EE-003867-0002-01

Chautauqua County
Multi-Jurisdictional Hazard Mitigation Plan

Photo credit: Chautauqua County Department of Planning and Economic Development

Prepared for:

Chautauqua County
Mitigation Planning Committee

Prepared by:

ecology and environment, inc.
Global Environmental Specialists

Chautauqua County, New York

MULTI-JURISDICTIONAL

HAZARD MITIGATION PLAN

Updated September 2015

Prepared for:

Chautauqua County
Office of Emergency Services
2 Academy Street, Suite A, Room 106
Mayville, New York, 14757

Prepared with the Support of:

ecology and environment, inc.
Global Environmental Specialists

THIS PAGE LEFT BLANK INTENTIONALLY

EXECUTIVE SUMMARY

The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. Chautauqua County and participating jurisdictions developed this multi-hazard mitigation plan to reduce future losses to the County and its communities resulting from all hazards. The plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 and to achieve eligibility for the Federal Emergency Management Agency (FEMA) Flood Mitigation Assistance, Pre-Disaster Mitigation, Repetitive Flood Loss Program, Severely Flood Loss Program and Hazard Mitigation Grant Programs.

The Chautauqua County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan first finalized in 2006. This 2015 update covers the following local governments that participated in the planning process.

- Chautauqua County
- City of Dunkirk
- City of Jamestown
- Town of Arkwright
- Town of Busti
- Town of Carroll
- Town of Charlotte
- Town of Chautauqua
- Town of Cherry Creek
- Town of Clymer
- Town of Dunkirk
- Town of Ellery
- Town of Ellicott
- Town of Ellington
- Village of Forestville
- Town of French Creek
- Town of Gerry
- Town of Hanover
- Town of Harmony
- Town of Kiantone
- Town of Mina
- Town of North Harmony
- Town of Poland
- Town of Pomfret
- Town of Portland
- Town of Ripley
- Town of Sheridan
- Town of Sherman
- Town of Stockton
- Town of Villenova
- Town of Westfield
- Village of Bemus Point
- Village of Brocton
- Village of Cassadaga
- Village of Celoron
- Village of Cherry Creek
- Village of Falconer
- Village of Fredonia
- Village of Lakewood
- Village of Mayville
- Village of Panama
- Village of Sherman
- Village of Silver Creek
- Village of Sinclairville
- Village of Westfield

The County's planning process followed a methodology prescribed by FEMA, which began with the formation of a Hazard Mitigation Planning Team (HMPT) comprised of key stakeholders from Chautauqua County and participating jurisdictions. State agency representatives from the New York Office of Emergency Management also attended the planning meetings. Please see Appendix B for a complete list of invited agencies/organizations. The HMPT conducted a risk assessment that identified and profiled hazards that pose a risk to Chautauqua County, assessed the County's vulnerability to these hazards, and examined the capabilities in place to mitigate them. The County is vulnerable to several hazards that are identified, profiled, and analyzed in this plan. Floods have the most significant impact on the County with related hazards such as severe storms and nor'easters also having impacts.

Based upon the risk assessment, the HMPT identified goals for reducing risk from hazards. The goals of this multi-hazard mitigation plan are to:

1. Create a disaster resistant community by involving individuals in the private and public sector in hazard mitigation planning and training activities geared toward reducing the impact of disasters in Chautauqua County.
2. Minimize the vulnerability of the people, property, environment, and economy of Chautauqua County to the impacts of all hazards.
3. Strengthen bi-directional communication among agencies and between agencies and the public.
4. Improve public understanding of hazards and risk by providing public awareness, preparedness, and mitigation information through various channels of communication.
5. Protect critical facilities and infrastructure from all hazards.

To meet the identified goals, the plan recommends the mitigation actions detailed in Chapter 5. The HMPT developed an implementation plan for each action, which identifies priority level, background information and ideas for implementation, responsible agency, timeline, cost estimate, potential funding sources, and more. These additional details are also provided in Chapter 5.

The multi-hazard mitigation plan will be formally adopted by the governing bodies of each participating jurisdiction and will be updated within a five-year timeframe.

ACKNOWLEDGMENTS

This Multi-Jurisdictional Hazard Mitigation Plan, its revision, and improvement, is an ongoing effort of the Chautauqua County Local Emergency Planning Committee. The County's hazardous mitigation planning program involves this plan and other related information and procedures.

Preparation of this document, and its continued improvement, requires participation and support from many individuals, jurisdictions, agencies, organizations, and businesses. Municipalities, emergency response agencies, County departments, other agencies, employees, and volunteers deserve recognition for their efforts to continue to improve and develop the Plan. The help of all participants is greatly appreciated.

Copies of this plan are available from the Chautauqua County Office of Emergency Services, 2 Academy Street, Suite A, Mayville, New York 14757.

The revision of this Multi-Jurisdictional Hazard Mitigation Plan was prepared under contract by Ecology and Environment, Inc.

THIS PAGE LEFT BLANK INTENTIONALLY

PLAN ADOPTION RECORD

Note to Reviewers: When this plan has been reviewed and approved pending adoption by FEMA Region II the adoption resolutions will be signed by the participating jurisdictions and added to the Appendix A. A model resolution is provided. The following jurisdictions participated in the development of this plan and have adopted the multi-jurisdictional plan. Resolutions of Adoptions are included in Appendix A.

Plan Adoption Record

Jurisdiction	Plan Adopted?	Date of Adoption	Date of Expiration
Chautauqua County			
City of Dunkirk			
City of Jamestown			
Town of Arkwright			
Town of Busti			
Town of Carroll			
Town of Charlotte			
Town of Chautauqua			
Town of Cherry Creek			
Town of Clymer			
Town of Dunkirk			
Town of Ellery			
Town of Ellicott			
Town of Ellington			
Village of Forestville			
Town of French Creek			
Town of Gerry			
Town of Hanover			
Town of Harmony			
Town of Kiantone			
Town of Mina			

Plan Adoption Record			
Jurisdiction	**Plan Adopted?**	**Date of Adoption**	**Date of Expiration**
Town of North Harmony			
Town of Poland			
Town of Pomfret			
Town of Portland			
Town of Ripley			
Town of Sheridan			
Town of Sherman			
Town of Stockton			
Town of Villenova			
Town of Westfield			
Village of Bemus Point			
Village of Brocton			
Village of Cassadaga			
Village of Celoron			
Village of Cherry Creek			
Village of Falconer			
Village of Fredonia			
Village of Lakewood			
Village of Mayville			
Village of Panama			
Village of Sherman			
Village of Silver Creek			
Village of Sinclairville			
Village of Westfield			

MODEL RESOLUTION

RESOLUTION NO. XXXX-XX

A RESOLUTION OF THE Governing Body OF THE Jurisdiction Name AUTHORIZING THE ADOPTION OF THE CHAUTAUQUA COUNTY MULTI-JURISDICTIONAL ALL-HAZARD MITIGATION PLAN

WHEREAS, all of Chautauqua County has exposure to natural hazards that increase the risk to life, property, environment and the County's economy; and

WHEREAS; pro-active mitigation of known hazards before a disaster event can reduce or eliminate long-term risk to life and property; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390) established new requirements for pre and post disaster hazard mitigation programs; and

WHEREAS; a coalition of Chautauqua County municipalities with like planning objectives has been formed to pool resources and create consistent mitigation strategies within Chautauqua County; and

WHEREAS, the coalition has completed a planning process that engages the public, assesses the risk and vulnerability to the impacts of natural hazards, develops a mitigation strategy consistent with a set of uniform goals and objectives, and creates a plan for implementing, evaluating and revising this strategy;

NOW, THEREFORE, BE IT RESOLVED that the **jurisdiction name**:

1) Adopts in its entirety, the Chautauqua County Multi-Jurisdictional All-Hazard Mitigation Plan (the "Plan") as the jurisdiction's Natural Hazard Mitigation Plan, and resolves to execute the actions identified in the Plan that pertain to this jurisdiction.
2) Will use the adopted and approved portions of the Plan to guide pre- and post-disaster mitigation of the hazards identified.
3) Will coordinate the strategies identified in the Plan with other planning programs and mechanisms under its jurisdictional authority.
4) Will continue its support of the Mitigation Planning Committee as described within the Plan.
5) Will help to promote and support the mitigation successes of all participants in this Plan.
6) Will incorporate mitigation planning as an integral component of government and partner operations.
7) Will provide an update of the Plan in conjunction with the County no less than every five years.

PASSED AND ADOPTED on this Xst, Xnd, Xrd, Xth day of month, 2014, by the following vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

Mayor of _____
ATTEST: _____
Clerk of _____

THIS PAGE LEFT BLANK INTENTIONALLY

TABLE OF CONTENTS

LIST OF ACRONYMS

FEMA	Federal Emergency Management Agency
NYSOEM	New York State Office of Emergency Management
DMA	Disaster Mitigation Act
CFR	Code of Federal Regulations
HMGP	Hazard Mitigation Grant Program
HAZUS-MH	Hazards U.S.-Multi-Hazard
NOAA	National Oceanic and Atmospheric Administration
HMPT	Hazard Mitigation Planning Team
HIRA-NY	New York State Hazard Identification and Risk Assessment
USDA	United States Department of Agriculture
SBA	Small Business Administration
NFIP	National Flood Insurance Program
FIRM	Flood Insurance Rate Maps
EF	Enhanced Fujita
NYSDEC	New York State Department of Environmental Conservation
OSHA	Occupational Safety and Health Administration
VOC	Volatile organic chemicals
CRS	Community Rating System
SRL	Severe Repetitive Loss
NYSDOT	New York State Department of Transportation
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, and Environmental
CCEMO	Chautauqua County Emergency Management Office
EMS	Emergency Medical Service

CDBG	Community development block grants
PDM	Pre-Disaster Mitigation Grant Program
HMT	Hazard Mitigation Team
HMPC	Hazard Mitigation Planning Committee
CCHPT	Chautauqua County Hazard Mitigation Planning Team
HAZNY	Hazards New York
MAP	Mapping, Assessment and Planning
HMA	Hazard Mitigation Assistance
NWS	National Weather Service

1. INTRODUCTION AND PLANNING PROCESS

Chapter 1 describes the authorities and principles that provide the basis for Chautauqua County's mitigation program and the planning process the county conducted to ensure that the mitigation strategy was informed by input from key county departments, jurisdictional and community partners, and the public.

1.1 Introduction

The Chautauqua County Hazard Mitigation Plan (Mitigation Plan) is the guiding document for the county's hazard mitigation program. The Mitigation Plan and subsequent updates identify the natural hazards that could put the county at risk and detail a comprehensive strategy for minimizing potential losses and maximizing opportunity to increase the community's resiliency. This update to the plan has been prepared in accordance with Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, and was the result of an engaged, multi-jurisdictional planning process. Mitigation planning provides local jurisdictions the opportunity to think through future disaster scenarios and plan for mitigating the resulting shocks and stresses. Chautauqua County, understanding the importance of disaster planning and funding, proactively initiated this process to update the county's hazard mitigation plan. As per federal mandates, this plan is an update to the previous plan approved on June 28, 2007.

1.2 Purpose and Objectives

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property posed by hazards (44 Code of Federal Regulations [CFR] §201.2). Hazard mitigation activities may be implemented prior to, during, or after an event. Mitigation planning is important to the county because it encourages communities to become more flexible and adapt to change more readily. Key objectives of mitigation planning are to

- Guide mitigation activities in a coordinated and economic manner,
- Integrate mitigation into existing community plans/programs,
- Consider future growth and development trends, and
- Make a community more disaster-resilient.

Chautauqua County and 44 other jurisdictions prepared this Mitigation Plan to guide hazard mitigation planning to better protect the county's people, environment, and economy from the impacts of hazard events. This plan demonstrates the communities' collective commitment to reduce vulnerability to hazards and increase community resiliency.

1.3 Authority

Supported by a grant provided by the Federal Emergency Management Agency (FEMA) and administered by the New York State Office of Emergency Management (NYSOEM), this plan was prepared in compliance with the Disaster Mitigation Act of 2000 (DMA 2000). DMA 2000

was signed into law on October 30, 2001, to amend the Robert T. Stafford Act of 1988 (Stafford Act). Section 322 of DMA 2000 requires that states and communities have a FEMA-approved mitigation plan in place in order to receive Hazard Mitigation Grant Program (HMGP) funding. The Interim Final Rule, prepared by FEMA in order to implement DMA 2000, establishes planning and funding criteria for states and local governments.

1.3.1 Federal Mitigation Planning Requirements

The planning process requirements mandated by FEMA (outlined in 44 CFR §201.6) include the following activities:

- Document the planning process.
- Provide stakeholders with an opportunity to participate.
- Conduct and document public involvement.
- Incorporate existing plans and reports.
- Discuss continued public participation and plan maintenance.
- Provide a method for monitoring, evaluating, and updating the hazard mitigation plan.

Tornado Damage to Buildings in Chautauqua County

Once complete, the hazard mitigation plan must be submitted to FEMA for approval. FEMA's approval of a hazard mitigation plan is a prerequisite for federal Hazard Mitigation Assistance grant program eligibility (outlined in 42 CFR §5165(a)).

See Appendix F for a completed FEMA Local Mitigation Plan Review Tool.

1.3.2 New York State Hazard Mitigation Plan

The mitigation goals and strategies of this plan are consistent with the mitigation goals of the New York State Hazard Mitigation Plan. Both plans are designed to prepare jurisdictions against disasters that may affect them. Additionally, both plans are designed to be forward-looking so as to incorporate the potential mid to long term effects of climate change.

1.4 Planning Process

This section documents how the planning process was conducted including how the plan was prepared and who was involved in the process.

1.4.1 Planning Area

The planning area refers to the geographic area covered by the plan (FEMA Local Mitigation Planning Handbook 2013). This Mitigation Plan is a multi-jurisdictional plan that geographically covers all of Chautauqua County's jurisdictional boundaries. The county and 44 municipalities participated in the planning process (see Table 1-1). Information in this plan will be used to guide and coordinate mitigation activities and decisions for local land use policy in the future. The Chautauqua County planning area has been affected by hazards in the past and the participating jurisdictions are therefore committed to reducing future impacts from hazard events and becoming eligible for mitigation-related federal funding.

See Chapter 2, Figure 2-1, for a map of the planning area. Maps of individual municipalities are provided in their respective sections in Appendix A.

1.4.2 Data Collection

To ensure that the Mitigation Plan incorporated the most relevant and accurate information, the planning team used a combination of local information supplemented by nationally available data sources. For earthquake, flood, and hurricane hazard data, FEMA's HAZUS-MH software was used to provide loss and risk estimates within each jurisdiction. This commonly used FEMA software uses nationally applicable standardized methodologies for estimating the potential losses from these hazards.

See Chapter 4 for a more detailed description of the HAZUS process. The results of this analysis are available in Appendix C.

