing issues associated with climate change that include:

- Effects on regional circulation and other atmospheric patterns that affect fire weather
- Effects of changing fire regimes on the carbon cycle, forest structure, and species composition
- Complications from land use change, invasive species, and an increasing WUI

As discussed earlier, average temperatures are anticipated to increase in New York; therefore, the suitability of habitats for specific types of trees will potentially change, altering the fire regime and resulting in more frequent fire events and changes in intensity. Prolonged and more frequent heat waves have the potential to increase the likelihood of a wildfire. The increased potential combined with stronger winds may make it harder to contain fires and thus will increase the County’s vulnerability to this hazard.

13.3.4 Change of Vulnerability Since 2020 Cattaraugus County HMP

The 2020 Cattaraugus County HMP has been updated to reflect 2020 Census and 2022 American Community Survey 5-Year Estimates for population changes. The building stock inventory was updated using data from Cattaraugus County. Further, the building stock inventory replacement cost values were updated using RS Means 2024 values providing an overall update to the assets assessed in this risk assessment. The Interface/Intermix WUI data from the University of Wisconsin were referenced to determine areas within Cattaraugus County that are vulnerable to wildfires spatial layer has been updated since the last HMP.

14. HAZARD RANKING

Hazard rankings have been used as one of the bases for identifying the jurisdictional hazard mitigation strategies included in Volume II. These rankings may 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.

14.2 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 of the hazard scenario evaluated was estimated by examining the historical record or calculating the likelihood of annual occurrence. When no scenario was assessed, an examination of the historical record and judgment was used to estimate the probability of occurrence of an event that will impact the County. Table 14-1 summarizes the scoring parameters for probability of occurrence.

The hazard ranking methodology for some hazards of concern is based on a scenario event that only impacts specific areas (such as a floodplain), while others are based on their potential risk to the County as a whole. In order to account for these differences, the quantitative hazard ranking methodology was adjusted using professional judgement and subject-matter input. The limitations of this analysis are recognized given the scenarios do not have the same likelihood of occurrence; nonetheless, there is value in summarizing and comparing the hazards using a standardized approach to evaluate relative risk.

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		
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	

14.2.1 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.

14.3 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 Cattaraugus 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 preliminary overall ranking for each jurisdiction is included in Table 14-9; any revisions to these rankings are reflected in the jurisdictional annexes in Volume II.

Table 14-5. Probability of Occurrence for Hazards of Concern for Cattaraugus County

Hazard of Concern	Probability	Numeric Value
Dam and Levee Failure	Occasional	2
Flood	Frequent	3
Landslide	Occasional	2
Pandemic	Occasional	2
Severe Storm	Frequent	3
Severe Winter Storm	Frequent	3
Utility Failure	Occasional	2
Wildfire	Occasional	2

Table 14-6. Consequence Rating for Hazards of Concern for Cattaraugus County

	Population			Property			Economy			Total Impact Rating (Population + Property + Economy)
Hazard of Concern	Consequence	Numeric Value	Multiplied by Factor (3)	Consequence	Numeric Value	Multiplied by Factor (2)	Consequence	Numeric Value	Multiplied by Factor (1)	
Dam and Levee Failure	Medium	2	6	Medium	2	4	Medium	2	2	12
Flood	Medium	2	6	Medium	2	4	Low	1	1	11
Landslide	Medium	2	6	Medium	2	4	Medium	2	2	12
Pandemic	High	3	9	Low	1	2	Low	1	1	12
Severe Storm	High	3	9	High	3	6	High	3	3	18
Severe Winter Storm	High	3	9	High	3	6	High	3	3	18
Utility Failure	Medium	2	6	Medium	2	4	Medium	2	2	12
Wildfire	Medium	2	6	Medium	2	4	Medium	2	2	12

Table 14-7. Adaptive Capacity and Climate Change Ratings for Hazards of Concern for Cattaraugus County

Hazard of Concern	Adaptive Capacity		Climate Change	
	Level	Numeric Value	Level	Numeric Value
Dam and Levee Failure	Medium	0	Medium	2
Flood	Medium	0	High	3
Landslide	Medium	0	Medium	2
Pandemic	Medium	0	Low	1
Severe Storm	Medium	0	High	3
Severe Winter Storm	Medium	0	High	3
Utility Failure	Medium	0	Medium	2
Wildfire	Medium	0	High	3

Table 14-8. Total Hazard Ranking Scores for the Hazards of Concern for Cattaraugus 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 and Levee Failure	0.6	3.6	0	0.2	4.4
Flood	0.9	3.3	0	0.3	4.5
Landslide	0.6	3.6	0	0.2	4.4
Pandemic	0.6	3.6	0	0.1	4.3
Severe Storm	0.9	5.4	0	0.3	6.6
Severe Winter Storm	0.9	5.4	0	0.3	6.6
Utility Failure	0.6	3.6	0	0.2	4.4
Wildfire	0.6	3.6	0	0.3	4.5

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. Preliminary Overall Ranking of Hazards by Jurisdiction

Jurisdiction	Dam and Levee Failure	Flood	Landslide	Pandemic	Severe Storm	Severe Winter Storm	Utility Failure	Wildfire
Town of Allegany	Low	Low	Low	Medium	High	High	Medium	Medium
Village of Allegany	Low	Medium	High	Medium	High	High	Medium	Medium
Town of Ashford	Medium	Medium	Low	Medium	High	High	Medium	Medium
Town of Carrollton	Low	Low	High	Medium	High	High	Medium	Medium
Village of Cattaraugus	Low	Medium	Medium	Medium	High	High	Medium	Medium
Town of Coldspring	Medium	Medium	High	Medium	High	High	Medium	Medium
Town of Conewango	Medium	High	Low	Medium	High	High	Medium	Medium
Town of Dayton	Medium	Low	Medium	Medium	High	High	Medium	Low
Village of Delevan	Low	Medium	Medium	Medium	High	High	Medium	Medium
Town of East Otto	Medium	Medium	High	Medium	High	High	Medium	Medium
Town of Ellicottville	Medium	Medium	High	Medium	High	High	Medium	Low
Village of Ellicottville	Low	High	High	Medium	High	High	Medium	Medium
Town of Farmersville	Medium	Medium	Medium	Medium	High	High	Medium	Medium
Town of Franklinville	Medium	Medium	High	Medium	High	High	Medium	Medium
Village of Franklinville	Low	Medium	High	Medium	High	High	Medium	Medium
Town of Freedom	Medium	Medium	Low	Medium	High	High	Medium	Medium
Village of Gowanda	Low	High	Medium	Medium	High	High	Medium	Medium
Town of Great Valley	Low	Medium	High	Medium	High	High	Medium	Low
Town of Hinsdale	Low	Medium	Medium	Medium	High	High	Medium	Medium
Town of Humphrey	Low	Medium	High	Medium	High	High	Medium	Medium
Town of Ischua	Low	Medium	High	Medium	High	High	Medium	Medium
Town of Leon	Low	Medium	High	Medium	High	High	Medium	Medium
Town of Little Valley	Low	Medium	Low	Medium	High	High	Medium	Medium
Village of Little Valley	Low	Medium	Medium	Medium	High	High	Medium	Medium
Town of Lyndon	Medium	Medium	High	Medium	High	High	Medium	Medium

Jurisdiction	Dam and Levee Failure	Flood	Landslide	Pandemic	Severe Storm	Severe Winter Storm	Utility Failure	Wildfire
Town of Machias	Medium	Medium	High	Medium	High	High	Medium	Medium
Town of Mansfield	Medium	Medium	High	Medium	High	High	Medium	Medium
Town of Napoli	Medium	Medium	High	Medium	High	High	Medium	Medium
Town of New Albion	Medium	Medium	High	Medium	High	High	Medium	Medium
City of Olean	Medium	Medium	High	Medium	High	High	Medium	Medium
Town of Olean	Low	Medium	High	Medium	High	High	Medium	Medium
Town of Otto	Medium	Medium	High	Medium	High	High	Medium	Medium
Town of Perrysburg	Medium	Medium	High	Medium	High	High	Medium	Medium
Town of Persia	Medium	Medium	High	Medium	High	High	Medium	Medium
Town of Portville	Medium	Medium	High	Medium	High	High	Medium	Medium
Village of Portville	Low	Medium	High	Medium	High	High	Medium	Medium
Town of Randolph	Medium	Medium	High	Medium	High	High	Medium	Medium
Town of Red House	Medium	Medium	High	Medium	High	High	Medium	Medium
City of Salamanca	Medium	Medium	High	Medium	High	High	Medium	Medium
Town of Salamanca	Low	Medium	High	Medium	High	High	Medium	Medium
Village of South Dayton	Low	Medium	High	Medium	High	High	Medium	Medium
Town of South Valley	Low	Medium	High	Medium	High	High	Medium	Medium
Town of Yorkshire	Medium	Medium	High	Medium	High	High	Medium	Medium
Cattaraugus County	**Medium**	**Medium**	**Medium**	**Medium**	**High**	**High**	**Medium**	**Medium**

Note: Low (yellow) = Values less than 3.9; Medium (orange) = Values between 3.9 and 4.9; High (red) = Values greater than 4.9
Note: Jurisdiction revisions to the above preliminary hazard ranking can be found in the Volume II annexes.

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

Each Planning Partner's annex in Volume II also includes a capability assessment specific to those jurisdictions. In addition to the above categories, the annexes review capabilities in the more localized categories of adaptive capacity and education and outreach.

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 Cattaraugus County and each jurisdiction virtually and in-person to review the capability assessment from the 2019 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 Cattaraugus County. Further information is provided in the jurisdictional annexes in Volume II.

15.2.1 State and Federal

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.

The New York State Department of Environmental Conservation (NYS DEC) is the lead coordinator of New York's NFIP efforts. NYS DEC is the agency working with New York communities with severe repetitive loss properties. This Statute helps New York residents with affordable flood insurance and gives additional tools to the states and communities to mitigate severe repetitive loss properties.

Community Risk and Resiliency Act

On September 22, 2015, Governor Andrew Cuomo signed bill A06558/S06617-B, the Community Risk and Resiliency Act (CRRA). The purpose of the bill is to ensure that certain state monies, facility-siting regulations, and permits include consideration of the effects of climate risk and extreme weather events. The bill's provisions will apply to all applications and permits no later than January 1, 2017. CRRA includes five major provisions (NYSDEC 2020):

- Official Sea-Level Rise Projections—CRRA requires the DEC to adopt science-based sea-level rise projections into regulation.
- Consideration of Sea-Level Rise, Storm Surge and Flooding—CRRA requires applicants for permits or funding in a number of specified programs to demonstrate that future physical climate risk due to sea-level rise, storm surge, and flooding have been considered, and that DEC 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 DEC, in consultation with the Department of State (DOS), to develop guidance on the use of natural resources and natural processes to enhance community resiliency.
- Model Local Laws Concerning Climate Risk—CRRA requires DOS, in cooperation with DEC, 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.

CRRA requires NYSDEC, in consultation with DOS, to prepare guidance on implementation of the statute. To meet its obligation to develop guidance for the implementation of CRRA, DEC is proposing a new document, State Flood Risk Management Guidance (SFRMG). The SFRMG is intended to inform state agencies as they develop program-specific guidance to require that applicants demonstrate consideration of sea-level rise, storm surge, and flooding, as permitted by program-authorizing statutes and operating regulations. The SFRMG incorporates possible future conditions, including the greater risks of coastal flooding presented by sea-level rise and enhanced storm surge and inland flooding expected to result from increasingly frequent extreme precipitation events (NYSDEC 2020).

Code of Federal Regulations, Standard State Mitigation Plans (44 CFR PART 201.4)

FEMA has prepared policies and procedures for FEMA's review and approval of state and local emergency all-hazard mitigation plans.

The New York State HMP provides actions based on risk assessments and capabilities of the State to achieve and fund mitigation activities based on those actions. Both the law and regulations have encouraged the counties to prepare plans.

Disaster Mitigation Act of 2000 P.L. 106-390

The Disaster Mitigation Act (DMA) is the current federal legislation addressing hazard mitigation planning. DMA 2000 provides an opportunity for states, tribes, and local governments to take a new and revitalized approach to mitigation planning. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the 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 DMA, improving eligibility for future hazard mitigation funds.

The New York State Division of Homeland Security and Emergency Services (NYS DHSES) is the lead agency within New York to promote mitigation planning. The law sets forth a more granular review of mitigation planning. 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 (Stafford Act) to modify 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; direct the President to establish a National Public Infrastructure Pre-Disaster Mitigation Fund; authorize 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; and direct FEMA to issue a final rulemaking that defines the terms “resilient” and “resiliency”.

From a mitigation perspective of the Act, the 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.

Emergency Support Function #14, Long-Term Recovery Planning

Long-Term Community Recovery provides a mechanism for coordinating federal support to state, tribal, regional, and local governments, nongovernmental organizations (NGOs), and the private sector to enable community recovery from the long-term consequences of extraordinary disasters. Emergency Support Function (ESF) #14 accomplishes this by identifying and facilitating availability.

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).

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. One of the areas of planning includes mitigation. This coordination allows for another statewide plan to incorporate mitigation principles and planning.

Homeowner’s Flood Insurance Affordability Act

This 2014 law repeals and modifies certain provisions of the Biggert-Waters Flood Insurance Reform Act, which was enacted in 2012, and makes additional program changes to other aspects of the program not covered by that Act. The new law lowers the recent rate increases on some policies, prevents some future rate increases, and implements a surcharge on all policyholders. The Act also repeals certain rate increases that have already gone into effect and provides for refunds to those policyholders. The Act also authorizes additional resources for the National Academy of Sciences (NAS) to complete the affordability study.

FEMA, Congress, FEMA authorized private insurers (known as Write–Your–Own (“WYO”) insurance companies), and other stakeholders work together to implement these Congressionally mandated reforms and to work toward shared goals of helping families maintain affordable flood insurance, ensuring the financial stability of the NFIP, and reducing the risks and consequences of flooding nationwide.

National Flood Insurance Program

The U.S. Congress established the National Flood Insurance Program (NFIP) with the passage of the National Flood Insurance Act of 1968 (FEMA’s 2002 NFIP: Program Description). The NFIP is a federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. The flood hazard profile in Chapter 7 provides further information on the NFIP as implemented in Cattaraugus County.

Community participation in the NFIP is voluntary. Flood insurance is designed to provide an alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods. Flood damage in the U.S. is reduced by nearly $1 billion each year through communities implementing sound floodplain management requirements and property owners purchasing flood insurance. Additionally, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance (FEMA 2007).

There are three components to the NFIP: flood insurance, floodplain management and flood hazard mapping. Communities participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these communities. Community participation in the NFIP is voluntary. Flood insurance is designed to provide an alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods. Flood damage in the U.S. is reduced by nearly $1 billion each year through communities implementing sound floodplain management requirements and property owners purchasing flood insurance. Additionally, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance (FEMA 2008).

Of the 43 municipalities in Cattaraugus County, 42 actively participate in the NFIP. As of 2024, there were 411 NFIP policies in Cattaraugus County. There have been 500 claims made, totaling over $5 million for damages to structures and contents. There are 28 NFIP Repetitive Loss (RL) properties in the County. Further details on the County's flood vulnerability may be found in the flood hazard profile in Chapter 7, Flood.

Municipal compliance with the NFIP is described in each of the jurisdictional annex in Volume II (Jurisdictional Annexes). The participating County's municipalities have been compliant with the NFIP. To enhance their flood damage prevention programs and enhance compliance with the NFIP in the future, 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. All municipalities have included an action to improve Substantial Damage determination procedures. In addition, Cattaraugus County's mitigation strategy (see Chapter 16) includes an action to encourage and empower municipalities to participate in FEMA's Community Rating System. Additional information on the NFIP program and its implementation throughout the County may be found in the flood hazard profile (Chapter 7, Flood).

The state and municipalities within it may adopt higher regulatory standards when implementing the provisions of the NFIP. Specifically identified are the following:

- **Base Flood Elevation (BFE):** The elevation of surface water due to flooding that has a 1 percent chance of being equaled or exceeded in any given year.
- **Freeboard:** By law, NYS requires Base Flood Elevation plus 2 feet (BFE+2) for all construction. When there is a base flood elevation available, the lowest floor, including any basement, must be at or above the base flood elevation (plus 2 feet beginning in 2007). Elevation may be 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 2018). 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.
- **Cumulative Substantial Improvements/Damages:** The NFIP allows improvements valued at up to 50 percent of the building's pre-improvement value to be permitted without meeting the flood protection requirements. Over the years, a community may issue a succession of permits for different repairs or improvement to the same structures. This can greatly increase the overall flood damage potential for structures within a community. The community may wish to deem "substantial improvement" cumulatively

so that once a threshold of improvement within a certain length of time is reached, the structure is considered to be substantially improved and must meet flood protection requirements.

NFIP Community Rating System

As an additional component of the NFIP, the Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance (FEMA 2012).

As of October 2024, none of the communities within Cattaraugus County participate in the CRS program. Cattaraugus County is exploring the program requirements of the Community Rating System (CRS) through technical expertise and assistance to guide interested municipalities through the application process.

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 (HSGP) and Emergency Management Program Grant (EMPG) 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

Since the 2020 SHMP, FEMA introduced Risk Rating 2.0: Equity in Action to consider specific characteristics of a building to provide a more modern, individualized, and equitable flood insurance rates. The new rating methodology considers frequency of flooding, multiple flood types, proximity to flood sources, and building characteristics such as first floor heights and costs to rebuilt. The update was rolled out in October 2021 through April 2022, and as of April 1, 2023, has been fully implemented (FEMA 2022). Homeowners that elect to drop NFIP insurance policies will no longer have access to FMA funding for future mitigation efforts. At the time of this HMP update, it is difficult to determine what the aggregate cost increase through Risk Rating 2.0 will be on post-mitigation properties.

Across the country, officials are finding it to be increasingly 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 to mitigation of flood prone properties, and potential updates to Risk Rating 2.0 will be monitored by Cattaraugus County throughout the period of performance of the 2025 HMP.

Robert T. Stafford Disaster Relief and Emergency Assistance Act

The Act provides an orderly and continuing means of assistance by the federal government to state and local governments in carrying out their responsibilities to alleviate the suffering and damage that results from disasters. The provisions of the Act include (1) revising and broadening the scope of existing disaster relief programs; (2) encouraging the development of comprehensive disaster preparedness and assistance plans, programs, capabilities, and organizations by state and local governments; (3) achieving greater coordination and responsiveness of disaster preparedness and relief programs; (4) encouraging individuals, and state and local governments to protect themselves by obtaining insurance coverage to supplement or replace governmental assistance; (5) encouraging hazard mitigation measures to reduce losses from disasters, including development of land-use and construction regulations; and (6) providing federal assistance programs for both public and private losses sustained in disasters.

From a mitigation perspective of the Act, the 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.

U.S. Army Corps of Engineers

Under Section 404(e) of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) can issue general permits to authorize activities that have only minimal individual and cumulative adverse environmental effects. A nationwide permit (NWP) 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 59 nationwide permits, and they authorize a wide variety of activities, including linear transportation projects, bank stabilization activities, residential development, commercial and industrial developments, aids to navigation and certain maintenance activities (USACE 2021).

There are three types of USACE permits: standard, nationwide (described above), and regional. Standard permits are individual permits that involve full public interest review of an individual permit application and includes the issuance of a public notice for any project that does not meet the terms and conditions of an NWP or a Letter of Permission (LOP). Regional general permits are for small, specialized projects. In New York State, there are six regional general permit categories (USACE Buffalo District n.d.).

State

New York State Floodplain Management

There are two departments that have statutory authorities and programs that affect floodplain management at the local jurisdiction level in New York State: the NYSDEC and the Department of State's Division of Code Enforcement and Administration.

The NYSDEC is charged with conserving, improving, and protecting the state's natural resources and environment, and preventing, abating, and controlling water, land, and air pollution. Programs that have bearing on floodplain management are managed by the Bureau of Flood Protection and Dam Safety, which cooperates with federal, state, regional, and local partners to protect lives and property from floods, coastal erosion, and dam failures. These objectives are accomplished through floodplain management and both structural and nonstructural means.

The Dam Safety Section is responsible for "reviewing repairs and modifications to dams and assuring [sic] that dam owners operate and maintain dams in a safe condition through inspections, technical reviews, enforcement, and emergency planning." The Flood Control Projects Section is responsible for reducing flood risk to life and property through construction, operation, and maintenance of flood control facilities.

The Floodplain Management Section is responsible for reducing flood risk to life and property through management of activities, such as development in flood hazard areas, and for reviewing and developing revised flood maps. The Section serves as the NFIP State Coordinating Agency and, in this capacity, is the liaison between FEMA and New York communities that elect to participate in the NFIP. The Section provides a wide range of technical assistance.

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

When proper controls are not in place, research studies show a clear link between urbanization and increased flooding and pollutant export. 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 New York State Department of Environmental Conservation (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 (SWMP) (NYSDEC 2023).

15.2.2 County and Local

County

Cattaraugus County Health Department Strategic Plan 2022–2025

The Cattaraugus County Health Department's (CCHD) Strategic Planning Process began in April 2022 using the resources of the New York State Department of Health NYS Public Health Corp Fellows. As a part of this process, the fellows reviewed the 2018–2021 strategic plan for past successes and failures and discussed what was needed for future success. Both an external assessment, in which county demographic data, economic factors, health outcomes, and community health assessment findings that have the potential to affect the agency and strategies were examined, and an internal assessment of a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis was completed.

2022–2024 Bradford Regional Medical Center, Olean General Hospital and Cattaraugus County Health Department Community Service Plan, Community Needs Assessment and Community Health Improvement Plan

The 2022–2024 OGH/BRMC Community Service Plan (CSP) and the CCHD's Community Health Assessment and Community Health Improvement Plan (CHA-CHIP) were conducted to identify significant health needs as outlined by the New York State Department of Health's 2022–2024 Prevention Agenda, where applicable. It also provides critical information OGH/BRMC, the CCHD, and others in a position to make a positive impact on the health of the region's residents. The CSP/CHA-CHIP enables the health department, hospital, and other community partners to strategically establish priorities, develop interventions, and direct resources to improve the health of residents living in the service area.

The CSP/CHA-CHIP includes a detailed examination of priority areas identified in the NYS Prevention Agenda: (1) prevent chronic diseases; (2) promote a healthy and safe environment; (3) promote healthy women, infants and children; (4) promote well-being and prevent mental health and substance use disorders; and (5) prevent communicable diseases. The Prevention Agenda is a six-year effort to make New York the healthiest state. Developed in collaboration with 140 organizations, the plan identifies New York's most urgent health concerns, and suggests ways local health departments, hospitals, and partners from health, business, education, and community organizations can work together to solve them.

Cattaraugus County Economic Strategic Plan

This plan provides a policy direction for economic growth, builds upon County strengths and assets, and identifies strategies, programs, and projects to improve the local economy. Socio-economic data for Cattaraugus County in this report is often compared to the five-county Western New York Local Workforce Development Areas (LWDA) region (composed of Allegany, Cattaraugus, Chautauqua, Erie, and Niagara Counties), the State of New York, and the nation. Labor and industry and tourism data is also presented for the three-county Southern Tier West region (composed of Allegany, Cattaraugus, and Chautauqua Counties) also known as the Chautauqua-Allegany region.

Cattaraugus County Agricultural and Farmland Protection Plan

The County's original Agricultural and Farmland Protection Plan and this update are governed by Agricultural Districts Law, under Section 324 of Article 25-AAA. This law requires that the state create an Agricultural and Farmland Protection Program to provide technical and financial resources to promote the conservation of working farms and farmland. The law also sets out the guidelines for counties and municipalities to follow when creating an Agricultural and Farmland Protection Plan.

The 2020 Cattaraugus County Agricultural and Farmland Protection Plan Update (AFPP) is divided into two sections. The first discusses the agriculture economy in the County and examines economic development tools that support the sector to ensure a strong future. The County has a strong entrepreneurial spirit but is also facing an aging farm owner population, a shrinking number of farms, changing markets, and a shifting agribusiness manufacturing sector.

The second section discusses land use issues and the need for and use of land use tools by local governments to protect agricultural land. Such land does not face traditional development pressure in the County, and the loss of farmland is more likely to come from energy projects than new housing developments. The County's unique situation requires thoughtful planning and policy at both the county and town levels.

Vision 2025 Comprehensive Plan

Cattaraugus County adopted its first and only Comprehensive Plan in 1978, nearly 40 years ago. This plan update reflects current priorities and policies and updates the County's vision for the future. It places an emphasis on promoting quality economic development and protecting the positive features and resources of the County as articulated by the public, while including a realistic assessment of the issues the County faces and the challenges that must be addressed. The plan identifies future projects and potential funding sources. It promotes coordination among municipalities and an enhanced quality of life for the County's residents. The County has no direct influence over zoning, but the vision articulated here provides guidance to the County's municipalities. It will help our cities, towns and villages work toward a common goal: a healthy and sustainable economy, environment, and populace.

Coordinated Public Transit-Human Services Transportation Plan

This plan is the Public Transit-Human Services Transportation Plan for Cattaraugus County, New York. Prior to the current update, the Plan was initially developed in 2009 and was first updated in 2014. This plan fulfills the requirements of the Federal Transit Administration (FTA) under the Fixing America's Surface Transportation (FAST) Act, signed into law as a reauthorization of surface transportation programs through Fiscal Year 2020. According to requirements of the FAST Act, locally developed coordinated public transit-human services transportation plans must be updated to reflect the changes established by the FAST Act legislation.

Transportation is a critical component of the communities in Cattaraugus County. Transportation provides access to jobs, education, healthcare, human services and allows all community members, including older adults and people with disabilities, to live independently and engage in community life. It is the purpose of this plan for local stakeholders to work collaboratively to do the following activities:

- Identify all community resources, including Olean Area Transportation System (OATS), Cattaraugus County Transit System (STS), CORVUS Bus, First Transit, Inc., Wyoming Transit Services (WYTS), and other regional and related transportation services such as Trans-Am Ambulance Service, local taxicab companies, and private residential, medical, and transportation entities that provide transportation to their clientele and residential population.
- Identify and prioritize community transportation needs, which have been found to include a need to provide more complete coverage/accessibility to transportation throughout the County, in particular, in the most rural reaches of the County that are isolated from services without reliable and predictably available transportation.
- Establish a clear plan for achieving shared goals, through such actions as convening quarterly meetings of the stakeholders and planning committee, with the purpose of increased inter-agency communication. Communication will highlight the importance of continued Medicaid funding which enables the transportation needs of the public to be met, especially the disabled and senior populations. Regular interaction will identify issues and increase cooperation with transportation service providers to improve regional efficiency.

Local

Comprehensive Master Plans

Comprehensive planning is a process for achieving community goals and aspirations through community development. The outcome of comprehensive planning is a comprehensive plan, general plan, or master plan that directs public policy in terms of transportation, utilities, land use, recreation, and housing. Towns are authorized to develop and adopt a comprehensive plan by New York State Town Law Section 272-a.; villages can do the same per Section 7-722 of the Village Law. State statutes require that all land use laws in a municipality be consistent with a comprehensive plan.

Local Waterfront Revitalization Program

The Waterfront Revitalization of Coastal Areas and Inland Waterways Act offers local governments the opportunity to participate in the State's Coastal Management Program (CMP) on a voluntary basis by preparing and adopting a Local Waterfront Revitalization Program (LWRP), providing more detailed implementation of the State's CMP through use of such existing broad powers as zoning and site plan review (New York State Division of Planning 2018).

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 (New York State Division of Planning 2018).

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 of New York. Also, funding to advance preparation, refinement, or implementation of Local Waterfront Revitalization Programs is available under Title 11 of the New York State Environmental Protection Fund Local Waterfront Revitalization Program (EPF LWRP), among other sources (New York State Division of Planning 2018).

Any village, town, or city located along the state's coast or designated inland waterway can prepare a new or amend an existing Local Waterfront Revitalization Program. Municipalities are encouraged to address local revitalization issues in a broader context, aligned with regional economic development strategies and regional resource protection and management programs (New York State Division of Planning 2018).

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 Cattaraugus County Planning Board for the examination of possible intermunicipal impacts. The Cattaraugus County Planning Board operates under New York State General Municipal Law §239 l and m to advise local boards on the potential intermunicipal or countywide impact of local land use decisions. The Planning Board uses the Cattaraugus County Comprehensive Plan to direct recommendations on municipal land use referrals and to review proposed County capital improvement projects.

15.3 ADMINISTRATIVE AND TECHNICAL CAPABILITIES

This section summarizes administrative and technical capabilities in Cattaraugus County. Further information is provided in the jurisdictional annexes in Volume II.

15.3.1 State and Federal

Federal

Federal Emergency Management Agency

FEMA is responsible for providing assistance before, during, and after disasters. FEMA is the federal reviewer of hazard mitigation plans and sets federal standards for local and state hazard mitigation plans.

Community Assistance Visits and Community Assistance Contacts

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 NYS DEC 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 five years, an independent consulting engineer, approved by the FERC, must inspect and evaluate projects with dams higher than 32.8 feet (10 meters) 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, the United States Army Corps of Engineers (USACE), and the National Atmospheric and Oceanic Administration (NOAA) National Hurricane Center used for tracking hurricanes (HURREVAC n.d.). HURREVAC permits governmental agencies to work as a unified team, coordinate notification, communication, activations, public warning, and evacuation and sheltering efforts. By operating together, the government agencies serve the public better by providing the same advisories and actions.

National Weather Service (NWS)

The NWS monitors weather and delivers weather forecasting for New York. The state is serviced by five weather forecast offices (WFO)–Albany (NY), Binghamton (NY), Buffalo (NY), Burlington (VT), and New York (NY). Allegany, Cattaraugus, Cayuga, Chautauqua, Erie, Genesee, Jefferson, Lewis, Livingston, Monroe, Niagara, Chautauqua, Orleans, Oswego, Cattaraugus County, St. Lawrence, Wayne, Wyoming, and Yates County are covered by the Buffalo WFO. NYS DHSES uses conference calling with the NWS and county OEMs to share specific information and needs when severe storms are forecasted. The NWS also offers various education and training programs on weather-related hazards (NWS 2023).

StormReady Program

The NWS operates the StormReady program, which encourages communities to take a new, proactive approach to improving local hazardous weather operations by providing emergency managers with clear-cut guidelines on how to improve their hazardous weather operations. To be recognized by the program, a community must 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; and develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) works to strengthen the nation's security by building and maintaining America's infrastructure and providing military facilities where servicemembers train, work, and live. Projects include dredging, storm damage reduction, and ecosystem restoration in and near waterways (USACE n.d.). New York is serviced by the Buffalo, Pittsburgh, and New York districts, with Cattaraugus County represented by the 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 Cattaraugus County.

Climate Preparedness and Resilience Community of Practice

The Practice develops and implements practical, nationally consistent, and cost-effective approaches and policies to reduce potential vulnerabilities to the nation's water infrastructure resulting from climate change and variability (USACE n.d.).

Planning Assistance to States Program

Section 22 of the 1974 Water Resources Development Act provides authority for the USACE to assist states, local governments, Native American Tribes, and other non-federal entities in the preparation of comprehensive plans for the development and conservation of water and related land resources. Types of work that can be done include Water Quality Studies, Wetland Evaluation Studies, Flood Plain Management Studies, Coastal Zone Management/Protection Studies, Harbor/Port Studies, or other water resource planning investigations. The individual non-federal sponsors determine the needed planning assistance (USACE n.d.).

Flood Plain Management Services Program

Section 206 of the 1960 Flood Control Act (PL 86-645), as amended, provides the authority for the USACE to provide assistance and guidance on all aspects of floodplain management planning. The program develops or interprets site-specific data on obstructions to flood flows, flood formation, and timing and the extent, duration, and frequency of flooding. Upon request, program services are provided to the state, regional, and local governments, Native American Tribes, and other non-federal public agencies without charge (USACE n.d.).

Inspection of Completed Works Program

Civil works structures whose failure, or partial failure, could jeopardize the operational integrity of the project, 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 those structures constructed by the USACE and turned over to others for operation and maintenance, the operating entity is responsible for periodic inspection and evaluation. The USACE may conduct the inspection on behalf of the project sponsor provided appropriate reimbursement to the USACE is made. However, the USACE may participate in the inspection with the operating entity at the government's expense.