For other hazards assessed in this plan, the planning team communicated directly with local communities to identify their critically at-risk areas and potential loss values. Representatives of local jurisdictions completed worksheets based on FEMA's Mitigation Planning How-To Guide # 2 (FEMA 386-2), resulting in the development of the community profiles in Appendix A.

1.4.3 Hazard Mitigation Planning Team and Advisory Group

In January 2013, Chautauqua County Emergency Services established a Hazard Mitigation Planning Team (HMPT) to facilitate the mitigation planning effort. The HMPT's role was to:

- Identify the data requirements and provide the documentation necessary to augment that data.
- Assist in facilitating the public input process.
- Review the draft and final plan documents.

- Coordinate with NYSOEM and FEMA Region II plan reviewers.

The HMPT comprised representatives from the 45 jurisdictions within Chautauqua County and was led by an Advisory Committee. The Advisory Committee consisted of Chautauqua County Emergency Services representatives working with Ecology and Environment (E & E). The Advisory Committee's role was to:

- Oversee the plan development process.
- Facilitate HMPT meetings.
- Obtain hard-to-locate information.
- Facilitate public, private sector, and not-for-profit outreach.
- Support county level information gathering.
- Gather and incorporate comment.
- Write the Mitigation Plan.

After finalization of the Mitigation Plan, implementation and ongoing maintenance will become a function of the HMPT. The HMPT will review the plan and accept public comment as part of an annual review and as part of the five-year mitigation plan update cycle.

Contract support for the mitigation planning effort was provided E & E.

See Appendix B for a list of HMPT and Advisory Group members.

1.4.4 HMPT Meetings

In May 2013 the first of two full-day HMPT meetings were held at the Chautauqua County Emergency Services offices. The members of the HMPT were invited to discuss planning activities and the purpose of the plan and generally to better understand the Mitigation Plan update process. During this meeting HMPT members were introduced to the planning and public participation processes and performed a hazard identification and prioritization exercise. Members also discussed the data collection process and how each identified hazard would be profiled. This included the provision of jurisdiction specific data and information, including but not limited to, the location, nature,

Planning Discussions

value, and risk for critical infrastructure. To help with this discussion, members filled out the FEMA Hazard Mitigation Planning Worksheet.

In October 2013, the second full-day HMPT meeting was held. This meeting focused on the review of data collected and the results of the HAZUS analysis conducted. That information, discussed in the morning, then informed and framed the identification of mitigation goals and objectives for each participating jurisdiction.

In addition to these meetings, a series of municipal data collection calls were held and communication was maintained with HMPT members through electronic mail (email), via the project portal web site, and by phone. The HMPT representative from each jurisdiction was also called during the data collection process to assist with completing the data collection worksheets.

During the planning process, the Advisory Committee also met regularly through weekly conference calls to discuss ongoing issues in data collection and the planning process. Figure 1-3 provides a graphic illustration of the HMPT process.

02:1003228\Project Schedule.ai

TASK	May	Jun	Jul	Aug	Sept	Oct	Nov
HMPT Meeting 1	★						
HMPT Meeting 2						★	
Plan Made Available to Public							
Weekly Conference Calls		→	→	→	→	→	→
Municipal Data Collection Calls		→	→	→	→	→	→

Figure 1-3 Project Meeting Schedule

Appendix B provides details of participation including meeting attendance, provision of data for the risk assessment, and identification of mitigation actions. All participating jurisdictions assisted in providing information to local officials, the public, and other interested parties.

See Appendix B for sign-in sheets and other supporting documentation and Appendix E for officially adopted resolution.

1.4.5 Public Involvement

A critical component of the update effort is a robust stakeholder engagement process that provides "an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval" (44 CFR §201.6).

Public input was solicited from September to November 2013, providing an opportunity for local residents, agencies, and neighboring communities to participate in the planning. A notice announcing each HMPT meeting, period for comment, and pertinent information about the survey were mailed to each of the local jurisdictions. The county posted a Hazard Mitigation Survey on its website to gauge the concerns of county residents and a portal web site was hosted to help circulate material and obtain comments.

Examples of meeting notices sent to each jurisdiction can be found in Appendix B.

Based on initial public input, a draft plan was made available for four weeks on the Chautauqua portal website (http://planningportal.ene.com/Document/Default.aspx) along with instructions on how to submit comments. All comments were incorporated into the Chautauqua County Hazard Mitigation Plan.

The draft plan was also presented to local municipalities and emergency managers in neighboring Erie and Cattaraugus counties in New York and adjacent Erie and Warren counties in Pennsylvania. In addition it was presented to other agencies within Chautauqua County. Comments received from local municipalities and agencies were incorporated, as appropriate.

In 2015, significant revisions were made to the plan based on comments received from the state and FEMA. The plan was re-posted on the County's website from [INSERT DATES]. The County issued a press release and sent e-mail notifications to key stakeholders to ensure awareness of the opportunity to comment on the updated plan. These materials are provided in Appendix B.

1.4.6 Coordination with Other Planning Efforts

For hazard mitigation planning to be successful, it must take into account other plans and programs that may have an effect on hazard identification and implementation of mitigation measures. The following plans and programs were reviewed and incorporated as appropriate during the development of this planning effort:

- FEMA's Disaster Declaration Archives
- NOAA National Environmental Satellite, Data, and Information Service, National Climactic Data Center's Storm Event Database
- Disaster Mitigation Act of 2000
- Stafford Act
- New York State Hazard Mitigation Plan
- Chautauqua County Planning Department
- Chautauqua County Comprehensive Emergency Management Plan
- Municipal Comprehensive Plans for All Chautauqua County Municipalities
- Flood Insurance Studies

The updated Mitigation Plan is an integral part of Chautauqua County's Comprehensive Emergency Management Plan. Any future master or land use planning will need to refer to and use this Mitigation Plan in order to ensure aligned goals. From these plans mitigation actions have been developed to help prevent or diminish the consequences of future disasters.

1.4.7 What's New in this Update?

This update of the Chautauqua County Multi-Jurisdictional Hazard Mitigation Plan includes the following major revisions to the 2007 plan:

- Hazard profiles and vulnerability have been updated based on recent hazard events.
- The plan has been updated to include a discussion of climate change.

Lake Chautauqua at Sunset. Credit to the Chautauqua County Planning and Economic Development

Table 1-1 Jurisdictional Participation

Jurisdiction	Meeting 1	Meeting 2	Data Collection Guide	Mitigation Actions
Chautauqua County	X	X	X	X
City of Dunkirk	X		X	X
City of Jamestown	X		X	X
Town of Arkwright	X		X	X
Town of Busti	X	X	X	X
Town of Carroll	X	X	X	X
Town of Charlotte	X		X	X
Town of Chautauqua	X	X		X
Town of Cherry Creek	X	X		X
Town of Clymer	X			X
Town of Dunkirk	X		X	X
Town of Ellery	X	X	X	X
Town of Ellicott	X	X	X	X
Town of Ellington	X	X	X	X
Town of French Creek	X	X	X	X
Town of Gerry		X	X	X
Town of Hanover	X		X	X
Town of Harmony		X	X	X
Town of Kiantone	X			X
Town of Mina	X		X	X
Town of North Harmony	X	X	X	X
Town of Poland	X	X	X	X
Town of Pomfret	X		X	X
Town of Portland	X		X	X
Town of Ripley	X	X	X	X
Town of Sheridan	X	X	X	X
Town of Sherman	X	X	X	X
Town of Stockton	X	X	X	X

Table 1-1 Jurisdictional Participation

Jurisdiction	Meeting 1	Meeting 2	Data Collection Guide	Mitigation Actions
Town of Villenova	X	X		X
Town of Westfield	X	X	X	X
Village of Bemus Point	X	X	X	X
Village of Brocton	X	X	X	X
Village of Cassadaga	X	X	X	X
Village of Celoron	X	X	X	X
Village of Cherry Creek	X	X	X	X
Village of Falconer	X	X	X	X
Village of Forestville				X
Village of Fredonia	X		X	
Village of Lakewood			X	X
Village of Mayville	X	X	X	X
Village of Panama	X		X	X
Village of Sherman			X	X
Village of Silver Creek	X	X	X	X
Village of Sinclairville	X		X	X
Village of Westfield	X	X	X	X

THIS PAGE LEFT BLANK INTENTIONALLY

2. COMMUNITY PROFILE

Chapter 2 provides a summary of the community profile for Chautauqua County. The county's mitigation strategy is designed to reflect the unique characteristics of the community.

A mitigation strategy should reflect the unique characteristics of a community, and while strategies to reduce vulnerability may be similar across jurisdictions, their implementation may be directly impacted by the geography, demographics, and culture of the community in question. Chautauqua County is a unique county with a diversity of municipalities and a distinct sense of place. This community profile provides the context for the mitigation strategy provided later in the Mitigation Plan.

Chautauqua County has long been closely tied to the city of Buffalo, New York. During the late 1800s and early 1900s Chautauqua County was booming. Many of the region's wealthy elite built estates in the county along the shore of Lake Erie. With the opening of the St. Lawrence Seaway and the move of many manufacturing jobs to China, the county saw a marked decline both in population and its economy. While manufacturing is still leaving the area, tourism and education have begun to grow again. The county today remains largely undeveloped, providing green, recreational, space for those from the more urban areas to the north.

2.1 Location and Geography

The county is located in the westernmost corner of New York and covers 1,060 square miles, or approximately 678,400 acres (U.S. Census Bureau 2010). There are 44 municipalities within the county. The county is in New York State's Western New York region, which is comprised of Erie, Monroe, Niagara, Ontario, Wayne, Cattaraugus, Livingston, Genesee, Allegany, Orleans, and Wyoming counties.

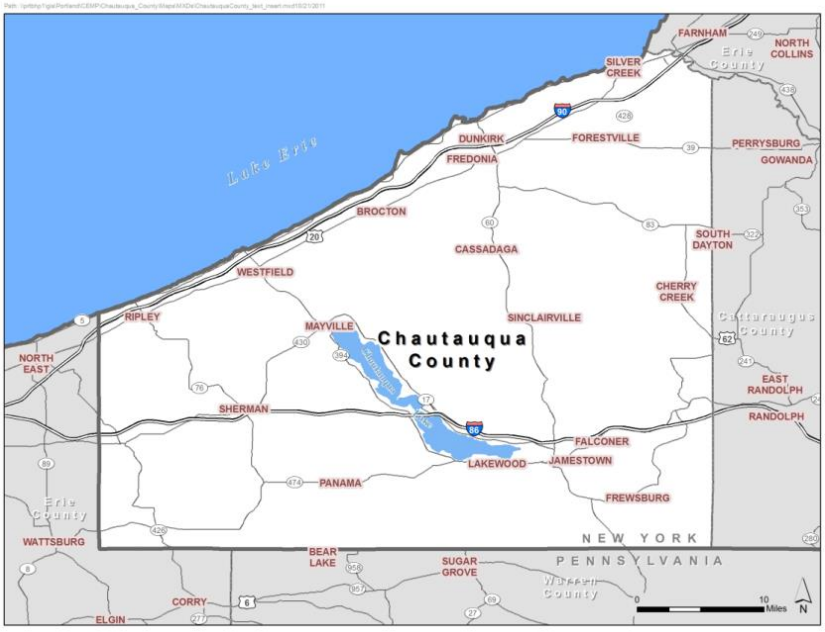


Figure 2-1 Map of Chautauqua County

Lake Erie forms a natural waterfront along the county's western edge. Pennsylvania borders the county along the south, and the eastern border is contiguous with Cattaraugus County, New York. Figure 2-1shows a map of Chautauqua County. The county's geography is primarily composed of rolling hills and valleys with elevations ranging anywhere between 1,100 and 2,100 feet. Starting from the Lake Erie waterfront and moving inland, the elevation gradually rises to the Allegheny Plateau, forming the Chautauqua Ridge, which drives local weather patterns and creates a unique microclimate for agriculture within the county (Chautauqua County 2011).

This ridge also creates a key watershed divide. Water to the south and east of the escarpment flows from tributaries Chadakoin Creek and Conewango Creek to the Allegheny River (Chautauqua County 2011). The Allegheny River flows into the Ohio River, eventually winding up in the Gulf of Mexico. To the north and west of the ridge, it flows into the Great Lakes.

2.2 Climate

The climate of Chautauqua County is generally characterized as a humid continental climate with seasonal temperatures. The county receives moisture-laden air from both the Great Lakes and the Atlantic Ocean, while warmer dryer air comes from the south. Storm systems generally move eastward across the state or travel northward along the Atlantic coast and have the potential to affect weather conditions in Chautauqua County. Prevailing winds generally move from west to east, with a southwest component during the summer and a northwest component during the colder months (NYS Climate Office Cornell n.d.).

Chautauqua Lake Credit to Chautauqua County Department of Planning and Economic Development

On average, the weather in Chautauqua ranges from lows of 15°F in January and February to highs of 80°F in July. The record low reached -30°F, while the highest recorded temperature was 100°F, indicating that the county can be prone to extreme weather (The Weather Channel 1995-2012). Extreme weather in the form of major precipitation events, and subzero temperatures has caused significant damage to infrastructure in the county.

2.3 Population Trends and Demographics

The population of Chautauqua County has been steadily decreasing over the last 40 years, which is consistent with trends in Western and Upstate New York (NYS Legislative Commission on Rural Resources 2008). In the 1970s the population peaked at 147,305 residents (Chautauqua County Department of Planning & Economic Development 2011). The most recent census, released in 2010, reported only 134,095 people resided in the county, almost a 9% decrease in total population (U.S. Census Bureau 2010). The city of Jamestown has the largest population, with approximately 31,146 people, followed by the town of Pomfret with 14,965 (U.S. Census Bureau 2010). Table 2-1 shows the population of each city and town in Chautauqua County.

The county's racial composition is primarily Caucasian (92.6%), 6.1% is Hispanic, and the balance of the population is African-American, American Indian, Asian, or a combination of more than one race (U.S. Census Bureau 2010).

The median age of Chautauqua's population is 40.9 years, higher than New York State's median age of 38. Within the county 5.6% of the population is under the age of five and 16.6% of the population is more than 65 years old. As a result of this aging population, the county will need to allocate resources to ensure the wellbeing of a larger, vulnerable population in the future. The 2010 Census also indicates that the county has a total of 54,220 households with an average of 2.37 people per household. According to the most recent American Housing Survey data, the county is estimated to contain 66,920 housing units, approximately 19% of which are vacant. The median home value within the county is $80,900, and the average household income was $51,360 within this five-year period (U.S. Census Bureau 2007-2011). This is lower than the New York State average of $58,003. Most of Chautauqua County's residents hold a high school degree (86.9 %) and 20.5% have attained a Bachelor's degree or higher (U.S. Census Bureau 2007-2011).

Detailed housing and income information for each municipality can be found in Appendix K

Chautauqua County Sheriff Cruiser

Low- income residents are often isolated during a disaster with no means of transportation and no place to go during an evacuation. These individuals will likely need alternative shelter provided by the county during an emergency. Based on

income and poverty data, Chautauqua County is one of the poorest counties in New York State. Over 9% of households in the County make less than $10,000 annually and 14.5% of residents live below the federal poverty level. Approximately 20% of children in the county currently live below the poverty line (Chautauqua County Community Health Assessment). This is by far the most affected age group. In the event of a disaster or emergency those below the poverty line are less likely to evacuate and if they do evacuate will likely need the most.

In addition to evacuation concerns, households at or below the poverty line would be less likely to afford any increase in their federal flood insurance rate – if they carry insurance at all. This will exacerbate recovery efforts where any damage to houses may not be able to be fixed. While groups like Americorps and Habitat for Humanity often help out in times of crisis, there is no guarantee, and reliance on nonprofit groups leaves the community vulnerable.

Chautauqua County is also home to 19,884 non-institutionalized residents with disabilities (2012 U.S. Census Bureau). This is approximately 15% of the total population of the County and is greater than the approximately 11% average at the state level. Residents with disabilities are far more likely to experience complications during evacuations and require additional care. Additionally, movement itself may be made more difficult and specialty transportation may be required with wheelchair or mechanical lift capabilities. All special needs requirements come with added costs for the county that must be accounted for during an emergency.

2.4 Governance

The Chautauqua County Legislature currently consists of 19 elected members representing each of the districts (Chautauqua County Board of Elections 2013).

Each of the towns in the county have a five-member town council, consisting of one mayor and four councilmembers; the cities of Dunkirk and Jamestown have a slightly larger board that consists of a mayor and representatives. Each village has a village board that consists of a mayor and trustees (Chautauqua County Board of Elections 2013). Changes to municipal code, such as the adoption of this plan, requires approval from each jurisdictions' governing body.

See Appendix A for a description of the governance in each municipality in the county and the districts that represent that municipality.

2.5 Economy

According to the U.S. Department of Labor, Bureau of Labor Statistics, the unemployment rate in Chautauqua County is approximately 8% (U.S. Department of Labor 2013a). This is slightly higher than the statewide unemployment rate of 7.8%. Unemployment in Chautauqua County has not seen the decrease noted elsewhere in the state and remains stable. The most common

occupation within the county is sales and services, and the most common industries in the county are educational services, health care, and social assistance (U.S. Census Bureau 2010). A list of the county's top ten industries and the number of people employed in those industries is provided in Table 2-1.

Table 2-1 Top Ten Industries for Employment in Chautauqua County

Industry	Number of Employees	Percentage within County
Education and Health Services	16,788	28%
Manufacturing	10,125	16.9%
Retail trade	6,631	11.1%
Arts, entertainment, and recreation, and accommodation and food services	5,322	8.9%
Other services except public administration	3,201	5.3%
Professional, scientific, and management, and administrative and waste management services	3,036	5.1%
Construction	2,990	5%
Public Administration	2,662	4.4%
Transportation, warehousing, and utilities	2,627	4.4%
Finance and insurance, and real estate and rental and leasing	2,306	3.8%

Source: U.S. Census Bureau 2010

While manufacturing remains a vital part of the county's economy, the economic environment continues to shift jobs away from that sector. In the face of job losses in this sector, the county has been transitioning to a more diversified economy (Chautauqua County 2011).

Although the agricultural industry provides relatively few employment opportunities when compared with the top industries, agricultural production has remained relatively stable over time, and the number of lost jobs in this sector has been minimal. Based on the most recent U.S. Agricultural Bureau Census (1982-2007), there are approximately 1,658 farms within the county, more than any other county in the state. The total market value of products sold in 2007 was $138,578,000, placing the county within the top ten in the state for agricultural production, and the number one producer within the Western New York region. The majority of this value came from livestock and their derivatives, specifically milk and other dairy products. The most

valuable crops produced included fruits, tree nuts, and berries; nursery products and sod; and vegetables, melons, potatoes, and sweet potatoes.

The escarpment of the Allegheny Plateau provides an ideal microclimate for growing grapes, particularly Concord grapes. New York ranked third in the nation in grape production for grape jelly and wine juice, largely due to production within Chautauqua County (DeNapoli and Bleiwas 2010).

2.6 Land Use Trends

The county's location and access to natural resources such as water and forested land are important assets. The location where development occurs and the type of development occurring is important in analyzing the type of disasters that may affect the county and the types of structures that could be impacted. Major land uses within the county include residential, vacant, and agricultural land uses. Table 2-2 shows the county's major land use distribution.

Table 2-2 Land Use Distribution, Chautauqua County

Land Use Type	Percentage of Land
Residential	31%
Vacant	30%
Agricultural	25%
Forest Land/Conservation/Other	9.3%
Community Services	1.2%
Public Services/Transportation	1%
Recreation	1%
Commercial	1%
Industrial	.5%

Source: Chautauqua County 2011

As shown in the table, the primary land use in the county is vacant/undeveloped or open space. Forested land plays a key role in protecting the county's abundant water resources, which are important for drinking, agricultural production, and recreational activities. Because of the declining population sprawl has been limited and development has been focused on infill or brownfield projects rather than greenfield projects. This has helped maintain the rural character of the county.

3. HAZARD PROFILES

Chapter 3 describes the risk assessment process and identifies and profiles relevant hazards and assesses the risk of exposure of lives, property, and infrastructure to these hazards. These profiles assist the community in better understanding the potential risk from natural and man-made hazards and develop and prioritize mitigation actions to reduce those risks.

The risk assessment for Chautauqua County and its jurisdictions followed the methodology described in FEMA publication 386-2, *Understanding Your Risks: Identifying Hazards and Estimating Losses* (2002), which includes a four-step process:

Step 1—Identify Hazards
Step 2—Profile Hazard Events
Step 3—Inventory Assets
Step 4—Estimate Losses

Through this process 24 possible hazards were identified by Chautauqua County. Of those 24 hazards, six were agreed to be of significant risk to the communities. The 24 hazards identified are listed below; the six hazards that the communities agreed were significant are in **bold:**

- **Hazardous materials (in transit)**
- **Floods**
- **Hazardous materials (fixed site)**
- Explosion
- **Water supply contamination**
- **Tornado**
- Terrorism
- Utility Failure
- **Severe storms (including ice storm and severe winter storm)**
- Ice jam
- Extreme temperatures
- Wildfire
- Air contamination
- Structural collapse
- Dam failure
- Drought
- Fire
- Epidemic
- Infestation
- Earthquake
- Civil unrest
- Blight
- Transportation accident
- Radiological (in transit)
- Landslides

This chapter is divided into two parts: hazard identification and hazard profiles.

Section 3.1, Hazard Identification, identifies the hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.

Section 3.2, Hazard Profiles, discusses the threat to the planning area and describes previous occurrences of hazard events and the probability of future occurrence.

3.1 Hazard Identification

3.1.1 Methodology

Through a review of historical records, existing plans, reports, experts, and internet resources, the Hazard Mitigation Planning Team identified 24 possible hazards to which each jurisdiction is susceptible. The HMPT then discussed the hazards to determine which ones most greatly affected Chautauqua County, ranking each of them as either low risk, moderately low risk, moderately high risk, or high risk. While at least one community voted to include each of the 24 potential hazards, only the following six hazards were defined as significant concern to the communities and were then profiled in this plan.

- Floods
- Severe storms
- Tornadoes
- Hazardous materials (in transit)
- Hazardous materials (fixed site)
- Water supply contamination

A full list of the voting results is provided in Appendix G.

For comparison purposes, the hazard rankings of the HMPT were matched against the results a New York State Hazard Identification and Risk Assessment (HIRA)-NY analysis. HIRA-NY analyses score a hazard based on the following five criteria:

- **Scope** - Areas potentially impacted and the chance of one hazard triggering another hazard, thus causing a cascading effect.
- **Onset** - The time between recognition of an approaching hazard and when the hazard begins to affect the community.
- **Impact** - The extent of the hazard impact on the community.
- **Duration** - The length of time the hazard remains active, the length of time emergency operations continue after the hazard event and the length of time that recovery will take.
- **Frequency** - How often a hazard has resulted in an emergency or disaster.

Hazards scoring from 321 to 400 in HIRA-NY are ranked as high, hazards from 241 to 320 are ranked as moderately high, hazards from 161 to 240 are ranked as moderately low, and those from 44 to 160 are ranked as low. The results are provided below in Table 3-1 below.

Table 3-1 HIRA-NY Hazard Rankings Results

Hazard	HIRA-NY Score[1]	Final Rating
Hazardous Materials (in Transit)	391	High
Flood	352	High
Hazardous Materials (fixed site)	328	High
Explosion	324	High
Water Supply Contamination	312	Moderately High
Tornado	308	Moderately High
Terrorism	292	Moderately High
Severe Storm (including ice storm [314] and severe winter storm [281])	290	Moderately High
Ice Jam	284	Moderately High
Extreme Temperatures	273	Moderately High
Wildfire	272	Moderately High
Air Contamination	239	Moderately Low
Utility Failure	237	Moderately Low
Structural Collapse	236	Moderately Low
Dam Failure	232	Moderately Low
Drought	222	Moderately Low
Fire	222	Moderately Low
Epidemic	186	Moderately Low
Infestation	154	Low
Earthquake	150	Low
Civil Unrest	148	Low
Blight	116	Low
Transportation Accident	277	Low
Radiological (in transit)	179	Low
Landslides	Not Applicable	Not Applicable

All of the hazards chosen by the county as the focus for this plan are listed as high or moderately high. This suggests that the experience of emergency managers within the county matches what the computer models show are the highest risks to the county. Hazards such as Terrorism,

wildfire, were not ranked by the HMPT as those threats were seen as having a low probability of occurrence. Similarly, the hazard of explosion was seen as closely tied to that of hazardous materials within the county and therefore covered by the hazard materials hazard profile.

3.1.2 History of Declared Disasters

Federal and/or state declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). In addition to these declarations, FEMA can also issue declarations with the long-term federal recovery program. These are, however, generally more limited in scope. The quantity and types of damages are the determining factor.

Table 3-2 lists state and federal disaster declarations that included Chautauqua County from 1972 to 2013.

Table 3-2 Declared Federal Disasters in Chautauqua County 1972-2013

Number	Date	Incident Description	Federal Funds Made Available to the State of New York for Disaster Declared Counties
DR-4204	December 22, 2014	Severe Winter Storm, Snowstorm, and Flooding	$30,457,381.72*
DR-4180	Tuesday, July 8, 2014	Severe Storms and Flooding	$21,819,027.15*
DR 4129	Friday, July 12, 2013	Severe Storms and Flooding	$42,663,708.10*
DR 1857	Tuesday, September 01, 2009	Severe Storms and Flooding	$43,699,155.93
DR 1589	Tuesday, April 19, 2005	Severe Storms and Flooding	$59,943,713.38
DR 1564	Friday, October 01, 2004	Severe Storms and Flooding	$14,064,700.88*
DR 1534	Tuesday, August 03, 2004	Severe Storms and Flooding	$18,461,262.75*
DR 1391	Tuesday, September 11, 2001	Terrorist Attack	$4,681,627,692.94*
DR 527	Saturday, February 05, 1977	Snowstorms	N/A

Table 3-2 Declared Federal Disasters in Chautauqua County 1972-2013			
Number	**Date**	**Incident Description**	**Federal Funds Made Available to the State of New York for Disaster Declared Counties**
DR 494	Friday, March 19, 1976	Ice Storm, Severe Storms, Flooding	N/A
DR 338	Friday, June 23, 1972	Tropical Storm Agnes	N/A
*Public Assistance Grants Only			

It is important to note that the federal funding listed does not reflect the amount provided to Chautauqua County but, rather, the combined amount provided to all affected counties. It should also be noted that federal funding was not provided to any disaster until 1979.

3.2 Hazard Profiles

This section provides a more detailed profile of the six hazards selected by the HMPT through the community voting process. Each of these hazards received more than one-third of the HMPT vote for being a significant hazard.

3.2.1 Floods

A flood is the temporary inundation of land that is normally dry. It is a natural event for rivers and streams to overflow from river channels into adjacent floodplains. Floodplains are lowlands areas adjacent to rivers and lakes that are subject to regular flooding. Most floodplains are mapped by the FEMA for their Flood Insurance Rate Maps (FIRMs) as part of the National Flood Insurance Program (NFIP). FEMA defines several types of floodplains:

- A **100-year flood zone** is an area that is subject to a 1 percent chance of flooding annually, whereas
- A **500-year flood zone** has a 0.2 percent chance of flooding annually.

Hazard Description

Floods may result from a variety of sources, including natural causes such as high intensity or long duration of rain or snow, rapid spring snow melt, or ice jams inhibiting a river's flow. Man-made hazards such as dam failures are also a concern in the county. Various types of floods can have different risk levels associated with them. The highest risk flood event is a flash flood because of the low predictability, rapid development, and high water flow rates associated with them. These floods are often associated with intense weather such as hurricanes, nor'easters, and large thunderstorms. They can also occur if the spring thaw occurs too rapidly for the ground to absorb the increased moisture. Natural beaver dams or man-made dam failure may result in flooding at any time, although severe storms and seismic events increase their risk of failure.

Flood damage in Chautauqua County

Severe floods may result in serious injuries and fatalities as well as damage to public facilities and private property. Cascading effects from flood hazards may include damaged power lines, blocked roadways, hindered commerce, and damaged infrastructure such as flooded water supply wells and waste water treatment plants. The risk of mosquito-borne illnesses and water-borne diseases also increases during floods.

Geographic Location and Extent

A number of areas throughout Chautauqua County are located within the flood zones of Lake Erie as well as along various rivers and streams. Bemus Point, Busti, Carroll, Celeron, Charlotte, Chautauqua, Cherry Creek, Dunkirk (both city and town), Ellery, Ellicott, Ellington, Falconer, Forestville, Fredonia, Gerry, Hanover, Jamestown, Kiantone, Lakewood, Mayville, North Harmony, Panama, Poland, Pomfret, Portland, Sheridan, Silver Creek, Sinclairville, and Westfield are partially located within floodplains and are subject to significant flood risk.