Rehabilitation and Inspection Program

The Rehabilitation and Inspection Program is a USACE program that 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

The 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

U.S. Geological Survey (USGS) maintains a network of gauges across New York that continuously measure lake, reservoir table, stream, and tidal levels. These data sets are 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 Department of Environmental Protection for drought determinations. USGS also recovers high water marks post-coastal flooding (USGS 2018).

State

New York State Division of Homeland Security and Emergency Services

For more than 50 years, NYS DHSES (formerly New York State Office of Emergency Management) and its predecessor agencies have been responsible for coordinating the activities of all state agencies to protect New York's communities, economic well-being, and the environment from natural and human-caused disasters and emergencies. NYS DHSES routinely assists local governments, voluntary organizations, and private industry through a variety of emergency management programs, including hazard identification, loss prevention, planning, training, operational response to emergencies, technical support, and disaster recovery assistance.

NYS DHSES administers the FEMA mitigation grant programs in the state and supports local mitigation planning in addition to developing and routinely updating the state hazard mitigation plan. NYS DHSES prepared the current state HMP working with input from other State agencies, authorities, and organizations. It was approved by FEMA in 2023, and it keeps New York eligible for recovery assistance in Public Assistance (Categories A through G) and Hazard Mitigation assistance in each of the Unified Hazard Mitigation Assistance Program's five grant programs. The 2023 New York State HMP was used as guidance in completing the Cattaraugus County HMP Update (NYS DHSES 2023).

For the purpose of this HMP, representatives from NYS DHSES provided technical assistance and data and attended planning partnership meetings.

New York State Department of Environmental Conservation Region 9

NYSDEC Region 9 is located in western New York and includes Allegany, Cattaraugus, Chautauqua, Erie, Niagara, and Wyoming counties. The main Department of Environmental Conservation office is located in Buffalo with a sub-office in Allegany. Staff have two main areas of responsibility: natural resource management and environmental quality protection. As part of natural resource management, staff oversee state fish and wildlife resources as well as state forests (NYSDEC 2023).

New York State Department of Environmental Conservation Division of Water—Bureau of Dam Safety, Coastal & Flood Protection

Within the NYSDEC Division of Water, the Bureau of Flood Protection and Dam Safety cooperates with federal, state, regional, and local partners to protect lives and property from floods, coastal erosion and dam failures through floodplain management and both structural and nonstructural means; and provides support for information technology needs in the division (NYSDEC 2023).The bureau consists of the following sections (NYSDEC 2023):

- Coastal Erosion and Flooding: Works to reduce coastal erosion and storm damage to protect lives, natural resources, and properties through structural and nonstructural means.
- Dam Safety: Is responsible for reviewing repairs and modifications to dams and assuring that dam owners operate and maintain dams in a safe condition through inspections, technical reviews, enforcement, and emergency planning.
- Flood Protection and Floodplain Management: Works with communities throughout the state in finding ways to reduce or protect against physical and property damage caused by flooding.

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."

NYSDEC's 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 2023).

Northeast Regional Climate Center

The Northeast Regional Climate Center (NRCC) partnered with the New York State Energy Research and Development Authority (NYSERDA) to compare various methods of downscaling global climate model output and create extreme precipitation projections for New York State. These projections will ultimately be incorporated into climate change adaptation planning. 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 2014).

NRCC also 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). These data are interpolated to a 30-second grid. 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 either directly or from the USDA NRCS Win TR-20 software, eliminating the need to use a static Type II or Type III curve (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).

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 a variety of 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). These codes provide for the construction of safe, resilient, and energy-efficient buildings throughout New York State.

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 (CEDAR) Program provides requesting communities with post-disaster assistance under the leadership of the DHSES Office of Emergency Management and in accordance with Executive Law 2-B. The program's initial disaster response focuses on performing rapid evaluation safety assessments of damaged structures in affected communities for use as part of the application process to request federal disaster assistance through FEMA. The CEDAR 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. Cattaraugus County is served by the Western New York, Region 5 NYSDOT office, which is based out of Buffalo, NY.

NYSDOT offers a variety of grant, education, and training opportunities; has several 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 impacts, particularly coastal flooding. 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.

Resilient NY

In November 2018, New York State launched the Resilient NY program. The overall goal of the program is to improve community resiliency to extreme weather events that result in flooding and ice jam formations.

NYS DEC and NYS OGS retained two consulting firms to prepare the Resilient NY studies. The consultants will work with NYS DEC experts, municipalities, and interested stakeholders to collect relevant information about flooding and ice jam formations in each priority watershed and use this information to develop specific mitigation projects and actions.

New York State Department of Environmental Conservation Division of Water—Bureau of Flood Protection and Dam Safety

Within the NYSDEC Division of Water, the Bureau of Flood Protection and Dam Safety cooperates with federal, state, regional, and local partners to protect lives and property from floods, coastal erosion and dam failures through floodplain management and both structural and nonstructural means; and provides support for information technology needs in the division (NYSDEC n.d.). The bureau consists of the following sections (NYSDEC n.d.):

- Coastal Management—Works to reduce coastal erosion and storm damage to protect lives, natural resources, and properties through structural and nonstructural means.
- Dam Safety—Is responsible for reviewing repairs and modifications to dams and assuring that dam owners operate and maintain dams in a safe condition through inspections, technical reviews, enforcement, and emergency planning.
- Flood Control Projects—Is responsible for reducing flood risk to life and property through construction, operation, and maintenance of flood control facilities.
- Floodplain Management—Is responsible for reducing flood risk to life and property through proper management of activities including, development in flood hazard areas and review and development of revised flood maps.

Grant funding is available to assist eligible dam owners with infrastructure repair costs. Funding is provided through the FEMA's High Hazard Potential Dam grant program. DEC accepts applications for grants to assist with technical, planning, design, and other pre-construction activities associated with the rehabilitation of eligible dams classified as High Hazard dams.

New York State Department of State's Division of Building Standards and Codes

Technical Bulletins for the 2020 Codes of New York State

The Department of State Division of Building Standards and Codes (DBSC) publishes 14 technical bulletins, including 2 recent bulletins with guidance related to flood hazard areas: Electrical Systems and Equipment in Flood-damaged Structures and Accessory Structures. One archived bulletin from October 31, 2017, Flood Venting in

Foundations and Enclosures Below Design Flood Elevation, provides clarification on the requirements for flood vents in foundations and enclosures located below the design flood elevation and in flood hazard areas.

Forms and Publications

The DBSC in conjunction with the Division of Homeland Security & Emergency Services–Office of Fire Prevention and Control (OFPC) has implemented a joint outreach program that is intended to guide and educate code users. The program will provide concise, easily digestible information on:

- New topics that code users must be aware of
- Frequently overlooked or misunderstood code requirements
- Concerns relating to the administration and enforcement of the Uniform Code and Energy Code

The DBSC and OFPC hope the program will continue to foster professional growth and support the efforts of the code enforcement community and provide helpful guidance to all code users.

The Code Outreach Program publications are expected to be distributed at the beginning of every month. If you have ideas for future topics to be addressed by the Code Outreach Program, email Cop.Codes@dos.ny.gov.

The DBSC posts several model reporting forms and related publications on its web page. The Building Permit Application requests the applicant to indicate whether the site is or is not in a floodplain and advises checking with town clerks or NYSDEC. The General Residential Code Plan Review form includes a reminder to “add 2’ freeboard.” Sample Flood Hazard Area Review Forms, including plan review checklists and inspection checklists for Zone A and Zone V, are based on the forms in Reducing Flood Losses through the International Code Series published by International Code Council and FEMA (2008).

15.3.2 County and Local

County, Local, and Regional

Cattaraugus County Department of Public Works

The Public Works Department consolidated the operations of the Highway and Refuse divisions. The Department is devoted to the maintenance of the 395 miles of road, 265 bridges, 258 culverts and 1,530 drainage structures under County jurisdiction. There are a total of six highway facilities, with the Little Valley maintenance facility completed in July 1998 and a new Franklinville Highway Department facility in 2019. The second largest operation the Public Works Department oversees and the one the public encounters, is the Refuse Division. The County operates seven transfer stations: Allegany, Conewango, Dayton, Five Points, Machias, Portville, and Salamanca. Refuse employs 11 full-time and 12 part-time individuals.

Cattaraugus County Department of Economic Development, Planning and Tourism

The Cattaraugus County Economic Development, Planning and Tourism makes up three subdepartments whose goal is to work to improve the communities in the County through the following:

- Retention and expansion of employment
- Aiding municipal governments through planning assistance
- Encouraging private sector investment
- Fostering entrepreneurship, and

- Promoting the County as a Tourism Destination, place to locate a business and as a truly great place to reside and raise a family.

The County Planning office is involved in many inter-municipal and countywide plans and development projects. Work in this area is often performed with partners where the County planning staff has a defined role representing the County's interest in the project or activity. The Tourism office promotes the activities, attractions, eateries, lodgings, points of interest (POIs) and other tourism-related assets of Cattaraugus County. The economic development office is responsible for building a healthy tax base that can support the services needed by the County residents.

Cattaraugus County Office of Emergency Services

The Office of Emergency Services is involved in many facets of county operations. County Emergency Plans, such as the Comprehensive Emergency Management Plan (CEMP), are created and maintained within the office and individual municipalities' emergency plans are forwarded to the office for review and filing. The office is responsible for assisting all towns, cities, and villages with emergency planning and coordination, as well as leading the County emergency operations. The office staff is highly trained in National Incident Management System (NIMS) and Incident Command System (ICS) principles and, therefore, serve as the backbone to the County Emergency Operations Center (EOC). Emergencies and planned events are managed in the primary EOC, several alternate EOCs throughout the County, and even from a Mobile Command Post trailer. The office also works closely with NYS DHSES, FEMA, as well as all other Cattaraugus County agencies involved in emergency management, including the Fire Service and Emergency Medical Services.

Cattaraugus County Department of Health

The Cattaraugus County Department of Health protects the health and safety of Cattaraugus County residents and visitors. The mission of the Cattaraugus County Health Department is to engage and empower the public of all ages to live healthier lifestyles through efforts of education, prevention, promotion, monitoring, accessibility, affordability, technology, testing, diagnosing, and treating.

Cattaraugus County Legislature

The Legislature serves as the governing body of the County and consists of 15 members elected from five legislative districts for four-year terms. It is the specific duty of the County Legislature to conduct the peoples' business as a vital unit of local government, assuming responsibility for planning, financing, and operating municipal services Countywide. In addition, the Legislature must provide adequate employees to carry out those duties. Cattaraugus County utilizes a County Administrator, appointed by the Legislature, in order to coordinate the daily operations of County Government. The County legislator works under a committee system which consists of all the areas of responsibility, including:

- Finance
- Public Works
- Strategic Planning
- County Operations
- Public Safety
- Human Services
- Development and Agriculture
- Labor Relations

Cattaraugus County Real Property & GIS Services

The general responsibilities of the Real Property & GIS Services are:

- Coordinate activities of assessors in the County with respect to the computer generation of assessment rolls, tax rolls, and bills.
- Coordinate training of assessors and set up training programs mandated by the state and training programs provided at the county level.
- Maintain digital tax maps. Locations and tax map numbers are assigned. Parcels are plotted to scale to aid assessors in locating and evaluating properties in their towns.
- Compute and extend town, county and special district, school, and village tax rates for the tax rolls.
- All deeds are read, recorded into records, and new parcels are plotted on the tax maps.
- Maintain a Countywide Assessment Roll.
- Maintain a GIS for use through all County Departments as well as other municipalities.

Cattaraugus County Soil & Water Conservation District

The Cattaraugus County Soil & Water Conservation District's mission is to protect and promote the health, safety, and general welfare of the present and future generations of Cattaraugus County residents through the conservation and enhancement of soil, water, air, flora, and fauna through the delivery of science-based technical and educational assistance. District involvement includes, but is not limited to, work with landowners, land managers, local government agencies, and other local interests in addressing a broad spectrum of resource concerns: erosion control, flood prevention, water conservation and use, wetlands, ground water, water quality and quantity, non-point source pollution, forestland protection, wildlife, recreation, wastewater management and community development.

15.4 FISCAL CAPABILITIES

This section summarizes fiscal capabilities in Cattaraugus County. Further information is provided in the jurisdictional annexes in Volume II. The State Capabilities section of 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.

15.4.1 State and Federal

Federal

FEMA

Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) is a post-disaster mitigation program. It is made available to states by FEMA after each federal disaster declaration. The HMGP can provide up to 75 percent funding for hazard mitigation measures. The HMGP 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. All applicants must have a FEMA-approved HMP.

Applicants who are eligible for the HMGP are state and local governments, certain nonprofit organizations or institutions that perform essential government services, and Indian tribes and authorized tribal organizations. Individuals or homeowners cannot apply directly for the HMGP; a local government must apply on their behalf. Applications are submitted to NYS DHSES and placed in rank order for available funding and submitted to FEMA for final approval. Eligible projects not selected for funding are placed in an inactive status and may be considered as additional HMGP funding becomes available.

Federal Hazard Mitigation Funding Opportunities

As noted on the FEMA hazard mitigation assistance website (FEMA n.d.), FEMA administers five programs that provide funding for eligible mitigation planning and projects that reduces disaster losses and protect life and property from future disaster damages. The programs are the Hazard Mitigation Grant Program (HMGP), and the HMGP Post Fire Grant, the Flood Mitigation Assistance (FMA) Program, and the Pre-Disaster Mitigation (PDM) Program. Table 15-1 provides an overview of program funding eligibility and cost share.

Table 15-1. FEMA HMA Grant Cost Share Requirements

Programs	Cost Share (Percent of Federal/Non-Federal Share)
HMGP	75/25
HMGP Post Fire	75/25
FMA (community flood mitigation, project scoping, individual mitigation of insured properties, and planning grants)	75/25
FMA—repetitive loss property(2)	90/10
FMA—severe repetitive loss property(2)	100/0
PDM	75/25
PDM—small and impoverished community	Up to 90/10

Source: FEMA 2023; FEMA 2023

Subapplicants should consult their State Hazard Mitigation Officer (SHMO) for the amount of percentage of HMGP subrecipient management cost funding their State has determined to be passed through subrecipients.

To be eligible for an increased federal cost share, a FEMA-approved state or tribal (standard or enhanced) mitigation plan that addressed repetitive loss properties must be in effect at the time of award, and the property is being submitted for consideration must be a repetitive loss property.

HMGP assists in implementing long-term hazard mitigation planning and projects following a Presidential major disaster declaration. PDM provides funds for hazard mitigation planning and projects on an annual basis. FMA provides funds for planning and projects to reduce or eliminate risk of flood damage to buildings that are insured under the National Flood Insurance Program (NFIP) on an annual basis (FEMA 2023).

HMGP funding is generally 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.

Individual homeowners and business owners may not apply directly to FEMA. Eligible local governments may apply on their behalf (FEMA 2023).

Federal mitigation grant funding is available to all communities with a current HMP (this plan); however, most of these grants require a “local share” in the range of 10–25 percent of the total grant amount. The FEMA mitigation grant programs are described below.

Flood Mitigation Assistance Program

The Flood Mitigation Assistance (FMA) program combines the previous Repetitive Flood Claims and Severe Repetitive Loss Grants into one grant program. The FMA provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The FMA is funded annually; no federal disaster declaration is required. Only NFIP insured homes and businesses are eligible for mitigation in this program. Funding for FMA is very limited and, as with the HMGP, individuals cannot apply directly for the program. Applications must come from local governments or other eligible organizations. The federal cost share for an FMA project is at least 75 percent. At most, 25 percent of the total eligible costs must be provided by a non-federal source. Of this 25 percent, no more than half can be provided as in-kind contributions from third parties. At minimum, a FEMA-approved local flood mitigation plan is required before a project can be approved. The FMA funds are distributed from FEMA to the state. The NYS DHSES serves as the grantee and program administrator for the FMA program.

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 eligible rehabilitation activities that reduce dam risk and increase community preparedness.