Areas outside flood zones remain at risk of secondary threats associated with floods such as the loss of electricity. Outside of defined flood zones, risk to properties and facilities is not generally considered significant. All of the communities in Chautauqua County except the county participate in the NFIP. NFIP data indicate that 2,132 flood insurance claims were filed in Chautauqua County between 1977 and 2010, with a total value paid out of $8,493,687. The 2014

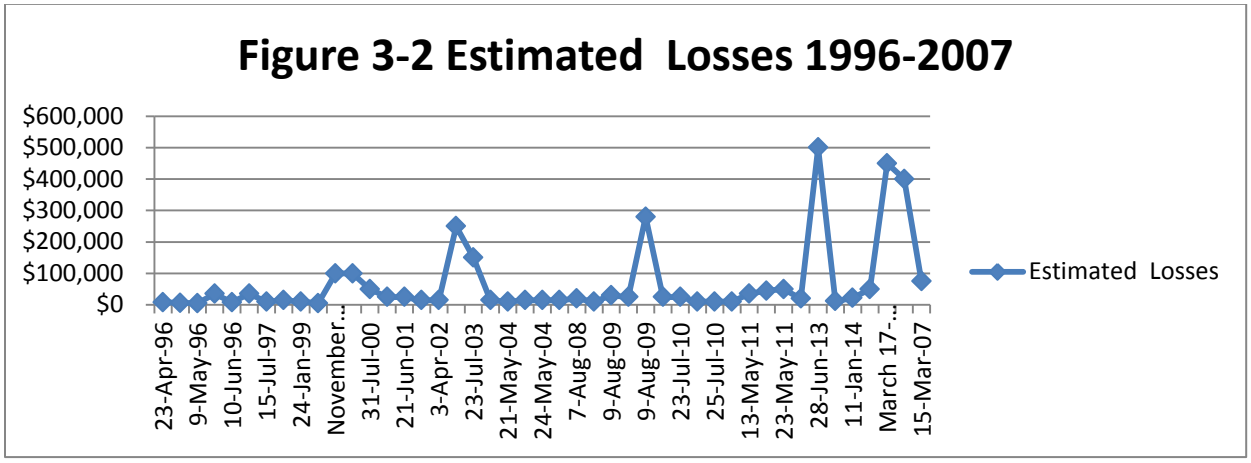
update of the state's hazard mitigation plan notes that there are 753 NFIP policies in Chautauqua County resulting in $118,748,100 in NFIP coverage. Appendix H provides details about the NFIP, current effective FIRMS, and available detailed FEMA Flood Insurance Studies.

HAZUS-MH MR3, Ver. 1.3 (HAZUS-MH MR3), software used by FEMA to provide estimates of potential losses from disasters, provided an estimate for a 100-year flood event along all major rivers and streams in the county (see Figure 3-1 below).

Figure 3-1 HAZUS-generated 100-year Flood Depth, Chautauqua County

Previous Occurrences

Chautauqua County has experienced many historic flood events. Since 1996, there have been 45 recorded flood events with losses in the county. This corresponds to a rate of roughly 2.5 floods with losses every year. Of these events, only eight have cost more than $100,000. The most costly flood event in Chautauqua County history was in the Village of Brocton in 2013, which totaled $500,000 in damages. The graph below shows the losses reported from 1996 to 2007.



It is important to note how floods have been getting more expensive over time. If this trend continues the county will need to set aside a larger sum of money to cover disasters each year. The dollar values for each flood can be found in Appendix I.

Magnitude/Severity/Probability

Given the history of occurrences in Chautauqua County, it is certain that future flooding will occur. These floods are likely to vary in severity and magnitude from relatively smaller events with $10,000 of reported damage to much larger events with more than ten times the damage reported.

Potential Impacts from Climate Change

Climate change potentially affects flooding in a variety of ways. First and foremost, as climate shifts, precipitation and surface wind patterns are likely to shift with them. Exactly how these shifts occur is widely debated among scientists, but it is likely that if the waters of Lake Erie continue to stay warmer later into winter, lake-effect snow will also increase when the first Arctic air pushes into the area. Summer rain patterns may also shift, causing increases in flow rates along Chautauqua's rivers and increasing the height of Lake Chautauqua itself. While the precise effects of climate change on flood risks in the county remains unknown, increases in precipitation are likely to increase the hazard risk.

3.2.2 Severe Storm

A severe storm is a type of weather condition characterized by high winds and precipitation and often accompanied by thunder and lightning. In winter, these storms are often nor'easters, which follow certain specific wind patterns. Severe storms may spawn tornadoes, lead to flooding, or directly cause other secondary hazards. During winter storms, ice and snow create additional secondary hazards including downing power lines, damaging roofs, and creating dangerous road conditions. Severe storm events may also include:

- Severe ice storms – A storm comprised mostly of freezing rain;
- Heavy snow – 6 inches or more within 12 hours; and
- Blizzard conditions – considerable or heavy snow, wind in excess of 35 mph, low visibility (1/4 mile or less), and low temperatures for at least 3 hours.

Hazard Description

The hazard of a severe storm may vary based on type and time of year. Hail storms are most prevalent in late April through July, and high winds are most prevalent in mid-May through August. Major snowstorms and nor'easters are more common in the winter months. Severe storms may result in serious injury and fatalities as well as damage to private infrastructure. Cascading effects from this hazard may include flooding, tornadoes, increased risk of utility failure, and damaged infrastructure.

Geographic Location and Extent

All of Chautauqua County is susceptible to damage from ice, snow, wind, hail and lighting caused by severe storms.. Past severe storms have damaged buildings and power lines, caused floods, and created conditions that have caused vehicle accidents in Chautauqua County. County assets (critical facilities, businesses, historic, cultural, and natural resource areas, and areas of special consideration) that are susceptible to damage from severe storms are discussed in greater detail in Chapter 4, Vulnerability Assessment. Severe snow storms are also a threat in the county causing downed power lines and damaged roofs as well as costing the County money in plowing and de-icing. Annual snowfall figures are shown below in Figure 3-4.

Previous Occurrences

Chautauqua County has experienced many historic severe storms. Since 1996, the estimated losses from these storms total more than $6 million – roughly $350,000 annually. This figure does not include the costs associated with secondary hazards such as power outages, increased traffic accidents, and dangerous roadway conditions. In total, this makes severe storms not only dangerous to human life but very expensive for the county as well. Appendix I contains a detailed table providing information on all storms and their estimated damages since 2000.

Magnitude/Severity/Probability

NOAA's National Severe Storms Laboratory predicts that in any given year from 1980 to 1999, Chautauqua County experienced between four and five days with severe storms characterized by winds of at least 57.5 miles per hour (Figure 3-3). It is anticipated that future storm probability will follow historic trends. As precipitation and wind patterns shift over time due to climate change, these storms have the potential to increase significantly in severity and probability.

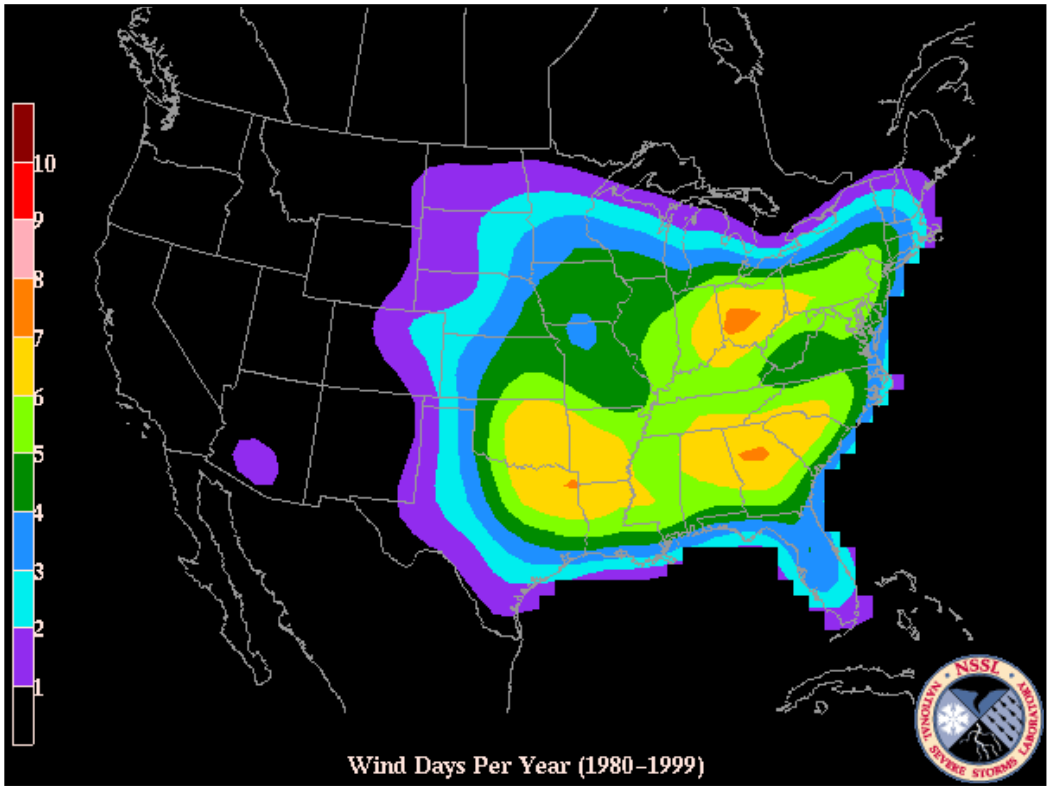


Figure 3-3 Historic Annual Severe Storm Probability for the United States

Average snowfall was evaluated to provide the probability of future severe winter storm events. Figure 3-4 shows that from 1979 to 2009 Chautauqua County had an average annual snowfall range from 212.8 inches to 84 inches of snow per year, with an overall average of 131.5 inches per year. This average is expected to continue for the immediate future. This average is expected to remain consistent for the foreseeable future.

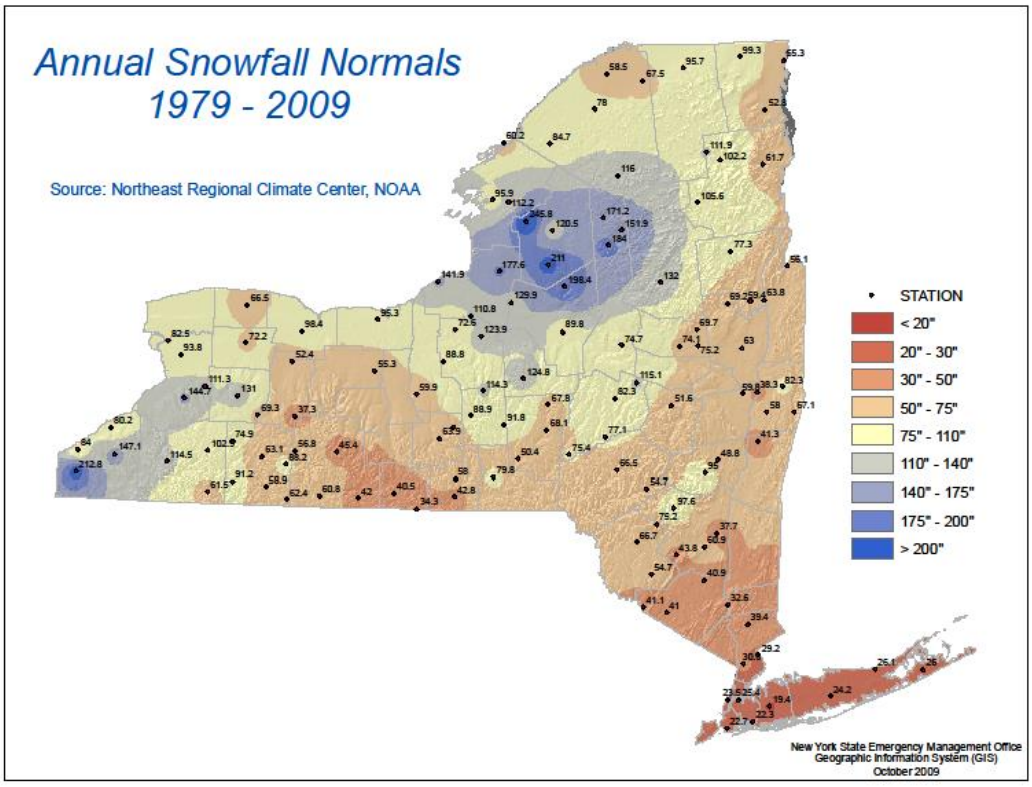


Figure 3-4 Normal Annual Snowfall, 1979-2009

Potential Impacts from Climate Change

While exact changes in precipitation patterns remain unknown, warmer lake water throughout the year is likely to increase rain and snowfall in tightly limited bands, as occurred during the blizzard of November 2014. Additionally, more powerful frontal systems driving down out of the Arctic through Canada may contain higher winds with larger amounts of precipitation throughout the year. Similarly, Atlantic hurricanes such as Hurricane Sandy are more likely to move farther up the coast and turn west, which may lead to extreme rainfall, as occurred in 2012. Cascading hazard events such as tornadoes may be more likely to spawn from more powerful frontal systems as well.

3.2.3 Tornado

A tornado is a local storm formed by winds rotating at very high speeds. Tornadoes are typically of short duration and have a vortex ranging from a few feet to a mile in width. The severity of tornadoes is measured using the Enhanced Fujita (EF) Scale based on estimated wind speeds and typical damage:

Tornado damage in Chautauqua County

- **EF0** – wind speeds from 65- 85 mph typically causing light damage
- **EF1** – wind speeds from 86 to 110 mph typically causing moderate damage
- **EF2** – wind speeds from 111 to 135 mph typically causing considerable damage
- **EF3** – wind speeds from 136 to 165 mph typically causing severe damage
- **EF4** – wind speeds from 166 to 200 mph typically causing devastating damage
- **EF5** – wind speeds from more than 200 mph typically causing incredible damage.

Hazard Description

Tornadoes are formed from powerful thunderstorms and appear as a rotating, funnel-shaped cloud that extends from the thunderstorm to the ground. Damage from tornadoes can range from light damage (e.g., branches broken off trees in an F0 tornado) to incredible damage (i.e., houses blown off foundations and swept away in an F5 tornado). Tornadoes may result in serious injury and fatalities, damage to public and private infrastructure, and can have cascading effects such as fire, fuel shortage, hazardous materials incidents at fixed facilities and in transit, transportation accidents, and utility failures. Tornadoes typically occur from March through August but may occur year-round.

Geographic Location and Extent

All of Chautauqua County is susceptible to tornadoes. The high winds associated with tornadoes can affect all areas in Chautauqua County equally. Figure 3-5 below shows FEMA wind speed design zones and past tornado tracks (1961-1990) for New York State. Figure 3-5 shows that Chautauqua County is within the area at high risk for a tornado. Past tornado events in Chautauqua County have damaged and destroyed buildings and homes, knocked down trees and power lines, destroyed automobiles, and caused crop damage. County assets that are susceptible to tornado damage are discussed in greater detail in Chapter 4, Vulnerability Assessment.

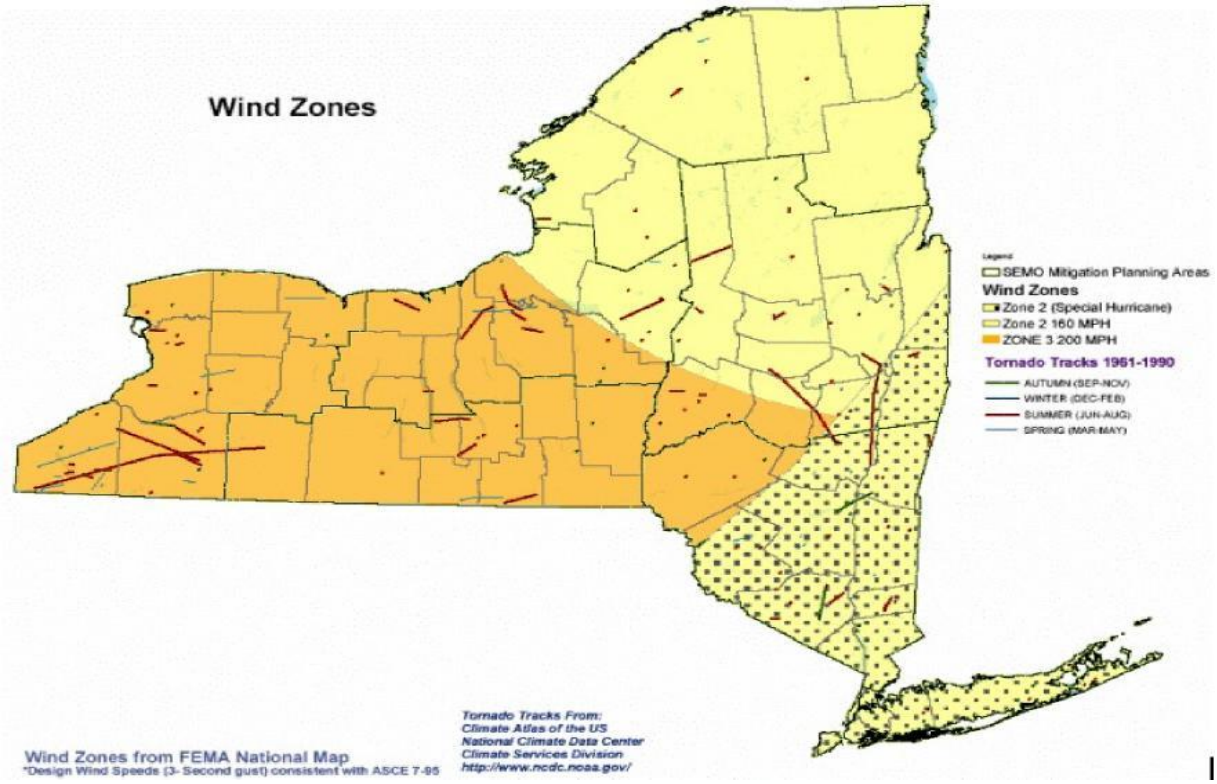
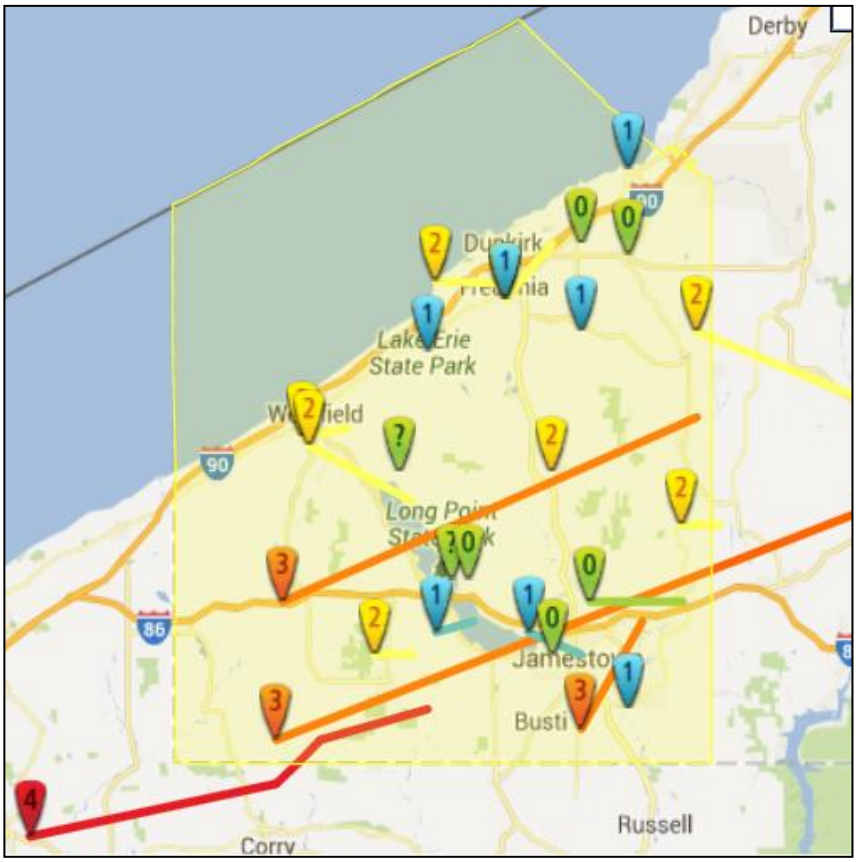


Figure 3-5 Tornado Risk Areas New York State

Previous Occurrences

Chautauqua County has experienced several historic tornado events. In total, Chautauqua County and municipalities have experienced approximately $5.8 million in damage from 1996 to present. Figure 3-6 shows the historic tornado paths within Chautauqua County from 1959 to 2011. Detailed information on the history of Tornado events in Chautauqua County can be found in Appendix I.



Source: Tornado History Project (http://www.tornadohistoryproject.com/tornado/New_York/Chautauqua, last accessed August 19, 2013)

Figure 3-6 History of Tornadoes from 1959-2011

Magnitude/Severity/Probability

NOAA's National Severe Storms Laboratory's Time Series of Tornado Annual Cycle Probability (Figure 3-7) indicates the probability of a tornado event occurring on any given day for New York State, including Chautauqua County. Chautauqua County has an average of 0.2 to 0.6 tornado days per year. Data from the past 20 years suggests that tornadoes may be occurring more often now than in previous decades.

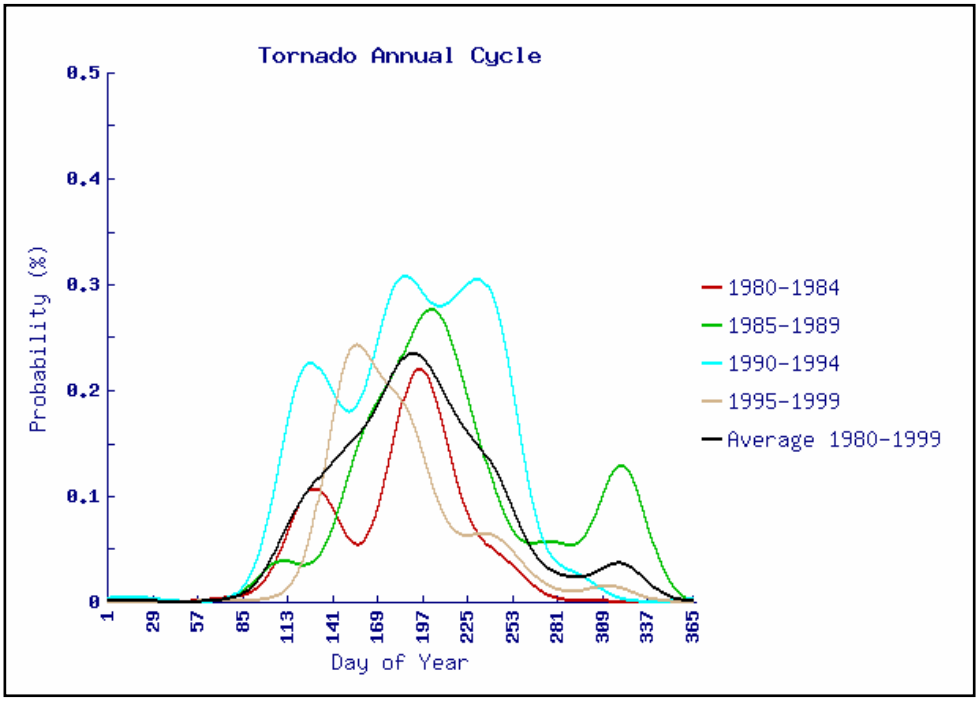


Figure 3-7 Historic Annual Tornado Probability in New York State

Potential Impacts from Climate Change

The risk of tornadoes is directly tied to that of severe storms. As noted in section 3.2.2, cascading hazard events such as tornadoes may be more likely to spawn from more powerful frontal systems. For information on the potential impacts of climate change on severe storms, please see Section 3.2.2.

3.2.4 Hazardous Materials (In Transit)

The uncontrolled release of hazardous materials during transport can result in death or injury to people and damage to property and the environment through the material's flammability, toxicity, corrosiveness, chemical instability, and/or combustibility.

Hazard Description

According to the NYS Department of Environmental Conservation (NYSDEC), accidental releases of petroleum, toxic chemicals, gases and other hazardous materials occurs frequently

throughout New York State. Even small releases can have the potential to endanger public health and contaminate groundwater, surface water, and soils. Environmental damage from such releases depends on the material spilled and the extent of contamination. Many are releases of small quantities that are contained and cleaned up quickly with little damage to the environment. In other instances, material releases seep through the soil and eventually into the groundwater, this can make water supplies unsafe to drink. Vapors from spilled materials can collect in houses and businesses, creating fire and explosion hazards.

Transportation corridors within Chautauqua County that carry hazardous materials include highways, railroads, pipelines, and navigable waterways. Major highways are more likely to experience this type of hazard because of interstate and local commercial transport of hazardous materials. Transport vehicles do not typically travel through residential areas unless en route to destinations such as a gasoline service station or storage facility.

Train derailment containing potentially hazardous materials near the City of Dunkirk

Geographic Location and Extent

A hazardous material incident of this type is most likely to occur in the following locations:

- NYS Thruway — Ripley to Erie County (Pennsylvania) line
- Routes 5 and 20 — Ripley to Erie County (Pennsylvania) line
- 1-86 — Cattaraugus County line to Pennsylvania State line
- NYS Routes 60, 62, 83, 394 arid 430
- County Route 380

- Other roadways destined for industry/business purposes
- AMTRAK, CSX and Norfolk Southern railroads.

In addition to hazardous spills on these land-based routes, air flights over the county and serving the Chautauqua County-Jamestown and Chautauqua County-Dunkirk municipal airports, underground petroleum and gas pipelines, and navigable waterways, including Lake Erie, Lake Cassadaga, Lake Chautauqua and Findley Lakes, are also likely to experience hazardous material spills.

Previous Occurrences

Michael Vendette, the Hazardous Materials Coordinator for Chautauqua County reports that there were 1,153 spills reported to NYSDEC from 1994 to 2004. He notes the following incidents as examples:

Site of a tanker truck accident near the Village of Fredonia

- January 16, 1999 — NYSDEC ship spilled diesel and motor oil into Dunkirk Harbor. This spill was due to equipment failure and affected Lake Erie, which is the source of drinking water for the city of Dunkirk
- September 15, 1997 — Con-rail derailment, city of Dunkirk, spilled waste oil and sulfuric acid. This spill was due to a traffic accident and affected the surrounding soils.
- September 15, 1997 — MC Tank Transport, Inc., spilled hydrogen chloride at Exit 59, NYS Thruway (Interstate Route 90) .This spill was due to tank failure.
- May 3, 1979 — A train wreck occurred in Sunset Bay. Two vinyl chloride tank cars broke through the bottom of a bridge overpass of a tributary to Cattaraugus Creek, settling in the creek bottom. Early the next morning, at the request of the Chautauqua County Health Department and the local fire chief, the Lake Shore Hospital and Chautauqua County Home were evacuated as was the surrounding community within a mile of the wreck site.

Additionally, data from the Pipeline Hazardous Materials Safety Administration (PHMSA) shows that between 2000 and 2015 there were 42 reported hazardous materials incidents in Chautauqua County.

Magnitude/Severity/Probability

Chautauqua County has more than 50 miles of shoreline on Lake Erie. In addition, 46 miles of the New York State Thruway (Interstate Route 90) run through the towns of Ripley, Westfield,

Portland, Pomfret, Sheridan, and Hanover, as well as a small portion of the city of Dunkirk. It is also located very close to the densely populated village of Fredonia. Interstate 86 runs through the towns of Mina, Sherman, North Harmony, Ellery, Ellicott, and Poland. Other main routes within the county include east-west highways NYS Route 5 and U.S. Route 20 and NYS Route 60, a main north-south highway. AMTRAK, CSX, and the Norfolk Southern railroads also transport hazardous materials. Transportation accidents involving hazardous materials can occur throughout Chautauqua County without warning and may create special hazards for those involved.

Fortunately, many of these incidents generally involve relatively small quantities of material; however, the potential exists for a more serious incident involving a pipeline failure, tank truck crash, or train derailment that releases large volumes of hazardous materials.

Potential Impacts from Climate Change

Climate change is unlikely to have any direct effects on hazardous materials in transit with the exception that increased storm activities may increase risk on the roadway. For detailed information on the effects of climate change on severe storms see Section 3.2.2.

3.2.5 Hazardous Materials (Fixed Site)

This hazard refers to a fixed site or facility which may have an uncontrolled release of hazardous material. When released, these materials can result in death or injury to people and/or damage to property and the environment through the materials' flammability, toxicity, corrosiveness, chemical instability and/or combustibility.

Workers in Personal Protective Equipment entering a potential Hazardous Materials site

Hazard Description

Hazardous materials come in all shapes and forms. Any solid, liquid, or gaseous material that is toxic, flammable, radioactive, corrosive, chemically reactive, or unstable after prolonged storage could pose a threat to life, property, or the environment. There are numerous facilities throughout Chautauqua County that contain hazardous materials. Many of these facilities are privately owned and require regular inspections to ensure compliance with government regulation.

Geographic Location and Extent

The term 'fixed facility' as used in this plan refers to facilities storing and/or utilizing hazardous chemicals, as defined by the Occupational Safety and Health Administration (OSHA) standards,

that are required to report if the quantity of a hazardous chemical on-site, during any one day in a calendar year, equals to or exceeds the reporting threshold. Federal law requires businesses and industry with a repository of certain chemicals to report names, types and quantities on hand to the State Emergency Response Commission, the County Local Emergency Planning Committee, and the district fire services agency that would respond to that location. Facility types range from local gasoline service stations to multi-chemical storage and use facilities. The extent of the hazard depends on the chemical products involved, the number of employees on-site, and the location of the facility with respect to its proximity to residential communities or other high risk areas.

Magnitude/Severity/Probability

Regulations for use and storage, together with employee training, should help reduce the number of incidents; however, there is significant risk that if an incident does occur the damage would be severe. The risks are increased exponentially by the location of the facility and its general proximity to population.

Potential Impacts from Climate Change

Climate change is unlikely to have a direct effect on hazardous materials at a fixed site.

3.2.6 Water Supply Contamination

Water supply contamination is defined as the contamination or potential contamination of surface or subsurface water supply by chemical or biological materials that result in restricted or diminished ability to use the water source.