The HHPD Grant Program will provide assistance for technical, planning, design, and construction activities toward:

- Repair
- Removal
- Structural/nonstructural rehabilitation of eligible high hazard potential dams

Extraordinary Circumstances

For FMA project subawards, the FEMA Region may apply extraordinary circumstances when justification is provided and with concurrence from FEMA Headquarters (Risk Reduction and Risk Analysis Divisions) prior to granting an exception. If this exception is granted, a local mitigation plan must be approved by FEMA within 12 months of the award of the project subaward to that community.

For HMGP and FMA, extraordinary circumstances exist when a determination is made by the Applicant and FEMA that the proposed project is consistent with the priorities and strategies identified in the State (Standard or Enhanced) Mitigation Plan and that the jurisdiction meets at least one of the criteria below. If the jurisdiction does not meet at least one of these criteria, the Region must coordinate with FEMA Headquarters (Risk Reduction and Risk Analysis Divisions) for HMGP; however, for FMA the Region must coordinate and seek concurrence prior to granting an exception:

- The jurisdiction meets the small, impoverished community criteria (see Part VIII, B.2).
- The jurisdiction has been determined to have had insufficient capacity due to lack of available funding, staffing, or other necessary expertise to satisfy the mitigation planning requirement prior to the current disaster or application deadline.
- The jurisdiction has been determined to have been at low risk from hazards because of low frequency of occurrence or minimal damage from previous occurrences as a result of sparse development.

- The jurisdiction experienced significant disruption from a declared disaster or another event that impacts its ability to complete the mitigation planning process prior to award or final approval of a project award.
- The jurisdiction does not have a mitigation plan for reasons beyond the control of the state, federally-recognized tribe, or local community, such as Disaster Relief Fund restrictions that delay FEMA from granting a subaward prior to the expiration of the local or Tribal Mitigation Plan.

For HMGP and FMA, the Applicant must provide written justification that identifies the specific criteria or circumstance listed above, explains why there is no longer an impediment to satisfying the mitigation planning requirement and identifies the specific actions or circumstances that eliminated the deficiency.

When an HMGP project funding is awarded under extraordinary circumstances, the Recipient shall acknowledge in writing to the Regional Administrator that a plan will be completed within 12 months of the subaward. The Recipient must provide a work plan for completing the local or Tribal Mitigation Plan, including milestones and a timetable, to ensure that the jurisdiction will complete the plan in the required time. This requirement shall be incorporated into the award (both the planning and project subaward agreements if a planning subaward is also awarded).

Assistance to Firefighters Grant Program

The goal of the Assistance to Firefighters Grants is to enhance the safety of the public and firefighters with respect to fire-related hazards by providing direct financial assistance to eligible fire departments, nonaffiliated emergency medical services organizations, and state fire training academies. This funding is for critically needed resources to equip and train emergency personnel to recognized standards, enhance operations efficiencies, foster interoperability, and support community resilience.

Emergency Management Performance Grants Program

The Emergency Management Performance Grant (EMPG) provides state, local, tribal, and territorial emergency management agencies with the resources required for implementation of the National Preparedness System and works toward the national preparedness goal of a secure and resilient nation. The EMPG's allowable costs support efforts 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 (HSGP) plays an important role in the implementation of the National Preparedness System by supporting the building, sustainment, and delivery of core capabilities essential to achieving the National Preparedness Goal of a secure and resilient nation. The program supports efforts to build and sustain core capabilities across the Prevention, Protection, Mitigation, Response, and Recovery mission areas. This includes two priorities: building and sustaining law enforcement terrorism prevention capabilities and maturation and enhancement of state and major urban area fusion centers. HSGP is composed of three interconnected grant programs including the State Homeland Security Program (SHSP), Urban Areas Security Initiative (UASI), and the Operation Stonegarden (OPSG). Together, these grant programs fund a range of preparedness activities, including planning, organization, equipment purchase, training, exercises, and management and administration.

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. Among the general types of assistance that may be provided should the President of the United States declare the event a major disaster includes the following:

Individual Assistance

Individual Assistance (IA) 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. For homeowners and renters, those who suffered uninsured or underinsured losses may be eligible for a Home Disaster Loan to repair or replace damaged real estate or personal property. Renters are eligible for loans to cover personal property losses. Individuals 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. For businesses, loans may be made to repair or replace disaster damages to property owned by the business, including real estate, machinery and equipment, inventory, and supplies. Businesses of any size are eligible. 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, by law, to small businesses only.

Public Assistance

Public Assistance (PA) provides cost reimbursement aid 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 with both local and state matching contributions required.

Small Business Administration Loans

The Small Business Administration (SBA) provides low-interest disaster loans to homeowners, renters, business of all sizes, and most private nonprofit organizations. SBA disaster loans can be used to repair or replace the following items damaged or destroyed in a declared disaster: real estate, personal property, machinery and equipment, and inventory and business assets.

Homeowners may apply for up to $200,000 to replace or repair their primary residence. Renters and homeowners may borrow up to $40,000 to replace or repair personal property (such as clothing, furniture, cars, and appliances) damaged or destroyed in a disaster. Physical disaster loans of up to $2 million are available to qualified businesses or most private nonprofit organizations.

National Park Service

Land and Water Conservation Fund

The Land and Water Conservation Fund (LWCF) was established by Congress in 1964 to fulfill a bipartisan commitment to safeguard natural areas, water resources, and cultural heritage, and to provide recreation opportunities. Using no taxpayer dollars, the LWCF invests earnings from offshore oil and gas leasing to help strengthen communities, preserve history, and protect the national endowment of lands and waters. The LWCF program is divided into the “State Side,” which provides grants to State and local governments, and the “Federal Side,” which is used to acquire lands, waters, and interests therein necessary to achieve the natural, cultural, wildlife, and recreation management objectives of federal land management agencies. The LWCF was permanently reauthorized in 2019 and permanently funded in August 2020.

Restore America's Estuaries

Coastal Watersheds Grant Program

Restore America's Estuaries, in close coordination with and financial support from EPA, administers the National Estuary Program (NEP) Coastal Watersheds Grant Program. This grant program funds projects within the geographic areas shown here and supports the following Congressionally set priorities:

- Loss of key habitats resulting in significant impacts on fisheries and water quality such as seagrass, mangroves, tidal and freshwater wetlands, forested wetlands, kelp beds, shellfish beds, and coral reefs
- Recurring harmful algae blooms
- Unusual or unexplained marine mammal mortalities
- Proliferation or invasion of species that limit recreational uses, threaten wastewater systems, or cause other ecosystem damage
- Flooding and coastal erosion that may be related to sea-level rise, changing precipitation, or salt marsh, seagrass, or wetland degradation or loss
- Impacts of nutrients and warmer water temperatures on aquatic life and coastal ecosystems, including low dissolved oxygen conditions in estuarine waters
- Contaminants of emerging concern found in coastal and estuarine waters such as pharmaceuticals, personal care products, and microplastics

U.S. Department of Agriculture

Community Facilities Direct Loan and Grant Program

This program provides affordable funding to develop essential community facilities in rural areas. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area and does not include private, commercial, or business undertakings. Funds can be used to purchase, construct, and/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 for this program.

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 qualifying farm-related losses directly caused by the disaster in a county declared or designated as a primary disaster or quarantine area. Also, farmers located in counties that are contiguous to the declared, designated, or quarantined area 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, a federal emergency recovery program, helps local communities recover after a natural disaster. The 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

Additional information regarding the EWP is detailed below and available on the website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/.

EWP–Recovery

The EWP–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 must be a legal subdivision of the state, such as a city, county, township, or conservation district, and Native American Tribes or Tribal governments. NRCS will pay up to 75 percent of the construction cost of emergency measures. The remaining 25 percent must come from local sources and can be in the form of cash or in-kind services.

EWP–Recovery work is not limited to any one set of measures. The 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 removal, and damaged upland sites stripped of protective vegetation by fire or drought.

EWP–Floodplain Easement

Privately owned lands or lands owned by local and state governments might be eligible for participation in the EWP–Floodplain Easement program. To be eligible, lands must meet one of the following criteria:

- Lands that have been damaged by flooding at least once within the previous calendar year or have been subject to flood damage at least twice within the previous 10 years
- Other lands within the floodplain 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

Through this 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.

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 (SSBG) is a flexible funding source that allows states and territories to tailor social service programming to their population's needs. Through the SSBG, states provide essential social services that help achieve a myriad of goals 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 to 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 intended to provide low and moderate-income households with viable communities, including decent housing, as 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 the times of "urgent need" (e.g., post-disaster) as defined by the CDBG National Objectives, CDBG 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. Additional information regarding CDBG is available on the website: https://www.hudexchange.info/programs/cdbg-entitlement/.

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 flexible grants help cities, counties, Indian tribes, and States recover from presidentially declared disasters, especially in low-income areas, subject to the availability of supplemental appropriations. Since CDBG-DR assistance may fund a broad range of recovery activities, HUD 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 the home to establish livable conditions, mortgage, and rental assistance.

HOME Investment Partnerships Program

The HOME Investment Partnerships Program (HOME) provides grants to states and localities that communities use—often in partnership with local nonprofit groups—to fund a wide range of activities, including building, buying, and/or rehabilitating affordable housing for rent or homeownership or providing direct 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.

The program's requirement that participating jurisdictions match 25 cents of every dollar in program funds mobilizes community resources in support of affordable housing.

Section 108 Loan Guarantee Program

The Section 108 Loan Guarantee Program (Section 108) provides communities with a source of 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.

Section 108 can fund economic development, housing, public facilities, infrastructure, and other physical development projects, including improvements to increase resilience against natural disasters. This flexibility of use makes it one of the most potent and important public investment tools that HUD offers to states and local governments.

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 New York State. The program is appropriated $100 million annually. For information regarding the FHWA Emergency Relief Program, refer to: https://www.fhwa.dot.gov/programadmin/erelief.cfm

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 PA. Additional information regarding the FTA Emergency Relief Program is available on the website: https://www.transit.dot.gov/funding/grant-programs/emergency-relief-program/emergency-relief-program.

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 (USDOT) to invest in road, rail, transit, and port projects that promise to achieve national objectives. The RAISE program enables USDOT to examine these projects on their merits to help ensure that taxpayers are getting the highest value for every dollar invested.

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 USDOT 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 USDOT 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.

U.S. Economic Development Administration

The U.S. Economic Development Administration (USEDA) is an agency of the U.S. Department of Commerce that supports regional economic development in communities around the country. It provides funding to support comprehensive planning and makes strategic investments that foster employment creation and attract private investment in economically distressed areas of the United States. Through its Public Works Program, USEDA invests in key public infrastructure, such as in traditional public works projects, including water and sewer systems improvements, expansion of port and harbor facilities, brownfields, multitenant manufacturing and other facilities, business and industrial parks, business incubator facilities, redevelopment technology-based facilities, telecommunications, and development facilities. Through its Economic Adjustment Program, USEDA administers its Revolving Loan Fund (RLF) 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.

Public Works Program

Through its Public Works Program, USEDA invests in key public infrastructure, such as traditional public works projects, 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.

State

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

The Waterfront Revitalization of Coastal Areas and Inland Waterways Act offers local governments the opportunity to participate in the State's Coastal Management Program (CMP) (pdf) on a voluntary basis by preparing and adopting an LWRP, providing more detailed implementation of the State's CMP through use of such existing broad powers as zoning and site plan review. 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.

An approved LWRP reflects community consensus and provides a clear direction for appropriate future development. It establishes a long-term partnership among local government, community-based organizations, and the State. Also, funding to advance preparation, refinement, or implementation of Local Waterfront Revitalization Programs is available under Title 11 of the New York State EPF LWRP, among other sources.

In addition, state permitting, funding, and direct actions must be consistent, to the maximum extent practicable, with an approved LWRP. Within the federally defined coastal area, federal agency activities are also required to be consistent with an approved LWRP. This “consistency” provision is a strong tool that helps ensure all government levels work in unison to build a stronger economy and a healthier environment (NYS DOS 2023).

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:

- Individual (up to $75,000)
- Shared services (up to $150,000)
- New York City Department of Records

New York State Department of Environmental Conservation

Clean Water State Revolving Fund

The 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 New York State Environmental Facilities Corporation (EFC) 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 EFC to finance new projects, and the funds “revolve” over time.

Climate Smart Communities Grant Program

Climate Smart Community (CSC) grants support mitigation and adaptation projects to reduce greenhouse gas emissions and prepare for the effects of climate change. 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 five years.

Competitive grants ranging from $25,000 to $100,000 provide support for local governments to become certified CSCs. All counties, cities, towns, and villages of New York State are eligible to receive funding. The CSC grant program will provide 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 hazard mitigation plans to address changing conditions and reduce climate vulnerability

As of October 2024, 430 communities have committed to acting on climate through the CSC program. In Cattaraugus County, four communities are registered in the program but are not certified:

- Town of Allegany
- Town of Lyndon
- Village of Little Valley
- Village of Portville

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

This 50/50 matching funds program makes funds available to rural fire companies for the purchase of wildland firefighting equipment such as portable backpack pumps, Nomex protective clothing, hand tools, hard hats, 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 CWSRF-eligible 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 (Cattaraugus County is located in the Western New York region)
- 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 activities, including engineering and consultant fees for 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

The goal of the Engineering Planning Grant program is to advance water quality projects to construction, so successful applicants can use the engineering report funded by the grant to seek financing through the CWSRF program, Water Quality Improvement Project program, or other funding entities to further pursue the identified solution. Details regarding this program can be found on the website: https://www.dec.ny.gov/pubs/81196.html.

Water Quality Improvement Project Program

The Water Quality Improvement Project (WQIP) program is a competitive reimbursement grant program that funds projects that directly address documented water quality impairments. The competitive, statewide grant program is open to local governments and not-for-profit corporations. Grant recipients may receive up to 75 percent of the project costs for high priority wastewater treatment improvement, non-agricultural nonpoint source abatement and control, land acquisition for source water protection, aquatic habitat restoration, and municipal separate storm sewer system projects; up to 50 percent for salt storage projects; and up to 40 percent for general wastewater infrastructure improvement projects. Eligible activities include (NYS DEC 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 (MS4)

New York State Department of Transportation

BRIDGE NY

The BRIDGE NY program, administered by the NYSDOT, is open to all municipal owners of bridges and culverts. Projects are awarded through a competitive process and support all phases of project development. Projects selected for funding under the BRIDGE NY Initiative are evaluated based on the resiliency of the structure, including such factors as hydraulic vulnerability and structural resiliency; the significance and importance of the bridge, including traffic volumes, detour considerations, number and types of businesses served, and impacts on commerce; and the current bridge and culvert structural conditions. Information regarding the program can be found on the following website: https://www.dot.ny.gov/BRIDGENY.

New York State Division of Homeland Security and Emergency Services

The New York State Emergency Services Revolving Loan

The New York State Emergency Services Revolving Loan Account was established under the State Finance Law to make 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 Office of Parks, Recreation, and Historic Preservation

Recreational Trails Grant Program

The Recreational Trails Program (RTP) provides funds to the states to develop and maintain recreational trails and trail-related facilities for both nonmotorized and motorized recreational trail uses. The RTP is an assistance program of the U.S. Department of Transportation's Federal Highway Administration (FHWA). In New York State, the RTP is administered by the Office of Parks, Recreation and Historic Preservation (OPRHP).

The RTP legislation 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.

15.4.2 County and Local

County, Local, and Regional

Cattaraugus County and individual jurisdictions are (legally, not necessarily practically) able to fund mitigation projects though existing local budgets, local appropriations (including referendums and bonding), and a variety of 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, budget constraints, and tax caps. 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.

Home Energy Assistance Program and Emergency

The Home Energy Assistance Program (HEAP) provides Cattaraugus County's eligible older population with financial help towards heating costs. Persons 60 years of age or over may apply for this help through the Department. The application process may be done by mail, telephone, or in person as required by the specific situation. HEAP payments appear as credits on an approved applicant's heating bill and are not meant to substitute regular payments.

Cattaraugus County Department of Economic Development, Planning & Tourism

Technical Assistance

The Department offers no cost technical assistance for community development assistance, marketing technical assistance, grant proposal development assistance, infrastructure location mapping, business research, and financial grant packaging.