Hazard Description

Contamination of water bodies or failure of water treatment plants could result in a critical shortage of water supply in this region. In addition, pollution or contamination of the water supply could result in significant illness or death. Water is an obvious vital resource and, appropriately, has a hazard rating of 312.

A safe and plentiful drinking water supply is critical to the health and wellbeing of Chautauqua County residents. About three-quarters of the residents rely on groundwater for their drinking water; the rest rely on surface water. The quality of both sources can be stressed by natural occurring and manmade sources of contaminants. Most contamination problems in the county have been associated with human sources. The most prevalent contaminants include nitrates, chloride salts, volatile organic chemicals (petroleum by-products, degreaser, etc.) and microbes (bacteria). These contaminants have caused problems for a limited number of the drinking water sources through the inappropriate management of sewage and agricultural activities, improper disposal of chemicals, chemical spills, oil and gas well drilling, and road deicing. Fortunately, the geology of the county is such that widespread contamination has been minimized: a major drainage divide separates the Lake Erie/Great Lakes basin from the Allegheny/Ohio/Mississippi

Rivers. The river basin transects the county, so most of the streams have their origin within the county. Moreover, the aquifers where the groundwater resources are found are typically isolated from the surrounding surface waters.

Geographic Location and Extent and Previous Occurrences

Volatile organic chemicals (VOCs) have been a problem in the town of Carroll for 20 years. The inappropriate disposal of industrial solvents in two areas of the town has rendered two municipal drinking water wells unusable because they exceeded the maximum contaminant level for VOCs, and contamination is currently threatening a third well. These wells provided water to 2,600 people. To address this problem, remedial investigations, contaminant cleanup, and the installation of water treatment facilities is ongoing. Additional VOC problems have recently been identified in the town of Ellery where three mobile home park wells that serve between 100 and 150 people have been found to be contaminated. Two of these wells had to be abandoned; the third is being used as a backup supply only.

Nitrate contamination of groundwater in the county is a problem in certain areas. This is especially prevalent in the town of Clymer where a municipal well that serves 650 people had to be abandoned because of high nitrates. This has been a problem for more than ten years and was caused by years of intensive farming in a valley containing highly permeable soils. These gravelly loam soils overlay an unconfined sand and gravel aquifer that is highly sensitive to pollution. To solve this problem, a new well has been developed and area farmers are implementing best management practices to reduce nitrate contamination.

This same problem has also affected three mobile home parks located in the towns of Westfield, Portland, and Hanover. In addition, a number of private wells in the towns of Clymer, French Creek, Mina, and Hanover have nitrate problems. The problem in Mina is caused by closely spaced septic systems located on small lots where gravelly soils are predominant. This not only threatens drinking water quality but has also caused use impairment of Findley Lake. The root cause of nitrate problems in general is from inappropriate land use practices that occur in areas of gravelly soils.

Salt contamination of surface water and groundwater resources has also occurred. This is linked to the use of salt and brine as deicing agents and to oil and gas well activities. A number of private wells have become contaminated with salt caused by the inappropriate storage of road salt. These problems were solved by locating a new well, installing treatment, and removing the source of contamination. Regionally, chloride salt concentration in both groundwater and surface water has increased significantly over the past few decades. Data from the city of Jamestown wells indicate chloride concentrations in groundwater have increased 300% since the mid-1960s. Data from Chautauqua Lake studies indicate that chloride levels in the lake have increased more than 100% since the early 1970s. While these chloride levels are an order of magnitude less than

the maximum allowable level in drinking water, increased chloride levels may pose a future threat to the lake.

Private wells are also plagued by bacteria contamination. This is often an indicator of either sewage contamination or poor construction. In these instances the condition of the well is improved, the well is shock-chlorinated, and/or water treatment is installed.

Arsenic is one of the few natural contaminants that have caused concern in Chautauqua County groundwater supplies. Two mobile home park supplies, one in the town of French Creek and the other in the town of Gerry have wells that are above the maximum allowable levels. These problems have been corrected by drilling new wells.

Flood and drought have caused recurring problems with drinking water supplies. Flooding most often causes problems with either private and/or public drinking water wells if flood waters directly inundate the well. This causes direct contamination of drinking water supplies, rendering them unfit for drinking until flood waters recede and wells can be properly disinfected. Drought has caused problems with both groundwater and surface water supplies. The Village of Fredonia, which relies on a reservoir as a drinking water source, has had to take extreme measures twice over a ten-year period by diverting surface water from another watershed into their reservoir. This community of more than 10,000 people has also had to implement strict water conservation measures during these years. Groundwater shortages during drought routinely force some private well owners to drill new, deeper wells that are more reliable. Public water systems can usually handle these shortages by enacting water conservation measures within the community. However, there are a few public systems with marginal sources who are exploring for new groundwater sources to augment present supplies.

Most of the water contamination problems are caused by widespread, diffuse sources of pollution known as nonpoint sources. These do not originate from point type discharges such as from a public sewer treatment plant or from an industrial discharge. The key to addressing nonpoint source pollution is through education and by implementing best management practices to reduce pollution. However, even if the source of groundwater contamination is eliminated, it can take many decades or longer to see an improvement in water quality.

Magnitude/Severity/Probability

Until nonpoint source issues are resolved through education and implementing best management practices, the probability of future events is very high.

Potential Impacts from Climate Change

While many of the potential effects of climate change involve an increase in precipitation, there is also an increased risk of drought. This may stem from warmer summer temperatures that evaporate surface water at a more rapid rate, or simply a shift to a more extreme cycle of precipitation where storm events are intense but short and water is not absorbed into the soil as

readily. These issues may exacerbate any existing water supply issues, especially those that concern pollution or contamination of some sort. The less water there is in the system, the more any pollutants are concentrated in whatever water remains.

4. VULNERABILITY ANALYSIS

Chapter 4 presents a vulnerability analysis for Chautauqua County. This chapter presents the critical county assets that are at risk from the hazards identified in Chapter 3 and discusses damage estimates for critical facilities in the hazard area. This analysis supports the county in developing a mitigation strategy that maximizes loss reduction. A full asset inventory for the county is provided in Appendix J.

4.1 Identifying Critical Infrastructure

Critical infrastructure is a term used to describe infrastructure that is essential to the functioning of society and economy. Common assets that are defined as critical include electrical infrastructure, telecommunication facilities, public service facilities (health, police, fire, etc.), and water supply and treatment infrastructure. Natural disasters can inflict costly damages on critical infrastructure and pose a threat to public health or safety. To determine critical infrastructure that could be affected by natural disasters, each municipality in the county was asked to identify the types and total percentage of infrastructure located within known hazard zones. Critical infrastructure identified within each municipality's jurisdiction is included in the respective profiles in Appendix A.

4.2 Asset Inventory

An asset inventory for Chautauqua County was conducted through an analysis of information collected from federal databases, then supplemented and revised through discussions and inputs from the communities in the county. The federal database that provided the baseline asset inventory came from FEMA's HAZUS-MH 2.2 tool, which is a nationally applicable standardized methodology containing models for estimating potential losses from hazard events. Assets were categorized such that only those affected by the hazards profiled in Chapter 3 were included in the inventory. These hazards were as follows:

- Hazardous materials (in transit)
- Floods
- Hazardous materials (fixed site)
- Water supply contamination
- Tornado
- Severe storms

Water supply contamination, tornadoes, and severe storms can affect any structure or person in the county indiscriminately. The inventory of potentially at-risk assets includes all structures within the county. Floods and hazardous materials (in transit), however, affect only those assets along the flood or transit path. Additional detail on assets in the 500-year flood plain and critical facility sites within 500 feet of an interstate or railroad and are vulnerable to hazardous material is discussed in further detail in this section.

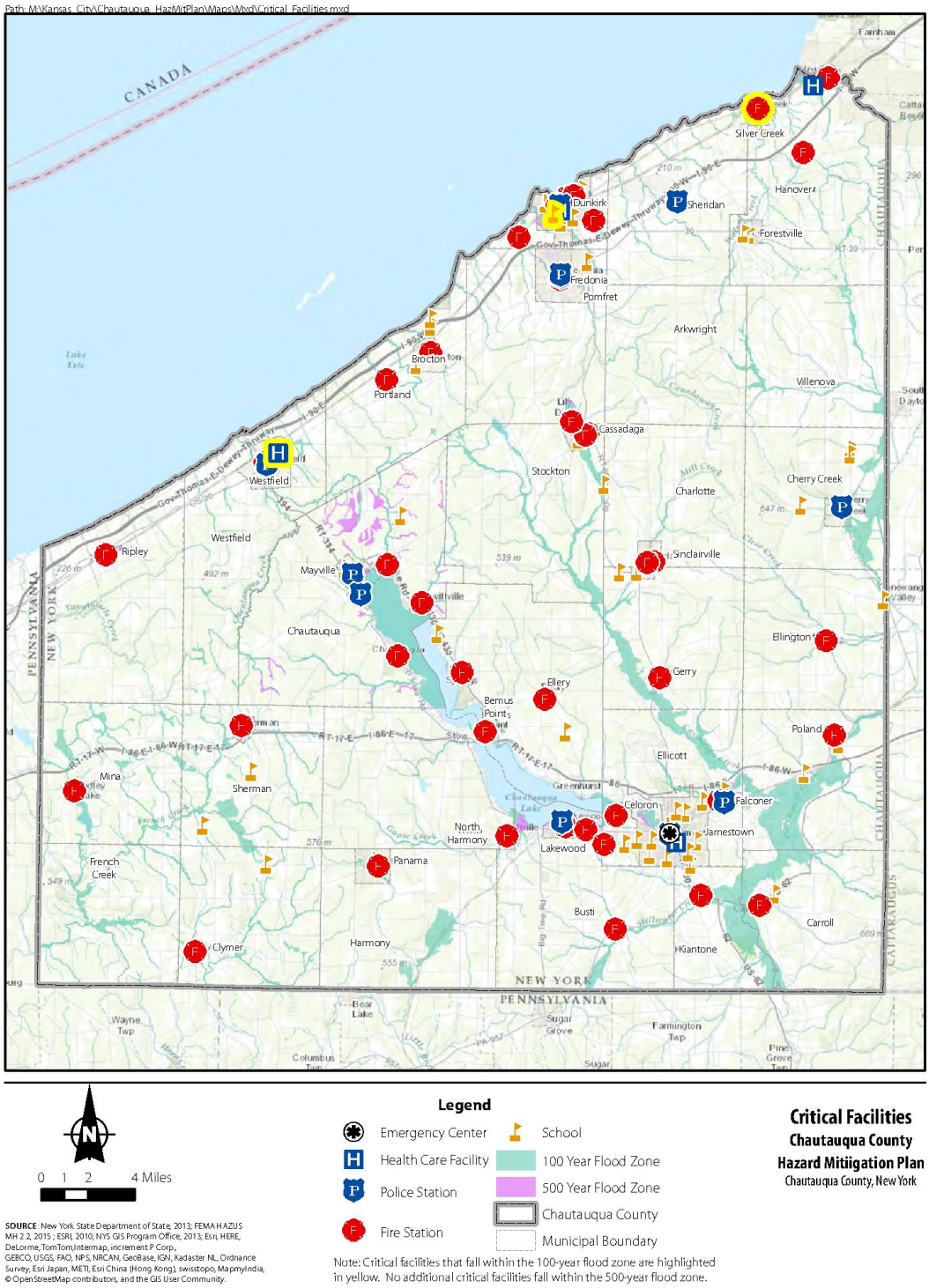


Figure 4-1 Critical Facilities

4.3 Flood Vulnerability Analysis

As the critical facilities map shows, at-risk assets in the county are concentrated around Lake Chautauqua and the Lake Erie shoreline. The state hazard mitigation plan notes that in Chautauqua County there are 1,858 residential properties within the 100-year floodplain with 776 properties covered under NFIP. Within the 100-year flood plain, the total replacement value for assets is more than $21,400,000. Luckily for the county, there are no facilities that are in the 500-year floodplain outside of the 100-year floodplain. While a 100- or a 500-year flood is an extreme event with a relatively low rate of occurrence any given year, the flood events in many parts of New York State after Hurricane Irene and Tropical Storm Lee in 2011, and then again in 2012 after Hurricane Sandy, were assessed as 1000-year flood events occurring in back-to-back years. Despite the current debates about changes in wind and precipitation patterns due to climate change, preparing for the possibility of increased incidence of these kinds of floods still is vital for a community. According to the most recent state hazard mitigation plan, average flood losses for Chautauqua County are $355,056.

4.3.1 National Flood Insurance Program and Repetitive Loss Properties

Despite a history of flood events, Chautauqua County has not yet chosen to join FEMA's Community Rating System (CRS). Instead, many residents in the county have purchased flood insurance through the National Flood Insurance Program (NFIP) on their own.

If a property has had two claims of $1,000 or more within a 10-year period, that property is labeled as a repetitive loss property. As a result of being labeled a repetitive loss property, certain restrictions are put in place on both the property and the property owner concerning how a property can be rebuilt. This is done to increase the mitigative measures in place on these properties to reduce future damage resulting from floods. Since 1978, 695 repetitive loss claims have been filed resulting in $5,285,471 in payments. The majority of claims and losses in the county came from the town of Hanover, which sits at the mouth of Cattaraugus Creek on the shores of Lake Erie. Claims from within the town total 607 cover $4 million in payments.

Table 4-1 identifies number of repetitive loss claims by community including amount of payments, date of latest claim, and types of properties impacted. This data was provided by FEMA and is current as of June 30, 2015.