Community Revitalization Fund

The purpose of the Cattaraugus County Community Revitalization Fund is to assist rural communities in improving and preserving the unique community character, heritage, and beauty of community centers; provide an incentive for communities to initiate new or expand upon existing downtown revitalization or community beautification efforts; encourage community leaders to develop a "vision" for the community; build local capacity through training, sharing information, and development of a plan to sustain the local vision; and encourage long-term community stewardship. Municipalities in Cattaraugus County can apply for up to $5,000 in grant funds to help improve the beauty of the community's center.

Part 4: Mitigation Strategy

16. MITIGATION STRATEGY

This chapter presents mitigation strategies for Cattaraugus 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 Cattaraugus County HMP. The current planning process represents the regulatory 5-year plan update process, which includes the participation of 43 jurisdictions in the County, along with key County and regional stakeholders.
- All but one municipality (Town of Red House) 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 Cattaraugus County have been reviewed and incorporated into this plan update as appropriate, as discussed in Chapter 2 (Planning Process) and References.

16.2 REVIEW AND UPDATE OF MITIGATION GOALS AND OBJECTIVES

This section documents describes the process of updating hazard mitigation goals and objectives for reducing or avoiding long-term vulnerabilities to identified hazards. 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 2020 goals and objectives and made revisions for the 2025 update based on the following considerations:

- Hazard events and losses since the 2020 HMP
- The updated hazard profiles and risk assessment
- The goals and objectives established in the New York State 2023 HMP
- The Planning Partnership's interests in integrating this plan with other planning mechanisms, including Cattaraugus County and local risk management plans
- 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 the following:

- Goal 1: Protect life, property, environment, economy, and critical infrastructure from hazard impacts.
  - Objective 1.1: Encourage the use of green and natural infrastructure.
  - Objective 1.2: Coordinate with local, county, state, federal, international, and other stakeholder agencies to maintain natural systems, including wetlands, parks, and riverine and coastal areas.
  - Objective 1.3: Prevent (or discourage) new development in hazardous areas or ensure that if building occurs in high-risk areas that it is done in such a way as to minimize risk.
  - Objective 1.4: Reduce the risk of utility failure.
  - Objective 1.5: Identify the need for, and acquire, any special emergency services, training, and equipment to enhance response capabilities for specific hazards.
  - Objective 1.6: Enhance sheltering capabilities at the local level.
  - Objective 1.7: Protect, maintain, and increase resilience of infrastructure and critical facilities.
  - Objective 1.8: Reduce repetitive and severe repetitive losses.
- Goal 2: Coordinate hazard mitigation programs and other planning efforts that affect the County.
  - Objective 2.1: Assure coordination between communities and encourage shared services in acquiring, maintaining, and providing emergency services.
  - Objective 2.2: Identify and pursue funding opportunities to develop and implement local and county mitigation activities.
  - Objective 2.3: Review and incorporate updated hazard data into the County HMP and other county and local planning mechanisms.
  - Objective 2.4: Increase support for the development of local mitigation planning and projects that provide co-benefits and support a healthy and equitable environment.
- Goal 3: Educate the public, officials, and other stakeholders about the hazards they face and what can be done to mitigate hazard impacts.
  - Objective 3.1: Enhance stakeholder education and training about hazard risks and mitigation.
  - Objective 3.2: Strengthen understanding of, and adaptation to, a changing climate.
  - Objective 3.3: Provide/Improve flood protection with flood control structures, and drainage maintenance plans.

  - Objective 3.4: Better characterize flood/stormwater hazard events by conducting additional hazard studies and identify inadequate stormwater facilities and poorly drained areas.
- Goal 4: Enhance mitigation capabilities to reduce hazard vulnerabilities.
  - Objective 4.1: Develop, enhance, and protect early warning and emergency communications systems.
  - Objective 4.2: Improve and support Comprehensive Regional Evacuation Plan.
  - Objective 4.3: Strengthen County and local planning, building codes, ordinances, and enforcement.
  - Objective 4.4: Review existing local laws and ordinances, safety inspection procedures, and applicable rules to help ensure that they employ the most recent and generally accepted standards for the protection of buildings and environmental resources.
- Goal 5: Support continuity of operations pre-, during, and post-hazard events.
  - Objective 5.1: Ensure continuity of government operations, emergency services and essential facilities during and immediately after disaster and hazard events.
  - Objective 5.2: Increase resiliency by facilitating rapid disaster recovery.
  - Objective 5.3: Support and encourage the implementation of alternative energy source.
  - Objective 5.4: Implement mitigation measures that promote the reliability of lifeline systems.
- Goal 6: Reduce the risk of natural hazards for socially vulnerable populations and underserved communities.
  - Objective 6.1: Encourage the establishment of policies to help ensure the prioritization and implementation of mitigation actions and/or projects designed to benefit socially vulnerable populations and underserved communities.
  - Objective 6.2: Promote sustainable and equitable land development practices that direct future development away from vulnerable areas.
  - Objective 6.3: Encourage and support multi-jurisdictional mitigation projects that leverage funding and support from multiple levels of government and community organizations.
- Goal 7: Address long-term vulnerabilities from High Hazard Dams.
  - Objective 7.1: Ensure that dam infrastructure is maintained.
  - Objective 7.2: Support the identification and access to funding to repair, rehabilitate, or replace dams.

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 (2020) 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 completed mitigation actions, in progress actions, or ongoing capabilities, as well as 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 September 2024, 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 a 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 17, 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 “Local Mitigation Planning Handbook” March 2013):

- **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**—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**—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**—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**—Actions that minimize hazard loss and also 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**—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**—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. 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., flood, severe storm, severe winter storm, and wildfire). 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 2020 Cattaraugus County HMP using a process similar to that used to review local jurisdiction mitigation strategy progress. The County, through their various department representatives, was provided with a Mitigation Action Plan Review Worksheet identifying all County-level actions and initiatives from the 2020 HMP. 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*, *Completed*, 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. Those actions the County has 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:
  - Attorney's Office Risk Management Division
  - Department of Public Works
  - Department of Community Services
  - Health Department
  - Office of Emergency Services
  - Office of Real Property & GIS Services
  - Engineering
- 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 flood, severe storm, and severe winter storm. 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 0.2 percent annual chance (500-year) events. 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. Further, the County has limited authority over privately-owned critical facility owners 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). One catalog was developed for each hazard of concern evaluated in this plan. The catalogs present alternatives that are categorized in two ways:

- By who would have responsibility for implementation:
  - Individuals—personal scale
  - Businesses—corporate scale
  - Government—government scale
- By 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 presented 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.

The catalogs are included in Appendix H.

16.3.4 Mitigation Strategy Evaluation and Prioritization

Section 201.c.3.iii of 44 CFR establishes how mitigation strategies are to be prioritized, implemented, and administered by local jurisdictions. 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 a set of 14 evaluation criteria for this process:

1. 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?

2. 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?
3. Cost-Effectiveness—Are the costs to implement the action commensurate with the benefits achieved?
4. 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?
5. Legal—Does the jurisdiction have the authority to implement the action?
6. 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?
7. Environmental—What are the potential environmental impacts of the action? Will it comply with environmental regulations? Are there co-benefits of this action?
8. Social Vulnerability—Does the action benefit socially vulnerable populations and underserved communities? Additional considerations can include appropriate numerical measures of social vulnerability.
9. 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?
10. Hazards of Concern—Does the action address one or more of the jurisdiction's high-ranked hazards?
11. Climate Change—Does the action incorporate climate change projections? Is the action designed to withstand/address long-term conditions?
12. Timeline—Can the action be completed in less than five years?
13. Community Lifelines—Does this action benefit community lifelines?
14. Other Local Objectives—Does the action advance other local objectives, such as capital improvements, economic development, environmental quality, or open space preservation? Does it support the policies of other plans and programs?

Participating jurisdictions were asked to use these criteria to 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.

It is noted that jurisdictions may be carrying forward mitigation actions from prior mitigation strategies that were prioritized using a different, but not inherently contrary, approach. Mitigation actions in the prior (2020) Cattaraugus 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

Section 201.6.c.3iii of 44 CFR requires 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. For all actions identified in the local strategies, jurisdictions identified the associated costs and benefits as follows:

- **Costs** presented include the total project estimation. This can include administrative, construction (engineering, design, and permitting), and maintenance costs.
- **Benefits** are the savings from losses avoided attributed to project implementation. These can include life safety, structure and infrastructure damages, loss of service or function, and economic and environmental damage and 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 16-1.

Table 16-1 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.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-effective.

For some of the Cattaraugus 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 five 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 approval period (the 5-year period between FEMA's approval of the plan and its expiration), 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 Cattaraugus County HMP Coordinator is designated as:

Kimberly A. Merrill
Cattaraugus County Department of Public Works
8810 Route 242, Jack Ellis Drive
Little Valley, NY 14755
(716) 938-9121 ext. 2480
Email: kamerrill@cattco.org

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 May 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.	May 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 previous 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 contacts 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 contacts 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

17.2.1 Monitoring

The Planning Partnership will be responsible for monitoring and documenting annual progress on the plan. Each year, beginning one year after plan development, Cattaraugus 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 approval 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 approval period will be addressed via the BATool^SM or manually.

17.2.2 Integrating the HMP into Municipal Planning Mechanisms

Hazard mitigation is sustained action taken to reduce or eliminate the long-term risk to human life and property from natural hazards. Integrating hazard mitigation into a community's existing plans, policies, codes, and programs leads to development patterns or redevelopment that reduce risk from known hazards. The Planning Partnership was tasked with identifying how hazard mitigation is integrated into existing planning mechanisms. The jurisdictional annexes in Volume II describe how this is done for each planning partner. During this process, many partners recognized the importance and benefits of incorporating hazard mitigation into future local planning and regulatory processes.

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.

The Capability Assessment (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 within the County. In the jurisdictional annexes in Volume II, each planning partner identified how it has integrated hazard risk management into its existing planning, regulatory, and administrative framework ("existing integration") and how they intend to promote this integration further ("opportunities for future integration").

It is the intention of Planning Partnership representatives to incorporate mitigation planning as an integral component of daily government operations. Planning Partnership representatives will work with local government officials to integrate the newly adopted hazard mitigation goals and actions into the general operations of government and partner organizations. The sample adoption resolution (Appendix A–Adoption Resolution) includes a resolution item stating the intent of the local governing body to incorporate mitigation planning as an integral component of government and partner operations. By doing so, the Planning Partnership anticipates that:

- 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.

Other planning processes and programs 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, adapted from FEMA's 2013 Local Mitigation Handbook, will help a community analyze how hazard mitigation is integrated into local plans, ordinances, regulations, and policies. Completing the checklist will help jurisdictions identify areas that currently integrate hazard mitigation and where to make improvements and reduce vulnerability to future development.

Table 17-2. Safe Growth Check List

Planning Mechanisms	Yes	No	How is it being done or how will this be utilized in the future?
Operating, Municipal, and Capital Improvement Program Budgets			
When constructing upcoming budgets, 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	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?			
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)?			

Planning Mechanisms	Yes	No	How is it being done or how will this be utilized in the future?
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?			

17.2.3 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 plan review 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 and 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.

Specifically, 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

Finally, 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 ("Implementation of Mitigation Plan through Existing Programs" subsection below discusses this process). 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 approval 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.

17.2.4 Updating

44 CFR 201.6.d.3 requires that local hazard mitigation plans be reviewed, revised as appropriate, and resubmitted for approval to remain eligible for benefits awarded under DMA 2000. It is the intent of the Cattaraugus County HMP Planning Partnership to update this plan on a 5-year cycle from the date of initial plan adoption.

To facilitate the update process, 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 5-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. At this meeting, the project team will determine what resources will be needed to complete the update and seek to secure these resources.

Following each 5-year update of the HMP, the updated plan will be distributed for public comment. After all comments are addressed, the HMP will be revised and distributed to all Planning Partners.

17.2.5 Grant Monitoring and Coordination

Cattaraugus 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, Cattaraugus 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.

17.2.6 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 webpage: https://www.cattcohmp.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, Twitter) to inform the public of natural hazard events, such as floods and severe storms; 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 Cattaraugus 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.

REFERENCES

5-Year American Community Survey. 2022. "House Heating Fuel." Accessed January 2024. https://data.census.gov/table/ACSDP5Y2022.DP04?g=050XX00US36009&d=ACS%205-Year%20Estimates%20Data%20Profiles.

—. 2023. *S2801 Types of Computers and Internet Subscriptions.* Accessed February 4, 2025. https://data.census.gov/table/ACSST5Y2023.S2801?q=Internet%20access&g=050XX00US36009,36009$0600000.

Airport Guide. n.d. *Airport Guide.* Accessed August 2023. https://airportguide.com/airport/info/8G3.

Association of State Dam Safety Officials . n.d. *Dam Failures and Incidents.* https://damsafety.org/dam-failures#The%20Causes%20of%20Dam%20Failures.

Association of State Dam Safety Officials. 2024. *Dam Failures and Incidents.* Accessed 2024. https://damsafety.org/dam-failures.

—. n.d. *Dams 101.* Accessed 2023. https://damsafety.org/dams101.

Behler McArthur, Donna. 2019. "https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7096727/." *Nurs Clin North Am*, June: 297-311. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7195975/.

Buffalo Cattaraugus & Jamestown Scenic Railway. n.d. *Buffalo Cattaraugus & Jamestown Scenic Railway.* Accessed 2023. https://www.bcjrailroad.com/.

Cattaraugus County . n.d. *Historical Museum and Research Center .* Accessed 2024. https://www.cattco.org/news/civil-war-exhibit-opens-cattaraugus-county-museum-14670.

—. n.d. *Home Energy Assistance Program .* Accessed 2024. https://www.cattco.org/social-services/HEAP.

Cattaraugus County. n.d. *Cattaraugus County.* Accessed 2024. https://www.cattco.org/news/emergency-rental-assistance-program-erap-13186.

—. 2015. *Cattaraugus County Road Map.* Accessed August 2023. https://www.cattco.org/sites/default/files/downloads/public-works/street_map_for_sale.pdf.

—. 2022. "Economic and Development." *Economic Strategic Plan.* January 20. Accessed 2023. https://www.cattco.org/sites/default/files/edpt/Cattaraugus-County-Economic-Strategic-Plan-20220120-ver.20220224.pdf.

—. n.d. *Emergency Services.* Accessed August 2023. https://cattco.org/oes.

—. n.d. *History of Cattaraugus County.* Accessed 2024. https://www.cattco.org/museum/history.

—. n.d. *Onsite Wastewater Treatment Systems.* Accessed 2023. https://www.cattco.org/health/services/environmental/onsite-wastewater.

Cattaraugus County Planning. n.d. *Trail System Plan .* Accessed 2024. https://www.cattco.org/planning/trail-system-plan.

Cattaraugus County. 2025. *Vision 2025 Comprehensive Plan.* Accessed 2024. https://www.cattco.org/sites/default/files/img/20160328-cattaraugus-county-comp-plan.pdf.

—. n.d. *Water Treatment Systems .* Accessed August 2023. https://www.cattco.org/health/services/environmental/water-treatment-systems.

CCAHA. 2019. *WINTERIZING HISTORIC BUILDINGS.* December 4. Accessed August 31, 2023. https://ccaha.org/resources/winterizing-historic-buildings.

CDC. 2021. *COVID-19.* U.S. Centers for Disease Control and Prevention. Accessed 2021. https://www.cdc.gov/coronavirus/2019-ncov/.

CDC. 2023. *COVID-19 Vaccination Coverage by Social Vulnerability Index (SVI), Overall and by Theme, United States.* Centers for Disease Control and Prevention. https://www.cdc.gov/ncird/health-equity/downloads/covid-vax-SVI-Report-2020-2022-508.pdf.

—. 2005. *Extreme Cold.* March 22. Accessed September 1, 2023. https://www.cdc.gov/disasters/winter/pdf/extreme-cold-guide.pdf.

—. 2022. *Extreme Heat.* June 17. Accessed September 1, 2023. https://www.cdc.gov/disasters/extremeheat/index.html.

—. 2024. *Historic Data.* Accessed July 23, 2024. https://www.cdc.gov/west-nile-virus/data-maps/historic-data.html.

—. 2022. *Lyme Disease Case Map.* Accessed July 23, 2024. https://www.cdc.gov/lyme/data-research/facts-stats/lyme-disease-case-map.html.

—. 2012. "Natural Disasters and Severe Weather." *Center for Disease Control and Protection.* December 03. Accessed August 22, 2022. https://www.cdc.gov/disasters/winter/guide.html.

—. 2020. *Pandemic Influenza.* May 12. https://www.cdc.gov/flu/pandemic-resources/index.htm.

—. 2016. *Pandemic Severity Assessment Framework (PSAF).* November 03. Accessed October 13, 2022. https://www.cdc.gov/flu/pandemic-resources/national-strategy/severity-assessment-framework.html.

—. 2023. *Prevent Hypothermia and Frostbite.* https://www.cdc.gov/disasters/winter/staysafe/hypothermia.html.

—. 2013. *West Nile Virus in the United States.* June 14. Accessed 2021. https://www.cdc.gov/westnile/resources/pdfs/wnvguidelines.pdf.

—. 2023. *WNV Current Year Data (2023).* Accessed October 30, 2023. https://www.cdc.gov/westnile/statsmaps/current-season-data.html.

Census. 2020. "United States Census Bureau." Accessed 2022. https://www.census.gov/quickfacts/cattarauguscountynewyork.

Census, United States. 2022. *Census Quick Facts.* Accessed 2024. https://www.census.gov/quickfacts/fact/table/US/PST045222.

Center for Disaster Resilience. 2016. *The Growing Threat of Urban FLooding: A National Challenge.* https://cdr.umd.edu/sites/cdr.umd.edu/files/resource_documents/COMPRESSEDurban-flooding-report-online-compressed-0319.pdf.

Centers for Disease Control and Prevention. 2020. *Heat Stress.* August 31. Accessed September 8, 2023. https://www.cdc.gov/niosh/topics/heatstress/default.html.

—. 2018. *Sun Exposure.* June 1. Accessed September 8, 2023. https://www.cdc.gov/niosh/topics/sunexposure/default.html.

CERCLIS. 2024. *Search for Superfund Sites Where You Live.* September. Accessed August 2024. https://www.epa.gov/superfund/search-superfund-sites-where-you-live.

City of Olean. n.d. *Cattaraugus County-Olean Municipal Airport.* Accessed August 2023. https://cityofolean.org/dpw-airport/.

Climate Smart Communities. n.d. *Certification Actions.* https://climatesmart.ny.gov/actions-certification/actions/.

—. n.d. *Climate Smart Communities.* New York State. Accessed December 2023. https://climatesmart.ny.gov/.

Columbia University. 2021. *Epidemic, Endemic, Pandemic: What are the Differences?* February 19. Accessed August 5, 2023. https://www.publichealth.columbia.edu/news/epidemic-endemic-pandemic-what-are-differences.

Community Transportation Coalition of Cattaraugus County. 2019. "Coordinated Public Transit-Human Services Transportation Plan." Accessed August 2023. https://www.cattco.org/sites/default/files/downloads/planning/CTC%20Report%202019%20FINAL.pdf.

Cornell. 2023. *Northeast Regional Climate Center.* July. Accessed August 2023. https://www.nrcc.cornell.edu/regional/tables/tables.html.

Cornell University College of Agriculture and Life Sciences. 2011. *New York's Changing Climate.* http://files.campus.edublogs.org/blogs.cornell.edu/dist/8/90/files/2011/03/ny_changing_climate.pdf.

Cornell University. 2018. *Cornell Projections Explorer.* Accessed March 28, 2024. https://pad.human.cornell.edu/counties/projections.cfm.

—. n.d. *The Climate of New York.* Accessed August 30, 2022. http://www.weather.com/weather/wxclimatology/monthly/USNY0378.

County Office. 2023. *Airports in Cattaraugus County, New York.* Accessed 2023. https://www.countyoffice.org/ny-cattaraugus-county-airport/.

—. n.d. *County Office.* Accessed 2023. https://www.countyoffice.org/ny-cattaraugus-county-police-department/.

County, Cattaraugus. 2022. "Cattaraugus County Health Department." Accessed 2024. https://www.cattco.org/sites/default/files/health/Strategic%20Plan%20FINAL%202_0.pdf.

Cybersecurity and Infrastructure Security Agency. n.d. *Critical Infrastructure Sectors.* Accessed August 25, 2023. https://www.cisa.gov/topics/critical-infrastructure-security-and-resilience/critical-infrastructure-sectors.

District, Cattaraugus County Soil and Water Conservation. n.d. *Cattaraugus County Soil and Water Conservation District.* Accessed 2024. http://www.cattcoswcd.org/p/about-us.html.

Dolce, Chris. 2012. *How to Stay Safe From Ice Storm.* https://weather.com/en-CA/canada/news/news/2018-01-03-ice-storm-damage-impacts-20121123.

EPA. 2023. *Climate Adaptation and EPA's Role.* U.S. Environmental Protection Agency. September 6. Accessed December 2023. https://www.epa.gov/climate-adaptation/climate-adaptation-and-epas-role.

—. 2013. "Climate Change Impacts and Adapting to Change." September 9. http://www.epa.gov/climatechange/impacts-adaptation/.

—. 2023. *Climate Change Indicators: Weather and Climate.* Environmental Protection Agency . Accessed 2023. https://www.epa.gov/climate-indicators/weather-climate.

—. 2013. "Climate Change: Northeast Impacts & Adaptation." June 21. http://www.epa.gov/climatechange/impacts-adaptation/northeast.html.

—. 2001. "EPA." *Chemical Accidents from Electrial Power Outages.* September. Accessed May 2023. https://www.epa.gov/sites/default/files/2013-11/documents/power.pdf.

FEMA. 2018. May. Accessed 2024. https://www.fema.gov/sites/default/files/2020-08/fact-sheet_risk-exposure-residual-risk-related-to-dams.pdf.

—. 2022. "BCA Toolkit 6.0." https://www.fema.gov/fact-sheet/fema-bca-toolkit-60-installation-instructions.

—. 2016. "Be Aware of Potential Risk of Dam Failure in Your Community." https://www.fema.gov/sites/default/files/2020-08/fema_dam-safety_aware-community_fact-sheet_2016.pdf.

—. 2023. *Community Lifelines.* July 27. https://www.fema.gov/emergency-managers/practitioners/lifelines.

—. 2024. *Disaster Declarations for States and Counties.* Accessed 2024. https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties.

—. 2024. *Disaster Declarations for States and Counties.* Accessed 2024. https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties.

—. 2024. *Disaster Declarations for States and Counties.* Accessed 2024. https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties.

—. 2024. *Disaster Declarations for States and Counties.* Accessed 2024. https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties.

—. 2024. *Disaster Declarations for States and Counties.* Accessed 2024. https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties.

—. 2024. *Disaster Declarations for States and Counties.* Accessed 2024. https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties.

—. 2024. *Disaster Declarations for States and Counties.* Accessed 2024. https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties.

—. 2018. *Emergency Preparedness Guidelines fo Levees.* https://www.fema.gov/sites/default/files/2020-08/fema_emergency-preparedness-guidelines-for-levees_2018.pdf.

—. 2022. *FEMA Fact Sheet – Understanding Risk Rating 2.0: Equity in Action.* February. https://agents.floodsmart.gov/sites/default/files/fema-Risk-Rating-2.0-Fact-Sheet-2022.pdf.

—. 2020. *Flood Risks Increase After Fires.* November. Accessed August 30, 2023. https://www.fema.gov/sites/default/files/documents/fema_flood-after-fire_factsheet_nov20.pdf.

—. 2020. *Flood Zones.* https://www.fema.gov/glossary/flood-zones.

—. 2007. *Floodplain Management Principles and Current Practices.* https://training.fema.gov/hiedu/aemrc/courses/coursetreat/fm.aspx.

—. 2007. *Floodplain Management Principles and Current Practices.* https://training.fema.gov/hiedu/aemrc/courses/coursetreat/fm.aspx.

—. 2020. *Guidance for Flood Risk Analysis and Mapping - Levees.* December. Accessed 2024. https://www.fema.gov/sites/default/files/documents/fema_levee-guidance.pdf.

—. n.d. *Hazard Mitigation Assistance Grants.* Federal Emergency Management Agency. Accessed December 2023. https://www.fema.gov/grants/mitigation.

—. 2023. *Information Needs for Dam Safety.* Federal Emergency Management Agency . Accessed 2023. https://www.fema.gov/emergency-managers/risk-management/dam-safety/about.

FEMA. 2023. *Local Mitigation Planning Handbook.* Federal Emergency Management Agency. Accessed December 2023. https://www.fema.gov/sites/default/files/documents/fema_local-mitigation-planning-handbook_052023.pdf.

FEMA. 2022. *Local Mitigation Planning Policy Guide.* OMB Collection #1660-0062, Federal Emergency Management Agency. Accessed December 2023. https://www.fema.gov/sites/default/files/documents/fema_local-mitigation-planning-policy-guide_042022.pdf.

—. n.d. *Mapping Information Platform Studies Tracker.* Accessed May 15, 2023. https://www.arcgis.com/home/webmap/viewer.html?webmap=6331cc6b45734c4eabfde6102d5fc0b1&extent=-148.9197,13.1588,-46.0876,55.5312.

—. 2018. "Mitigation Planning and the Community Rating System Key Topics Bulletin." October. https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-planning-and-the-community-rating-system-key-topics-bulletin_10-1-2018.pdf.

FEMA. 1997. *Multi Hazard Identification and Risk Assessment.* Technical, FEMA. http://www.fema.gov/library/viewRecord.do?id=2214.

—. 2019. *National Risk Index.* Accessed August 16, 2023. https://hazards.fema.gov/nri/map.

FEMA. 2015. *Plan Integration: Linking Local Planning Efforts.* Federal Emergency Management Agency. Accessed December 2023. https://www.fema.gov/sites/default/files/2020-06/fema-plan-integration_7-1-2015.pdf.

FEMA. 2003. *State and Local Mitigation Planning how-to guide: Developing the Mitigation Plan; identifying mitigation actions and implementation strategies.* Federal Emergency Management Agency. https://mitigation.eeri.org/wp-content/uploads/FEMA_386_3.pdf.

—. 2023. *Summary of FEMA Hazard Mitigation Assistance (HMA) Programs.* https://www.fema.gov/fact-sheet/summary-fema-hazard-mitigation-assistance-hma-programs.

—. 2020. *What is a Levee?* https://www.fema.gov/sites/default/files/2020-08/fema_what-is-a-levee_fact-sheet_0512.pdf#:~:text=FEMA%20accreditation%20of%20a%20levee%20does%20not%20guarantee,adherence%20to%20evacuation%20procedures%20are%20strongly%20recommended.%203.

FERC. 2023. *Dam Safety and Inspections.* Accessed 2023. https://www.ferc.gov/dam-safety-and-inspections.

Garrison, L, and C Ritchie. n.d. "Choose Energy." *New York Utilities by Zip Code.* https://www.chooseenergy.com/electricity-rates/new-york/.

Harris, T. 2008. *How Floods Work.* http://science.howstuffworks.com/flood.htm.

Hazwoper OSHA. 2020. *Protecting Workers in Bad Weather Conditions.* November 6. Accessed September 14, 2023. https://hazwoper-osha.com/blog-post/protecting-workers-in-bad-weather-conditions.

HURREVAC. n.d. *A HURRICANE DECISION SUPPORT TOOL FOR GOVERNMENT EMERGENCY MANAGERS.* Accessed June 6, 2023. https://www.hurrevac.com/.

Karmakar, Monita, Paula Lantz, and Renuka Tipirneni. 2021. "Association of Social and Demographic Factors With COVID-19 Incidence and Death Rates in the US." *JAMA Network Open* 4 (1). doi:DOI: 10.1001/jamanetworkopen.2020.36462.

Lam, Linda. 2019. "Ground Blizzards: Why Blizzard Warnings are Issued with Little or No Falling Snow."

Miller, Susan W.S. 2004. "Methodology." *IDENTIFICATION OF MAPPED ICE-MARGIN POSITIONS IN WESTERN NEW YORK FROM DIGITAL TERRAIN-ANALYSIS AND SOIL DATABASES.* Accessed August 2023. https://www.maxwell.syr.edu/docs/default-source/research/millar3.pdf?sfvrsn=4f18f39f_0#:~:text=Southern%20Cattaraugus%20County%2C%20New%20York%2C%20is%20unique%20in,dipping%20gently%20to%20the%20south-%20west%20%28Lytle%2C%201965%29.

MitigateNY. 2023. *Wildfire.* Accessed 2024. https://mitigateny.org/hazards_of_concern/wildfire.

Monroe County Pure Waters. 2022. *Pure Waters.* https://www.monroecounty.gov/des-purewaters.

n.d. *N.Y. Comp. Codes R. & Regs. Tit. 6 § 673.3 - General provisions.* Accessed 2023. https://www.law.cornell.edu/regulations/new-york/6-NYCRR-673.3#:~:text=N.Y.%20Comp.%20Codes%20R.%20%26%20Regs.%20Tit.%206,6%20%C2%A7%20673.3%20-%20General%20provisions%20State%20Regulations.

NASA. 2022. *NASA Study Finds Climate Extremes Affect Landslides in Surprising Ways.* National Aeronautics and Space Administration. October. Accessed May 2024. https://climate.nasa.gov/news/3218/nasa-study-finds-climate-extremes-affect-landslides-in-surprising-ways/.

—. 2013. *Severe Thunderstorms and Climate Change.* https://climate.nasa.gov/news/897/severe-thunderstorms-and-climate-change/.

—. n.d. *Understanding Sea Level.* Accessed June 2024. https://sealevel.nasa.gov/understanding-sea-level/global-sea-level/thermal-expansion.

National Academies of Sciences, Engineering, and Medicine. 2022. *Resilience for Compounding and Cascading Events.* Washington, DC: : The National Academies Press. Accessed December 2023. https://nap.nationalacademies.org/read/26659/chapter/3.

Network, Kaleida Health. n.d. *Bradford Regional Medical Center Olean General Hospital .* Accessed 2024. https://www.brmc-ogh.org/.

New York and Lake Erie Railroad. n.d. *New York and Lake Erie Railroad.* Accessed August 2023. https://nylerailroad.com/.

New York Department of Environmental Conservation. 2020. *Pesticie Laws and Regulations.* Accessed 2020. https://www.dec.ny.gov/chemical/112881.html#:~:text=Pesticide%20Laws%20and%20Regulations,in%20the%20Environmental%20Conservation%20Law.&text=Businesses%20must%20be%20registered%20with,services%20in%20New%20York%20State.

New York State. n.d. *Cattaraugus.* Accessed 2024. https://www.ny.gov/counties/cattaraugus.

—. n.d. "NYS Health Profiles." Accessed 2022. https://profiles.health.ny.gov/home_care/counties_served/county:055.

NHC NOAA. 2010. *NHC Issuance Criteria Changes for Tropical Cyclone Watches/Warnings.* Accessed November 15, 2021. https://www.nhc.noaa.gov/watchwarn_changes.shtml#:~:text=Hurricane%20Watch%3A%20An%20announcement%20that,within%20the%20specified%20coastal%20area.&text=Hurricane%20Warning%3A%20An%20announcement%20that,within%20the%20specified%20coastal%20area.

NIDIS. 2023. *Ecosystems.* National Integrated Drought Information System. https://www.drought.gov/sectors/ecosystems.

—. 2023. *Keetch-Byram Drought Index.* https://www.drought.gov/data-maps-tools/keetch-byram-drought-index.

—. 2023. *Wildfire Management.* Accessed August 30, 2023. https://www.drought.gov/sectors/wildfire-management.

NOAA. 2023. *Climatological Report.* May. Accessed August 2023. https://forecast.weather.gov/product.php?site=BUF&product=CLM&issuedby=BUF.

—. 2023. *Dead Fuel Moisture.* https://www.ncei.noaa.gov/access/monitoring/dyk/deadfuelmoisture.

—. 2009. *Naionanl Weather Service, Heat Wave.* June 25. Accessed August 30, 2022. https://w1.weather.gov/glossary/index.php?word=heat+wave.

—. 2021. *NOAA Historical Hurricane Tracks Tool.* https://coast.noaa.gov/hurricanes/#map=6.07/41.171/-74.06&search=eyJzZWFyY2hTdHJpbmciOiJSb2NrbGFuZCBDb3VudHksIE5ldyBZb3JrLCBVU0EiLCJzZWFyY2hUeXBlIjoiZ2VvY29kZWQiLCJvc21JRCI6IjE4MzUzNjMiLCJjYXRlZ29yaWVzIjpbIkg1IiwiSDQiLCJIMyIsIkgyIiwiSDEiLCJUUyIsIlREIiwiRV.