Table 4-1 NFIP Repetitive Loss Claims from 1978-2015

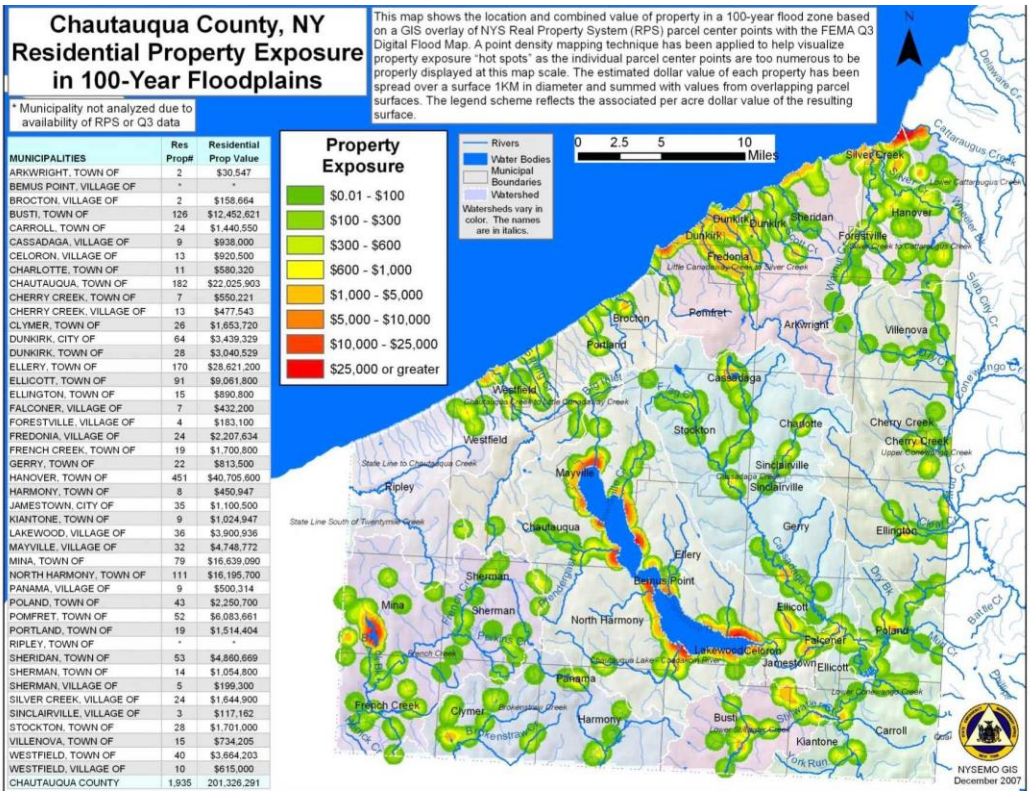
# of Claims	# of Claims	# of Claims	# of Claims	# of Claims	# of Claims	# of Claims	# of Claims
Village of Bemus Point	2	$3,872	1986	1	0	0	1
City of Dunkirk	15	$103,425	2008	5	1	1	7

Table 4-1 NFIP Repetitive Loss Claims from 1978-2015

# of Claims	# of Claims	# of Claims	# of Claims	# of Claims	# of Claims	# of Claims	# of Claims
Village of Falconer	4	$6,839	1985	1	0	1	2
Village of Fredonia	24	$365,794	1986	5	4	2	11
Town of Hanover	607	$4,116,644	2014	174	3	6	183
City of Jamestown	4	$19,083	1986	0	0	2	2
Village of Lakewood	2	$2,429	1981	1	0	0	1
Town of North Harmony	2	$7,404	1986	1	0	0	1
Town of Poland	4	$10,647	2004	2	0	0	2
Town of Sheridan	2	$6,457	1985	1	0	0	1
Town of Silver Creek	29	$642,877	2014	5	4	2	11
TOTAL	**695**	**$5,285,471**		**196**	**12**	**14**	**222**

Source: FEMA, 2015

If four separate claims are filed on a property totaling more than $20,000, or if two payments have been made on a property that exceed the market value of the structure, the structure goes on the Severe Repetitive Loss (SRL) property list. SRL properties have more restrictive guidance placed upon their rebuilding than do standard repetitive loss properties. The state hazard mitigation plan notes that there are six severe repetitive loss properties in Chautauqua County resulting in 38 claims and total payments of $467,971.



MUNICIPALITIES	Res Prop#	Residential Prop Value
ARKWRIGHT, TOWN OF	2	$30,547
BEMUS POINT, VILLAGE OF	*	*
BROCTON, VILLAGE OF	2	$158,664
BUSTI, TOWN OF	126	$12,452,621
CARROLL, TOWN OF	24	$1,440,550
CASSADAGA, VILLAGE OF	9	$938,000
CELORON, VILLAGE OF	13	$920,500
CHARLOTTE, TOWN OF	11	$580,320
CHAUTAUQUA, TOWN OF	182	$22,025,903
CHERRY CREEK, TOWN OF	7	$550,221
CHERRY CREEK, VILLAGE OF	13	$477,543
CLYMER, TOWN OF	26	$1,653,720
DUNKIRK, CITY OF	64	$3,439,329
DUNKIRK, TOWN OF	28	$3,040,529
ELLERY, TOWN OF	170	$28,621,200
ELLICOTT, TOWN OF	91	$9,061,800
ELLINGTON, TOWN OF	15	$890,800
FALCONER, VILLAGE OF	7	$432,200
FORESTVILLE, VILLAGE OF	4	$183,100
FREDONIA, VILLAGE OF	24	$2,207,634
FRENCH CREEK, TOWN OF	19	$1,700,800
GERRY, TOWN OF	22	$813,500
HANOVER, TOWN OF	451	$40,705,600
HARMONY, TOWN OF	8	$450,947
JAMESTOWN, CITY OF	35	$1,100,500
KIANTONE, TOWN OF	9	$1,024,947
LAKEWOOD, VILLAGE OF	36	$3,900,936
MAYVILLE, VILLAGE OF	32	$4,748,772
MINA, TOWN OF	79	$16,639,090
NORTH HARMONY, TOWN OF	111	$16,195,700
PANAMA, VILLAGE OF	9	$500,314
POLAND, TOWN OF	43	$2,250,700
POMFRET, TOWN OF	52	$6,083,661
PORTLAND, TOWN OF	19	$1,514,404
RIPLEY, TOWN OF	*	*
SHERIDAN, TOWN OF	53	$4,860,669
SHERMAN, TOWN OF	14	$1,054,800
SHERMAN, VILLAGE OF	5	$199,300
SILVER CREEK, VILLAGE OF	24	$1,644,900
SINCLAIRVILLE, VILLAGE OF	3	$117,162
STOCKTON, TOWN OF	28	$1,701,000
VILLENOVA, TOWN OF	15	$734,205
WESTFIELD, TOWN OF	40	$3,664,203
WESTFIELD, VILLAGE OF	10	$615,000
CHAUTAUQUA COUNTY	1,935	201,326,291

Figure 4-2 Residential Property Exposure

As shown in the above map, Chautauqua County's residential property exposure is concentrated in the areas around Lake Chautauqua and along Lake Erie's shoreline. This map correlates with the evidence shown in Table 4-1 with areas of highest loss being in areas of highest exposure.

4.4 Severe Storm Vulnerability Analysis

Data from the NOAA Climatic Data Center Storm Events Database shows that between 2000 and 2015 there were 417 documented events (storms or other significant weather phenomena) resulting in over $61 million dollars in damage. A full list of these events including event type, location, injuries, and estimated damages is provided in Appendix I.

The risk from severe storms affects all assets within the county equally. An individual asset is no more or less at risk based on location or type of asset. As a result, a list of assets specifically vulnerable to severe storms was not added to this section. Instead all assets are being considered to be equally at risk from this hazard. A list of all of the assets in the county can be found in Appendix J.

4.5 Tornado Vulnerability Analysis

The risk from tornadoes affects all assets within the county equally. An individual asset is no more or less at risk based on location or type of asset. As a result, a list of assets specifically vulnerable to tornadoes was not added to this section. Instead all assets are being considered to

be equally at risk from this hazard. A list of all of the assets in the county can be found in Appendix J.

4.6 Hazardous Materials Vulnerability Analysis

Data from the Pipeline Hazardous Materials Safety Administration (PHMSA) shows that between 2000 and 2015 there were 42 reported hazardous materials incidents in Chautauqua County resulting in approximately $711,689 in damages. No injuries or fatalities were reported. A full list of these events including date, location, mode of transportation, damages, and material is provided in Appendix I.

The figure below shows the critical facilities within 500 feet of interstates and railroads. Interstates and railroads are the main arteries used to transport materials within Chautauqua County so it stands to reason that critical facilities near them are more vulnerable to disasters involving these materials. While rail technology and increased safety features in tanker trucks will continue to diminish the risk of accidents and disasters, proximity to hazardous materials transportation lines will continue to increase the risk associated with these areas.

In an effort to increase the safety of hazardous materials transport at the state level, the New York State Department of Transportation (NYSDOT) and its federal partners inspected more than 7,000 rail crude oil tanker cars and more than 2,600 miles of track in 2014. In the state as a whole, more than 800 defects and 12 hazardous material violations were uncovered. In the City of Dunkirk rail yard, one critical rail defect was found along with 11 non-critical safety defects. The critically defective rail was placed out of service until it could be fixed.

Areas of particular concern are vehicle crossings along railroad tracks. Accidents in these locations tend to have higher than average incidents of fatalities. These locations, where both methods of transit collide, are considered to be of special concern for both national and local transportation officials.

4.7 Water Supply Contamination Vulnerability Analysis

The risk of municipal water supply contamination affects all assets attached to a municipal supply well equally. Any asset connected to the municipal supply is therefore considered equally at risk. Water supply is critical to the health and wellbeing of a community and damage to the supply of clean water can have significant effects. In an effort to protect the local watershed, the county joined the Erie County Watershed alliance in early 2015. The alliance works to support Lake Erie restoration initiatives and reduce point and non-point source pollution.

Protecting against intentional contamination from an individual or group is not covered by the alliance. To avoid such actions, security measures are often put in place based on local threat levels at municipal supply facilities.

A complete list of all assets in the county, including those at special risk, is included in Appendix J.

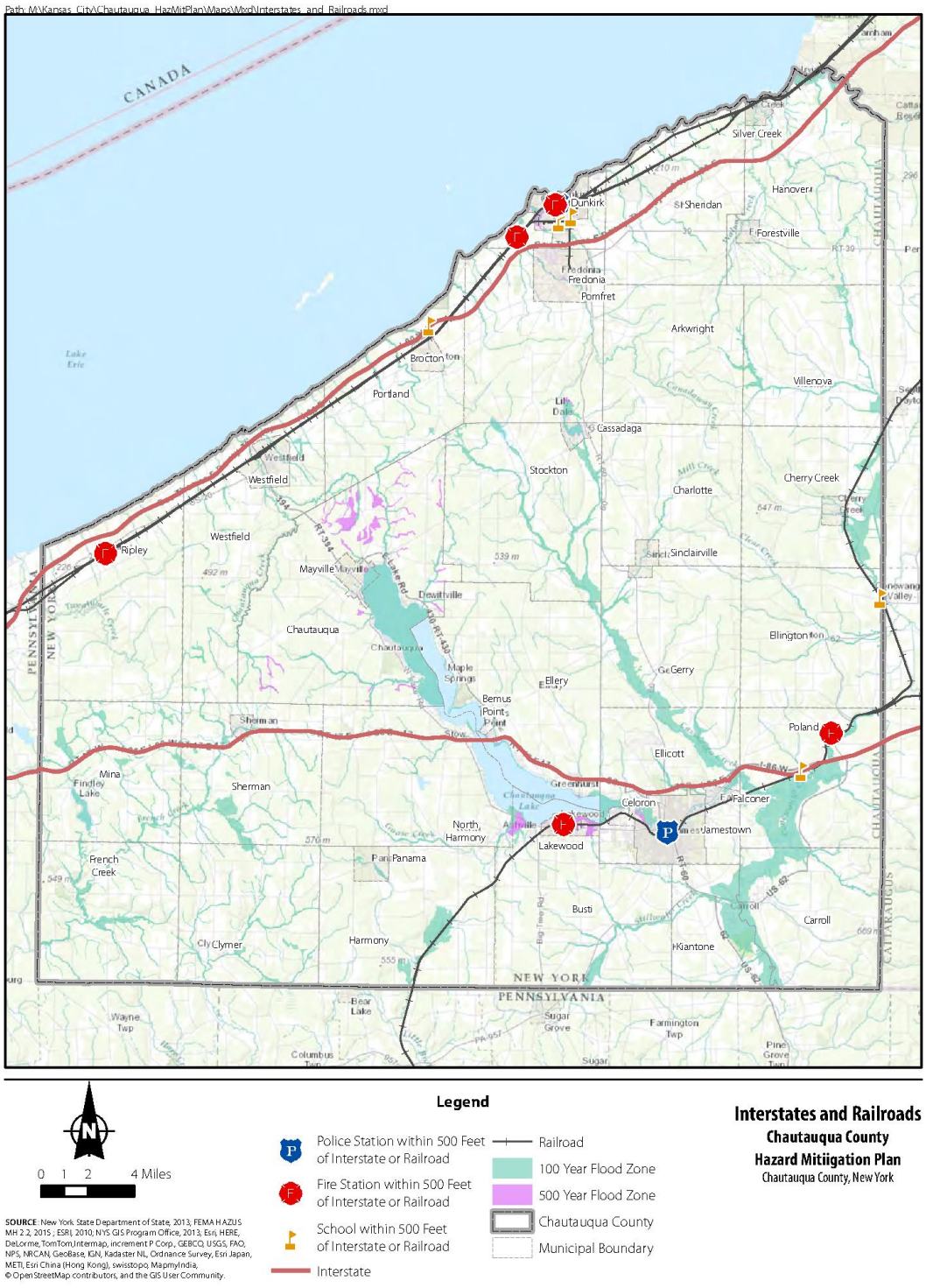


Figure 4-3 Interstates and Railroads

THIS PAGE LEFT BLANK INTENTIONALLY

5. MITIGATION STRATEGY

This section presents the mitigation strategy developed by the Chautauqua County Hazard Mitigation Planning Team (HMPT) based on the asset inventory and risk assessment. The mitigation strategy was developed through a collaborative group process and consists of goals, objectives, and mitigation actions.

5.1 Goals and Objectives

The goals and objectives presented in this plan serve as the foundation for the County's policies regarding hazard mitigation. The HMPT reviewed and confirmed the goals developed for the 2007 plan that provide direction for reducing hazard-related losses in Chautauqua County. These goals were based upon the results of the risk assessment and a review of goals and objectives in the, New York State Hazard Mitigation Plan, and the Chautauqua County Operations Plan. Additionally, a goal was included to reflect the need to consider climate change as having an impact on the community's vulnerability to hazards. Each goal is written to be an inclusive and generalized policy statement. They are designed to be broad to ensure that jurisdictions can remain flexible in the face of a changing world and mitigation activities can be conducted to deal with new or emerging issue. These goals were as follows:

- Reduce Vulnerability to Life-Safety Threats
- Reduce Property and Economic Loss
- Update and Maintain Current Emergency Plans
- Maintain Readiness for an Effective and Safe Response to Disaster
- Promote an Efficient Response and Recovery Process
- Strive to be the Best Possible
- Reduce the Impacts of Climate Change on Vulnerability to Hazards

The HMPT then identified specific objectives to achieve each goal. Each objective was written to define strategies or implementation steps to attain a specific goal. The objectives are designed to be specific and measurable and help the County achieve the identified goal. Each objective is therefore tied to a particular goal. The objectives tied to each goal are as follows:

Goal 1: Reduce Vulnerability to Life Safety Threats

- *Objective 1-1:* Increase public awareness by identifying ways to increase public knowledge of threats and preparedness measures.
- *Objective 1-2:* Enhance and expand public alerting and notification means.

Goal 2: Reduce Property and Economic Loss

- *Objective 2-1:* Increase public awareness.
- *Objective 2-2*: Enhance and expand public alerting and notification means.

- *Objective 2-3*: Identify appropriate insurance for vulnerabilities.
- *Objective 2-4:* Identify protective measures.