—. n.d. "NOAA National Severe Storms Laboratory." *Severe Weather 101 - Lightning .* Accessed August 2024. https://www.nssl.noaa.gov/education/svrwx101/lightning/.

NOAA NSSL. n.d. National Oceanic and Atmospheric Administration National Severe Storms Laboratory. Accessed 2023. https://www.nssl.noaa.gov/education/svrwx101/floods/faq/.

—. n.d. *National Oceanic and Atmospheric Administration.* Accessed August 2022. https://www.nssl.noaa.gov/education/svrwx101/winter/types/.

NOAA. n.d. *Regional Snowfall Index (RSI).* Accessed August 2022. https://www.ncei.noaa.gov/access/monitoring/rsi/.

—. n.d. *Severe Weather 101.* Accessed 2022. https://www.nssl.noaa.gov/education/svrwx101/wind/types/.

—. 2023. "Severe Weather 101." Accessed 2023. https://www.nssl.noaa.gov/education/svrwx101/tornadoes/.

—. n.d. *Severe Weather 101.* Accessed 2023. https://www.nssl.noaa.gov/education/svrwx101/thunderstorms/.

—. 2023. *Thunderstorms.* April 14. https://www.noaa.gov/jetstream/thunderstorms.

—. 2011. *Tornadoes 101.* April 17. Accessed November 25, 2021. https://www.noaa.gov/stories/tornadoes-101.

—. 2023. *Tornadoes and Climate Change: What do we Know? .* July. Accessed June 2024. https://www.noaa.gov/sites/default/files/2023-10/Tornadoes_Climate_OnePager_July2023.pdf.

—. 2023. *Tropical Cyclone Introducton.* September 8. https://www.noaa.gov/jetstream/tropical/tropical-cyclone-introduction#:~:text=A%20tropical%20cyclone%20is%20a%20warm-core%20low%20pressure,an%20organized%20circulation.%20These%20include%20hurricanes%20and%20typhoons.

—. 2024. *What is Snow?* March 14. Accessed July 23, 2024. https://www.nesdis.noaa.gov/our-environment/ice-snow#:~:text=Snow%20is%20precipitation%20in%20the%20form%20of%20ice,into%20ice%20without%20going%20through%20the%20liquid%20stage.

—. n.d. *Wind Chill.* Accessed November 2023. https://www.weather.gov/ama/WindChill.

NOAA-NSSL. n.d. *Severe Weather 101: Tornado Basics.* https://www.nssl.noaa.gov/education/svrwx101/tornadoes/.

—. n.d. *Thunderstorm Basics.* https://www.nssl.noaa.gov/education/svrwx101/thunderstorms/.

NPS. 2020. *Wildland Fire: What is a Prescribed Fire?* March 19. https://www.nps.gov/articles/what-is-a-prescribed-fire.htm.

NRCC. 2014. *Downscaled Projections of Extreme Rainfall.* NYSERDA, Cornell University, Northeast Regional Climate Center. https://ny-idf-projections.nrcc.cornell.edu/idf_tech_document.pdf.

—. 2022. *Extreme Precipitation in New York & New England.* Northeast Regional Climate Center. https://precip.eas.cornell.edu/#/.

—. n.d. "Precip.net Web Site User Manual." https://precip.eas.cornell.edu/#/user_manual/Distribution_Curves_-_Graphical.

NRDC. 2015. "Climate Changes Threatens Health." *Natural Resource Defense Council.* Natural Resource Defense Council. October 13. Accessed August 29, 2022. https://www.nrdc.org/resources/climate-change-threatens-health.

NSIDC. n.d. *Snow.* Accessed August 27, 2023. https://nsidc.org/learn/parts-cryosphere/snow/why-snow-matters#:~:text=Faster%20snow%20cover%20retreat%20means%20earlier%20soil%20exposure%2C,runoff%20potentially%20leaves%20rivers%20drier%20in%20late%20summer.

NSSL. 2021. *Glossary of Terms.* NSSL. https://w1.weather.gov/glossary/.

—. 2021. *Severe Weather 101 - Hail Basics.* Accessed 2021. https://www.nssl.noaa.gov/education/svrwx101/hail/.

—. 2021. *Severe Weather 101 - Hail Basics.* Accessed 2021. https://www.nssl.noaa.gov/education/svrwx101/hail/.

NSSL. 2021. *Severe Weather 101 - Winter Weather.* NSSL. https://www.nssl.noaa.gov/education/svrwx101/winter/types/.

NVRC. 2006. "Northern Virginia Regional Hazard Mitigation Plan." *Northern Virginia Regional Commission.* http://www.novaregion.org/index.aspx?NID=661.

NWS. 2012. *Air Pressure and Wind.* November 9. Accessed 2021. https://www.weather.gov/media/zhu/ZHU_Training_Page/winds/pressure_winds/pressure_winds.pdf.

—. n.d. *Cold Weather Safety.* National Weather Service. Accessed August 22, 2022. https://www.weather.gov/safety/cold.

NWS. 2021. *Definitions, Threshold, Criteria for Warning.* NWS.

—. 2020. *Definitions, Thresholds, Criteria for Warnings, Watches and Advisories.* https://www.weather.gov/ctp/wwaCriteria.

—. 2009. *Flash Flood.* http://w1.weather.gov/glossary/index.php?word=flash+flood.

—. n.d. *Lightning Victims.* National Weather Service. Accessed October 12, 2023. https://www.weather.gov/safety/lightning-victims.

—. 2023. *National Weather Service.* June 23. https://www.weather.gov/.

—. n.d. *NWS StormReady Program.* Accessed June 23, 2023. https://www.weather.gov/stormready/.

—. n.d. *Severe Thundertstorm Safety.* https://www.weather.gov/safety/thunderstorm.

—. 2022. *Storm Prediction Center Severe Risk .* https://www.weather.gov/media/ewx/iwt/SPC_WPC_Differences.pdf.

—. n.d. *The Enhanced Fujita Scale (EF Scale).* https://www.weather.gov/oun/efscale.

—. 2022. "Weather Related Fatality and Injury Statistics." *National Weather Service.* Accessed October 18, 2021. https://www.weather.gov/hazstat/.

—. n.d. *Weather Safety: Tornadoes.* https://www.weather.gov/mfl/tornadoes.

—. n.d. *Wind Warnings, Watches and Advisories .* Accessed September 2023. https://www.weather.gov/safety/wind-ww#:~:text=Wind%20Warnings%2C%20Watches%20and%20Advisories%201%20High%20Wind,7%20Gale%20Warning%3A%20Take%20Action%21%20...%20More%20items.

NY Regional Economic Development Councils . 2023. "2023 Strategic Plan ." *Western New York Regional Economic Development Council .* Accessed 2024. https://regionalcouncils.ny.gov/sites/default/files/2023-12/WNYREDC_Strategic_Plan_2023.pdf.

NYC Emergency Management. n.d. Accessed September 2023. https://www.nyc.gov/site/em/ready/thunderstorms.page.

NYCDEP. 2015. *Reservoirs.* New York: NYCDEP. http://www.nyc.gov/html/dep/html/watershed_protection/reservoirs.shtml.

NYS Agriculture and Markets. 2022. *Agriculture and Markets.* December. Accessed August 2023. https://agriculture.ny.gov/system/files/documents/2022/12/agdistrictprofile.pdf.

NYS. n.d. *Cattaraugus.* Accessed August 2023. https://www.ny.gov/counties/cattaraugus.

NYS DEC. 2022. *Bulk Storage Database Search .* Accessed August 29, 2022. https://www.dec.ny.gov/cfmx/extapps/derexternal/index.cfm?pageid=4.

—. n.d. *Dam Hazard Classification.* Accessed August 2022. https://www.dec.ny.gov/docs/water_pdf/togs315.pdf.

—. n.d. *Water Quality Improvement Project (WQIP) Program.* New York State Department of Environmental Conservation. Accessed Dece,ber 2023. https://www.dec.ny.gov/get-involved/grant-applications/wqip-program.

NYS DHSES. 2011. "2011 New York State Standard Multi-Hazard Mitigation Plan." *New York State Division of Homeland Security and Emergency Services.* http://www.dhses.ny.gov/oem/mitigation/archive/hm-plan-2011.cfm.

NYS DHSES. 2022. *2022 New York State Hazard Mitigation Planning Standards.* New York State Division of Homeland Security and Emergency Services.

—. 2023. *2023 New York State Hazard Mitigation Plan.* New York State Division of Homeland Security and Emergency Services – Mitigation Planning. Accessed October 2024. https://hazardmitigation.ny.gov/.

—. 2023. "2023 New York State Standard Multi-Hazard Mitigation Plan." https://mitigateny.org/home.

—. 2023. *Extreme Cold.* Accessed July 8, 2024. https://mitigateny.org/hazards_of_concern/extreme_cold.

—. 2023. *Flood.* New York State Division of Homeland Security and Emergency Services. Accessed July 23, 2024. https://mitigateny.org/hazards_of_concern/flood.

—. 2023. "Hazards." *MitigateNY.* Accessed July 8, 2024. https://mitigateny.org/hazards_of_concern/extreme_heat/extreme_heat_risk_profile.

—. n.d. "Heat Safety Tips." *NYS DHSES.* New York Department of Homeland Security and Emergency Services. Accessed August 23, 2022. https://www.dhses.ny.gov/heat-safety-tips.

—. n.d. *Landslide Safety Tips.* https://www.dhses.ny.gov/landslide-safety-tips.

—. 2023. *Mitigate NY.* https://mitigateny.org/hazards_of_concern/snowstorm.

—. 2023. "MitigateNY." *Landslide.* Accessed July 24, 2024. https://mitigateny.org/hazards_of_concern/landslide.

—. 2023. "Snow Storm." *MitigateNY.* Accessed July 26, 2024. https://mitigateny.org/hazards_of_concern/snowstorm.

NYS DOH. 2023. *Climate Change and Health.* New York State Department of Health. September. Accessed January 29, 2024. https://www.health.ny.gov/environmental/weather/.

—. 2016. *Influenza (Flu) Fact Sheet.* New York State Department of Health. October. Accessed January 29, 2024. https://www.health.ny.gov/diseases/communicable/influenza/fact_sheet.htm.

—. 2019. *Lyme Disease and Other Diseases Carried by Ticks.* March. Accessed 2021. https://www.health.ny.gov/diseases/communicable/lyme/.

—. 2017. *West Nile Virus (WNV) Disease.* August. Accessed 2021. https://www.health.ny.gov/diseases/west_nile_virus/index_wnv.htm.

NYS DOS. 2023. *Local Waterfront Revitalization.* New York State Department of State. https://dos.ny.gov/local-waterfront-revitalization-program.

—. 2019. *Stormwater Control Measures.* June. Accessed October 2024. https://dos.ny.gov/system/files/documents/2020/06/5_stormwater_control_measures_all.pdf.

NYS DOT. n.d. *2023 BRIDGE NY Program.* New York State Department of Transportation. Accessed December 2023. https://www.dot.ny.gov/BRIDGENY.

—. 2019. *Map of New York State Railroads.* https://www.dot.ny.gov/divisions/operating/opdm/passenger-rail/railroadsmap.

NYS EFC. n.d. *State Water Grants.* New York State. Accessed December 2023. https://efc.ny.gov/wiia.

NYS ESD. 2023. *Empire State Development.* New York State Empire State and Development. https://esd.ny.gov/.

NYS. 2019. *NYS Hazard Mitigation Plan 2019: Hurricane.* https://mitigateny.availabs.org/hazards/hurricane.

—. 2019. *NYS Hazard Mitigation Plan 2019: Tornado Hazard.* https://mitigateny.availabs.org/hazards/tornado.

NYSDEC. 2023. *About DEC.* New York State Department of Environmental Conservation. https://www.dec.ny.gov/about#:~:text=Mission%3A%20%22To%20conserve%2C%20improve,and%20social%20well%2Dbeing.%22.

—. 2020. *Community Risk and Resiliency Act.* https://www.dec.ny.gov/docs/administration_pdf/crrasmartgrowth.pdf#:~:text=CRRA%20directs%20the%20Department%20of%20Environmental%20Conservation%20%28DEC%29%2C,storm%20surge%2C%20and%20flooding%2C%20and%20other%20related%20guidance.

—. 2023. *Dam Safety.* New York State Department of Environmental Conservation. https://www.dec.ny.gov/environmental-protection/water/water-quantity/dam-safety-coastal-flood-protection/dam-safety.

—. n.d. *Dam Safety.* New York State Department of Environmental Conservation. Accessed December 2023. https://www.dec.ny.gov/environmental-protection/water/water-quantity/dam-safety-coastal-flood-protection/dam-safety.

—. n.d. *Dam Safety.* Accessed 2023. https://www.dec.ny.gov/lands/4991.html.

—. n.d. *Dam Safety, Coastal & Flood Protection.* Accessed 2024.

—. 2023. *DEC Statewide Offices.* New York State Department of Environmental Conservation. https://www.dec.ny.gov/about/contact-us/statewide-office-information.

—. 2023. *Division of Water.* New York State Department of Environmental Conservation. https://www.dec.ny.gov/environmental-protection/water#:~:text=The%20Floodplain%20Management%20branch%20is,development%20of%20revised%20flood%20maps.

—. n.d. "GUIDANCE FOR DAM HAZARD CLASSIFICATION." Accessed 2023. https://www.dec.ny.gov/docs/water_pdf/togs315.pdf.

—. n.d. *New York State Department of Environmental Conservation Dam Safety.* Accessed 2024. https://dec.ny.gov/environmental-protection/water/water-quantity/dam-safety-coastal-flood-protection/dam-safety.

—. 2023. *Stormwater.* New York State Department of Environmental Conservation. https://www.dec.ny.gov/environmental-protection/water/water-quality/stormwater.

—. n.d. *Watersheds.* New York State Department of Environmental Conservation . Accessed 2023. https://www.dec.ny.gov/lands/26561.html.

—. 2022. "Wildfires." *New York State Department of Environmental Conservation.* https://www.dec.ny.gov/lands/4975.html.

NYSDHSES. n.d. "Heat Safety Tips." *NYSDHSES.* Accessed September 2023. https://www.dhses.ny.gov/heat-safety-tips.

NYSDOH. 2024. *NYS Health Connector.* Accessed July 23, 2024. https://nyshc.health.ny.gov/web/nyapd/new-york-state-flu-tracker.

—. 2021. *What You Should Know About the Flu.* October. Accessed 2021. https://www.health.ny.gov/diseases/communicable/influenza/seasonal/.

NYSEG. 2024. *NYSEG.* Accessed 2024. https://www.nyseg.com/.

NYSERDA. 2014. "Responding to Climate Change in New York State (ClimAID)." *NYSERDA.* September. Accessed August 23, 2022. https://www.nyserda.ny.gov/About/Publications/Research%20and%20Development%20Technical%20Reports/Environmental%20Research%20and%20Development%20Technical%20Reports/Response%20to%20Climate%20Change%20in%20New%20York.

Placer Mosquito and Vector Control District. 2019. *Invasive Species.* Accessed 2019. http://www.placermosquito.org/unlisted-news/invasivespecies/.

Public Works. n.d. *Highway Division.* Accessed August 2023. https://www.cattco.org/public-works/highway-division.

Radbruch-Hall, Dorothy H., et. al. 1982. *Landslide Overview Map of the Conterminous United States.* Washington: United States Government Printing Office.

Radeloff, C, D Helmers, H Kramer, M Mockrin, P Alexandre , A Bar-Massada, and T Hawbaker. 2020. *WUI Change 1990-2020.* https://silvis.forest.wisc.edu/data/wui-change/.

Radeloff, Volker, David Helmers, H Kramer, and Susan Stewart . 2018. *Rapid growth of the US wildland-urban interface raises wildfire risk.* March 12. Accessed October 9, 2023. https://www.pnas.org/doi/10.1073/pnas.1718850115.

RGRTA. 2020. *2020-23 Comprehensive Strategic Plan.* https://www.myrts.com/Portals/0/RGRTA_2020%20Comp%20Plan_FINAL.pdf.

Rokaya, P. 2018. *Trends in the Timing and Magnitude of Ice-Jam Floods in Canada.* https://www.nature.com/articles/s41598-018-24057-z.

Seneca Nation of Indians . n.d. *About The Seneca Nation .* Accessed 2024. https://sni.org/about/.

Sesana, Elena, Alexandre S. Gagnon, Chiara Ciantelli, JoAnn Cassar, and John J. Hughes. 2021. "Climate change impacts on cultural heritage: A literature review." *WIREs Climate Change*, March 15: 1-29. https://wires.onlinelibrary.wiley.com/doi/epdf/10.1002/wcc.710.

Southern Tier Extension Railroad Authority. n.d. *Southern Tier Extension Railroad Authority (STERA).* Accessed August 2023. https://www.ccasstera.org/.

Stanford University. 2023. *NPDP Dam Incident Database.* April 12. Accessed July 24, 2024. https://npdp.stanford.edu/dam_incidents.

Steere, Allen, Jenifer Coburn, and Lisa Glickstein. 2004. "The emergence of Lyme disease." *The Journal of Clinical Investigation* 1093-1011.

Stevens & Lamie. 2024. *New York State Climate Impacts Assessment: Understanding and preparing for our changing climate.* February. Accessed May 16, 2024. https://nysclimateimpacts.org/explore-by-region/the-central-finger-lakes/.

Stewart, S, V Radeloff , R Hammer, and T Hawbaker. 2006. "Defining the Wildland-Urban Interface." *SILVIS Lab.* https://silvis.forest.wisc.edu/wp-content/uploads/sites/379/2018/10/Stewart-et-al-JOF-2007.pdf.

Strully, Kate, and Tse-Chuan Yang. 2022. "County Social Vulnerability and Influenza Vaccine Rates: National and Local Estimates for Medicare Recipients." *American Journal of Preventative Medicine* 62 (1). doi:DOI: 10.1016/j.amepre.2021.06.015.

Tiwari, A., and J.W. Rachlin. 2018. "A Review of Road Salt Ecological Impacts." *Northeastern Naturalist* 123-142. https://www.jstor.org/stable/26453969.

Towers, S., G. Chowell , R Hameed, M Jastrebski, M Khan, J Meeks, A Mubayi, and G Harris. 2013. "Climate Change and Influenza: the likelihood of early and severe influenza seasons following warmer than average winters." *National Library of Medicine.*

U.S. Climate Data. 2023. *Climate Salamanca.* Accessed August 2023. https://www.usclimatedata.com/climate/salamanca/new-york/united-states/usny3088.

U.S. Department of Commerce; NOAA; NWS. 1994. *Thunderstorms and Lightning: a preparedness guide.* January. https://www.weather.gov/media/grr/brochures/nwsthunderstorms&lightning.pdf#:~:text=Of%20the%20estimated%20100%2C000%20thunderstorms%20that%20occur%20each,diameter%2C%20wind%2058%20mph%20or%20higher%2C%20or%20tornadoes.

U.S. Forest Service. 2020. "Effects of Fire on grassland soils and water." June 2. Accessed January 2023. https://www.fs.usda.gov/rmrs/science-spotlights/effects-fire-grassland-soils-and-water#:~:text=Since%20grassland%20fires%20often%20move,fires%20in%20forests%20and%20woodlands.

United For ALICE. 2024. *About Us.* https://www.unitedforalice.org/meet-alice.

United State Geological Survey. 2020. *Drought, FIre and Extreme Weather.* https://www.usgs.gov/ecosystems/climate-adaptation-science-centers/science/drought-fire-and-extreme-weather.

United States Climate Resilience Toolkit. 2016. *Changing Ecosystems and Infectious Diseases.* November 16. Accessed August 27, 2023. https://toolkit.climate.gov/topics/human-health/altered-risk-infectious-diseases.

United States Environmental Protection Agency. 2023. *Climate Change Indicators: Weather and Climate.* July 26. Accessed August 27, 2023. https://www.epa.gov/climate-indicators/weather-climate.

US Census. 2020. *Explore Data.* Accessed 2021. https://www.census.gov/.

US DOI. n.d. "NCH in Action." US Department of the Interior. https://www.doi.gov/protectNCH/about-NCH/nch-in-action.

US DOT. n.d. *Bureau of Transportation Statistics.* https://www.transtats.bts.gov/airports.asp?pn=1&Airport=BUF&Airport_Name=Buffalo,%20NY:%20Buffalo%20Niagara%20International&carrier=FACTS.

US EPA. 2020. "Climate Change Indicators in the United States." Washington DC.

USA, Data. 2022. "Cattaraugus County, NY." Accessed 2024. https://datausa.io/profile/geo/cattaraugus-county-ny/.

USACE. 2021. June 22. https://www.lrb.usace.army.mil/Media/News-Releases/Article/2666429/us-army-corps-of-engineers-completes-rochester-harbor-east-pier-repairs/.

—. n.d. *About Us.* Accessed May 10, 2023. https://www.usace.army.mil/About/.

USACE Buffalo District. n.d. *New York District Boundaries.* U.S. Army Corps of Engineers Buffalo District. Accessed December 2023. https://www.lrb.usace.army.mil/Missions/Regulatory/New-York-Permit-Information/.

USACE. 2022. *Ice Jam Database.* August. Accessed August 2022. https://icejam.sec.usace.army.mil/ords/f?p=101:7::::::.

—. n.d. *National Inventory of Dams.* Accessed August 29, 2022. https://nid.sec.usace.army.mil/#/dams/search/sy=@countyState:Monroe,%20New%20York&viewType=map&resultsType=dams&advanced=false&hideList=false&eventSystem=false.

—. n.d. *National Levee Database.* Accessed August 2022. https://levees.sec.usace.army.mil/#/.

—. 2021. *Summary of the 2021 Nationwide Permits.* U.S. Army Corps of Engineers. December 28. Accessed October 2024. https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/19757.

—. n.d. *U.S. Army Corps of Engineers Engineering and Design Dam Safety Assurance Program, ER 1110-2-1155, Appendix E.* https://www.law.cornell.edu/cfr/text/7/appendix-A_to_subpart_E_of_part_1724.

—. 2014. "USACE." *Engineering and Design Safety of Dams.* Accessed 2023. https://www.publications.usace.army.mil/Portals/76/Users/182/86/2486/ER_1110-2-1156.pdf?ver=2020-01-29-103920-173.

—. 2021. *USACE LEVEE SAFETY PROGRAM.* April 22. Accessed May 07, 2023. https://www.publications.usace.army.mil/Portals/76/Users/182/86/2486/EC%201165-2-218.pdf?ver=Gm_2vTnybm3P4xgmb5vUbw%3d%3d.

USDA. 2022. *2022 Census of Agriculture County Profile.* Accessed July 9, 2024. https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/New_York/cp36099.pdf.

—. 2022. *2022 Census of Agriculture, Cattaraugus County, New York.* https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/New_York/cp36009.pdf.

—. 2024. *Disaster Designation Information.* Accessed mAY 3, 2024. https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster-designation-information/index.

—. 2012a. "Effects of Climatic Variability and Change on Forest Ecosystems: A Comprehensive Sceince Synthesis for the U.S. Forest Sector." December. http://www.usda.gov/oce/climate_change/effects_2012/FS_Climate1114%20opt.pdf.

—. n.d. "Fire Effects on the Environment." Accessed 2022. https://www.fs.usda.gov/pnw/page/fire-effects-environment.

—. n.d. *U.S. Department of Agriculture.* Accessed 2024. https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster-designation-information/index.

USGS. 2020. *Ground Failure.* https://earthquake.usgs.gov/data/ground-failure/.

—. 2018. *High-Water Marks and Flooding.* June 6. https://www.usgs.gov/special-topics/water-science-school/science/high-water-marks-and-flooding.

—. n.d. *Landslide Hazard Program.* https://www.usgs.gov/programs/landslide-hazards.

—. 2016. *Socioeconomic and Environmental Impacts of Landslides in the Western Hemisphere.* Accessed September 2023. https://pubs.usgs.gov/of/2001/ofr-01-0276/.

—. 2022. *The wildland-urban interface in the United States based on 125 million building locations.* March 27. https://www.usgs.gov/publications/wildland-urban-interface-united-states-based-125-million-building-locations#:~:text=Our%20building-based%20WUI%20maps%20identified%205.6%25%20%E2%80%93%2018.8%25,increasing%20WUI%20area%20but%20excluding%20isolated%20buil.

—. 2023. *USGS Current Water Data for New Jersey.* May 15. https://waterdata.usgs.gov/nj/nwis/rt.

—. 2018. *Water Quality after a Wildfire.* https://ca.water.usgs.gov/wildfires/wildfires-water-quality.html.

—. 2023. *What are landslides & how can they affect me?* October 23. Accessed May 23, 2024. https://www.usgs.gov/programs/landslide-hazards/what-a-landslide.

—. n.d. *What is a landslide and what causes one?* Accessed 2024. https://www.usgs.gov/faqs/what-a-landslide-and-what-causes-one.

—. 2023. *Wildfire Fire Potential Index (WFPI).* https://www.usgs.gov/fire-danger-forecast/wildland-fire-potential-index-wfpi.

USSD. 2023. United States Society on Dams. Accessed 2023. https://www.ussdams.org/glossary_definition/dam-failure/.

WFAS. 2023. *National Fuel Moisture Database.* August 2. https://www.wfas.net/index.php.

WHO. 2022. *Coronavirus Disease (COVID-19).* https://www.who.int/health-topics/coronavirus#tab=tab_1.

WHO. 2009. *Pandemic Influenza Preparedness and Response.* Geneva: World Health Organization.

ABBREVIATIONS

%	Percent
ACS	American Community Survey
AFPP	Agricultural and Farmland Protection Plan
ALICE	Asset, Limited, Income, Constrained, Employed
APA	Approval Pending Adoption
BCA	Benefit Cost Analysis
BFE	Base Flood Elevation
BIPOC	Black, Indigenous, and People of Color
BLS	Bureau of Labor Statistics
BOH	Board of Health
BRMC	Bradford Regional Medical Center
C	City
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
CCHD	Cattaraugus County Health Department
CDBG	Community Development Block Grant
CDBG-DR	Community Development Block Grant Disaster Recovery
CDC	Centers for Disease Control
CEDAR	Code Enforcement Disaster Assistance Response
CEMP	Comprehensive Emergency Management Program
CFR	Code of Federal Regulations
CHA-CHIP	Community Health Assessment and Community Health Improvement Plan

CHHA	Certified Home Health Agency
CMP	Coastal Management Program
Co.	County
COAD	Community Organizations Active in Disaster
COVID	Corona Virus Disease
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
CSP	Community Service Plan
CWSRF	Clean Water State Revolving Fund
DBSC	Division of Building Standards and Codes
DEM	Digital Elevation Model
DFIRM	Digital Flood Insurance Rate Map
DI	Damage Indicators
DMA 2000	Disaster Mitigation Act of 2000
DOD	Degree of Damage
DPW	Department of Public Works
DR	Major Disaster Declaration (FEMA)
EAP	Emergency Action Plan
ECL	Environmental Conservation Law
EF	Enhanced Fujita Scale
EFC	Environmental Facilities Corporation

EM	Emergency Declaration (FEMA)
EMPG	Emergency Management Program Grant
EMS	Emergency Medical Services
EOC	Emergency Operation Center
EPA	Environmental Protection Agency
EPF	Environmental Protection Fund
ERAP	Emergency Rental Assistance Program
ES	Executive Summary
ESCO	Energy Service Company
ESF	Emergency Support Function
ESRI	Environmental Systems Research Institute
EWP	Emergency Watershed Protection
FAST	Fixing America’s Surface Transportation
FDRA	Fire Danger Rating Areas
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FIA	Flood Insurance Administration
FIS	Flood Insurance Study
FM	Fuel Moisture
FMA	Flood Mitigation Assistance
FPI	Fire Potential index
FTA	Federal Transit Administration
FY	Fiscal Year

GIS	Geographic Information System
HAZMAT	Hazardous Materials
HAZUS	Hazards U.S.
HAZUS-MH	Hazards U.S. Multi-Hazard
HEAP	Home Energy Assistance Program
HHPD	High Hazard Potential Dams
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HSGP	Homeland Security Grant Program
HUD	U.S. Department of Housing and Urban Development
HVAC	Heating, Ventilation, and Air Conditioning
IA	Individual Assistance
ICS	National Incident Command System
IT	Information Technology
KBDI	Keetch-Bryam Drought Index
LOP	Letter of Permission
LWCF	Land and Water Conservation Fund
LWDA	Local Workforce Development Areas
LWRP	Local Waterfront Revitalization Program
MERS	Middle East Respiratory Syndrome
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
NDSP	National Dam Safety Program
NEP	National Estuary Program
NFDRS	National Fire Danger Rating System
NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NIFC	National Interagency Fire Center
NGO	Non-Governmental Organization
NHC	National Hurricane Center
NID	National Inventory of Dams
NIDIS	National Integrated Drought Information System
NIMS	National Incident Management System
NLCD	National Land Cover Database
NLD	National Levee Database
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
NRDC	Natural Resources Defense Council

NSIDC	National Snow and Ice Data Center
NSSL	National Severe Storms Library
NWIS	National Water Information System
NWP	Nationwide Permit
NWS	National Weather Service
NY	New York
NYC	New York City
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 GIS	New York State Geographic Information System
New York State HMP	New York State Hazard Mitigation Plan
NYSDEC	New York State Department of Environmental Conservation
NYS DHSES	New York State Division of Homeland Security and Emergency Services
NYSDOH	New York State Department of Health
NYSDOS	New York State Department of State
NYSDOT	New York State Department of Transportation
NYSEG	New York State Electric and Gas
NYSESD	New York State Empire State Development
NYSERDA	New York State Energy Research and Development Authority
NYSOGS	New York State Office of General Services
NYSOIT	New York State Office of Information Technology Services
NYSPSC	New York State Public Service Commission
OATS	Olean Area Transportation System

OEM	Office of Emergency Management
OES	Office of Emergency Services
OFPC	Office of Fire Prevention and Control
OGH	Olean General Hospital
OPRHP	Office of Parks, Recreation and Historic Preservation
OSHA	Occupational Safety and Health Administration
PA	Pennsylvania
PA	Public Assistance
PDM	Pre-Disaster Mitigation Program
POI	Point of Interest
PPD-8	Presidential Policy Directive 8
PSAF	Pandemic Severity Assessment Framework
PSI	Pandemic Severity Index
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
SARS	Severe Acute Respiratory Syndrome
SBA	Small Business Administration
SFHA	Special Flood Hazard Area
SFRMG	State Flood Risk Management Guidance

SHMO	State Hazard Mitigation Officer
SHSP	State Homeland Security Program
SILVIS	Spatial Analysis for Conservation and Sustainability
SPC	Storm Prediction Center
SRL	Severe Repetitive Loss
SSBG	Social Services Block Grant
STERA	Southern Tier Extension Railroad Authority
STS	Cattaraugus County Transit System
SVI	Social Vulnerability Index
SWMP	Stormwater Management Program
SWOO	Strengths, Weaknesses, Obstacles and Opportunities
SWOT	Strengths, Weaknesses, Opportunities, and Threats
SWPPP	Stormwater Pollution Prevention Plan
T	Town
TBD	To Be Determined
THIRA	Threat Hazard Identification and Risk Assessment
US	United States
USACE	United States Army Corps of Engineers
UASI	Urban Areas Security Initiative
USBR	United States Bureau of Reclamation
U.S.C.	United States Code
USDA	United States Department of Agriculture
USDHS	United States Department of Homeland Security
USDOT	United States Department of Transportation
USEDA	United States Economic Development Administration

USFS	United States Forest Service
USGS	United States Geological Survey
USSD	United States Society on Dams
V	Village
WCT	Wind Chill Index
WFAS	Wildland Fire Assessment System
WFO	Weather Forecast Office
WFPI	Wildfire Fire Potential Inde
WHO	World Health Organization
WIC	Women, Infants, and Children
WIN	Western New York Incubator Network
WQIP	Water Quality Improvement Project
WNV	West Nile Virus
WUI	Wildland/Urban Interface
WYTS	Wyoming Transit Service