Goal 3: Update and Maintain Current Emergency Plans

- *Objective 3-1:* Plan Review for accuracy.
- *Objective 3-2*: Maintain resource databases and contacts.
- *Objective 3-3:* Acknowledge and practice cycles that satisfy regulatory requirements.

Goal 4: Maintain Readiness for an Effective and Safe Response to Disaster

- *Objective 4-1:* Provide state-of-the-art training programs and equipment for public safety providers.
- *Objective 4-2:* Identify voids in the public safety infrastructure.
- *Objective 4-3:* Coordinate resources for effective and efficient response.
- *Objective 4-4:* Review and improve, if necessary, emergency traffic routes; communicate such routes to the public and communities.

Goal 5: Promote an Efficient Response and Recovery Process

- *Objective 5-1:* Identify and deploy assistive resources.
- *Objective 5-2:* Ensure accurate and timely communication with the public.
- *Objective 5-3:* Promote "neighbor helping neighbor" concepts.

Goal 6: Strive to be the Best Possible

- *Objective 6-1:* Seek professional accreditations.
- *Objective 6-2:* Continue personal and professional development opportunities.
- *Objective 6-3:* Seek additional community partnerships.
- *Objective 6-4:* Inform municipal officials of activities and elicit their support.
- *Objective 6-5:* Seek funding sources to assist program goals and objectives.

Goal 7: Reduce the Impacts of Climate Change on Vulnerability to Hazards

5.2 Identification and Analysis of Mitigation Actions

In addition to coming up with goals and objectives, the HMPT also created mitigation actions which could be taken to help achieve individual goals and objectives. The discussion on these actions centered around those that would achieve the goals and mitigate damages in the community from floods including actions necessary to join FEMA's Community Rating Program. Other types of actions discussed included the following:

- **Prevention** – Actions include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulation;

- **Property Protection** – Actions include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass;
- **Public Education and Awareness** - Actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs;
- **Natural Resource Protection** – Actions include sediment and erosion control, stream corridor restoration, watershed forest and vegetation management, and wetland restoration and preservation;
- **Emergency Services** - Services include warning systems, emergency response services, and protection of critical facilities; and
- **Structural Projects** - Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, and retaining walls.

5.3 Implementation of Mitigation Actions

After actions were identified, the responsible jurisdictions were instructed to go through a Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) review. This process utilizes a standardized worksheet to evaluate individual mitigation actions based on a set of criteria. Each element of the STAPLEE is defined as follows.

- Social: Will the action be acceptable to the community? Could it have an unfair effect on a particular segment of the population?
- Technical: Is the action technically feasible? Are there secondary impacts? Does it offer a long-term solution?
- Administrative: Are there adequate political and public support for the project?
- Political: Will there be adequate political and public support for the project?
- Legal: Does your jurisdiction have the legal authority to implement the action?
- Economics: Is the action cost-beneficial? Is there funding available? Will the action contribute the local community?
- Environmental: Will there be negative environmental consequences from the action? Does it comply with environmental regulations? Is it consistent with community environmental goals?

STAPLEE scores are then used to guide mitigation dollars ensuring that the most effective actions are completed first. Mitigation Strategies were outlined for all hazards identified by the communities in the County including those only identified by a single community. In total, the HMPT came up with more than 300 specific mitigation measures. Table 5-1 shows all of the Mitigation Strategies and their individual STAPLEE Scores

5.4 Status of 2007 Mitigation Actions

The following strategy draws heavily on the strategies identified in 2007 plan. Many of those strategies were either not completed due to resource limitations, or are ongoing actions.

However, some actions were removed due to being completed or having been determined by the HMPT as not required in this plan update. Appendix M identifies the actions from the 2007 plan and their status.

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
New development is designed and located in such a manner as to minimize risks associated with transport and use of hazardous materials	HM-1	Update the County comprehensive plan and land use regulations to promote development patterns in which major transportation routes and industrial facilities are located away from population centers, schools, groundwater recharge areas, etc.	Chautauqua County	27
Emergency response personnel respond quickly and effectively to a hazardous material release	HM-2	Provide annual Hazardous Materials Training to first responders	Chautauqua County	32
Improve access to areas within Chautauqua County that could be threatened by a hazardous materials incident	HM-3	Update the 2001 study for emergency access to Sunset & Hanford Bay.	Town of Hanover	32
Improve and restructure roadways within Chautauqua County that routinely carry traffic transporting hazardous materials	HM-4	Restructure NYS Route 60	Town of Gerry	36

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
F Flood				
Raise public awareness about flood hazards, flood safety and flood damage	F-1	Develop and implement a public outreach and education program regarding all natural hazards and risks. Program should create a website/information portal which allows individual homeowners to look up FIRM maps and other information on their property. Program should include information on flood proofing, flood insurance, storm sewers, and other mitigative measures. The website should be used as a consistently updated platform to disseminate hazard information to the public. The program should be tied to the emergency alert system so that in times of crisis information can still be disseminated quickly.	Chautauqua County	31
Update local flood maps	F-2	Work with FEMA and NYS Department of Environmental Conservation to ensure that all FIRM maps created prior to 2010 are updated by 2020. New maps should be then disseminated to all households and businesses in the floodplain.	Chautauqua County	29
	F-3	Update zoning throughout the county to increase regulation in flood hazard areas. Ensure that these laws coincide with updated FIRM maps and that code enforcement officials are educated on any changes and updates to code.	Chautauqua County	32
	F-4	Develop and implement a countywide program to help local municipalities meet the standards of the NFIP Community Rating System.	Chautauqua County	27

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
Protect new and existing development from stream bank erosion	F-6	Conduct a sedimentation and erosion study on all waterways and drainage throughout the county. Include information regarding private bridges and structures. This should include project ideas for keeping stream corridors clear of debris and stream banks stable.	Chautauqua County	28
Runoff from new construction and land use changes does not contribute to increased flood risks	F-7	Design and implement a watershed management plan for the County. Include an implementation plan for routine inspection and improvement of local waterways.	Chautauqua County	29
	F-8	Develop and implement a strategy to minimize the drainage impacts of timber harvesting activities	Chautauqua County	28
Resolve local drainage way issues identified by participating Chautauqua County municipalities	F-9	Alburtis Avenue flood project. Reconstruct street with proper draining and curbing	Village of Bemus Point	31
Mitigate flood risks of existing development	F-10	Install two retention ponds at Shadow Creek to mitigate overflow issues during severe rain events.	Town of Busti	30
	F-11	Purchase all necessary equipment including a Mud Cat dredger to maintain openings at the mouths of creeks near the Town	Town of Busti	29
	F-12	Operate direct intake pumps to alleviate flooding on Park Avenue/Dale Drive during severe storm events and spring snow melt	Village of Cassadaga	32
	F-13	Install larger cross pipe and rip rap ditches along Engdahl Road to alleviate flooding and erosion issues.	Town of Charlotte	30

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-14	Massey Avenue Culvert; inlet of the structure is located at the convergence of three streams; hydraulic opening of culvert is inadequate	Town of Chautauqua	36
	F-15	Re-establish original flow characteristics of the drainage channel to an unnamed tributary to Lake Erie along Otter, Ounce, Rabbit, and Warsaw streets and Wright Park Drive. Also, increase the capacity of downstream conveyance piping through the removal of vegetation.	Town of Dunkirk/City of Dunkirk	39
	F-16	Vineyard Drive - replacement of twin 36" pipes under Vineyard Drive-only method of conveyance of water and is not adequate	Town of Dunkirk/City of Dunkirk	40
	F-17	Fluvanna area mitigation and remediation of flooding exacerbated by I-86 construction; put a series of detention ponds along the stream to detain the storm water during peak flows; construct a storm sewer in North Bentley Avenue area to pick up waters trapped behind homes and drain to the outflow stream; construct a storm sewer system in the South Bentley Avenue, Bonita Lane and Denslow Avenue areas; improve cross culverts, protect stream banks and replace a deficient bridge on Old Fluvanna Road	Town of Ellicott	33
	F-18	Century Plaza mitigation and remediation of flooding exacerbated by development; construct a storm water detention pond; install larger storm sewers on Cobb Circle and Nottingham Circle	Town of Ellicott	31

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-19	Idlewood Drive and Orchard Road Drainage area; flooding with long history of danger to facilities and homes; construct a storm water detention pond above the problem area	Town of Ellicott	33
	F-20	North Hanford and North Butts storm water stream flooding exacerbated by residential development; replace existing arch culverts with box culvert on each street	Town of Ellicott	34
	F-21	Orchard Road and Southwestern Drive Drainage Area; flooding exacerbated by poor systems; install storm sewers along both highways, remove water flowing on private property and install detention pond or underground storage; stabilize shoulders to increase street width for public safety	Town of Ellicott	30
	F-22	Willard street extension drainage area flooding exacerbated by inadequate systems; upgrade storm sewers on the west end; construct a new storm drainage system on the east end	Town of Ellicott	40
	F-23	Storm drainage study throughout village	Village of Fredonia	44
	F-24	Kelly Hill flooding and erosion, install larger culvert pipe with a series of direct intakes and a cross pipe	Town of Pomfret	28
	F-25	Feral Road Flooding; culvert cannot take heavy runoff along slow drainage run on lower end	Town of Pomfret	26
	F-26	Bear lake road-flooding, culvert problem along with lower end drainage	Town of Pomfret	22
	F-27	Newell Road- replace detraining culverts over Scott Creek	Town of Sheridan	36

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-28	East Middle road- replace deteriorating culvert	Town of Sheridan	35
	F-29	Lord Road water runoff; replace inadequate culvert pipes; re-shape ditches and line with rip rap	Town of Stockton	30
	F-30	Bliss Street (Union Street Extension) - cover open ditches; install storm sewers	Village of Westfield	31
	F-31	Spring street-cover open ditches; install storm sewers	Village of Westfield	28
	F-32	Persons Street-Doty Creek railroad Culvert, expand culvert capacity at point where water enters railroad bed	Village of Westfield	28
Local implementation of mitigation of flood risks for existing development	F-33	Develop and implement a strategy for replacing undersized bridges and culverts of public roadways and on private property	Countywide	29
	F-34	Purchase and remove three houses and Ashville Fire Hall from 100-year floodplain in hamlet of Ashville	Town of North Harmony	21
Provide timely and reliable warning of floods and flash floods	F-35	Provide municipal officials and emergency response personnel with periodic training and in the use of flood stage maps and other tools as they relate to evacuations and other emergency response procedures	Countywide	28
Resolve local flooding/erosion/ice jam issues identified by participating Chautauqua County municipalities	F-36	Lower grade approach to Roberts Road to Route 60 and apply blacktop surface	Town of Charlotte	20

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-37	Clean debris and rip rap bank along Mill Creek	Town of Charlotte	20
	F-38	Dredge Prendergast and Dewittville creeks and remove vegetation along the shore	Town of Chautauqua	36
	F-39	Unnamed creek running beside mile strip and Kent switch Roads; 1400' of bank eroding; install 6 rows of concrete blocks 2' x 2' x 6'	Town of Cherry Creek	28
	F-40	Install rip rap on bank of Chandakoin River	Village of Falconer	36
	F-41	Upgrade water main crossings at Canadaway Creek	Village of Fredonia	30
	F-42	Update sewer siphon crossing at Canadaway Creek	Village of Fredonia	30
	F-43	Hatch creek and Damon hill bridge & route 60 bridge; heavy rains could cause flooding and/or bridge washout at these locations, as well as property erosion along the streambed between the two bridges; streambed and banks need to be cleaned out; the Route 60 bridge is constructed with a center pier that collects debris	Town of Gerry	36
	F-44	Evaluate and manage large debris along the Chadokin River and place rip rap to control erosion	City of Jamestown	34
	F-45	Replace bridge on Ellicott Road	Town of Portland	34
	F-46	Replace bridge on Webster Road	Town of Portland	32
	F-47	Replace bridge on South Roberts Road	Town of Sheridan	35

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-48	Replace culvert on North Hill Road; existing 14' x 40' culvert would be replaced with 14' x 60'; line banks with rip rap; install 300' guard rail and gravel road bed with blacktop surface – 20' lane	Town of Villenova	28
	F-49	Replace the break wall at Village Park to prevent erosion	Village of Celeron	28
	F-50	28 creek throughout village to confluence with Clear Creek; add rip rap to retain shape in critical areas	Town of Ellington	36
Create Greenspace for future flooding	F-51	Install rip rap on bank of Moon Bridge & Richard Ave Bridge in Falconer Park	Village of Falconer	37
	F-52	Complete restoration of retaining wall at Forest Place	Village of Fredonia	30
	F-53	Mill Creek flooding and erosion; install rip rap on bank that is experiencing erosion due to flooding	Village of Sinclairville	31
	F-54	Repair County Bridge #853, County Road 312; install flooding and erosion/ Canadaway Creek; install rip rap bed sills, weirs on banks/streambed that experience flooding erosion	Town of Arkwright	12
Resolve county flooding/erosion issues identified by the Chautauqua County Department of Public Facilities	F-55	Repair County Bridge #76, County Road 312; remove gravel, sand and silt deposits that choke drainage structure causing roadway flooding and shoulder erosion	Town of Arkwright	12
	F-56	Repair County Bridge #56, County Road 307; Walnut Creek – install rip rap bed sills wires on banks/streambed that experiences flood erosion	Town of Arkwright	12

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
Discourage development in 100-year flood plain by creating green space	F-57	Repair County Bridge #51, County Road 306	Town of Arkwright	12
	F-58	Repair County Bridge #52, County Road 306	Town of Arkwright	12
Raise public awareness about flood hazards, flood safety and flood damage	F-59	Repair County Bridge #53, County Road 306	Town of Arkwright	12
Mitigate County flood and erosion hazards through repair of county bridges and transportation infrastructure	F-60	Repair County Bridge #39, County Road 307	Town of Arkwright	12
	F-61	Repair County Bridge #40, County Road 307	Town of Arkwright	12
	F-62	Repair County Bridge #41, County Road 307	Town of Arkwright	12
	F-63	Repair County Bridge #55, County Road 307	Town of Arkwright	12
	F-64	Repair County Bridge #64, County Road 307	Town of Arkwright	12
	F-65	Repair County Bridge #311, County Road 307	Town of Arkwright	12
	F-66	Repair County Bridge #843, County Road 307	Town of Arkwright	12
	F-67	Repair County Bridge #52, County Road 312	Town of Arkwright	12
	F-68	Repair County Bridge #987, Straight Road	Town of Arkwright	12
	F-69	Repair County Bridge #846, Henry Road	Town of Arkwright	12
	F-70	Repair County Bridge #818, County Road 80; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Carroll	35
	F-71	Repair County Bridge #819, County Road 80; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Carroll	35

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-72	Repair County Bridge #20, County Road 80; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Carroll	35
	F-73	Repair County Bridge #820, County Road 80; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Carroll	35
	F-74	Repair County Bridge #821, County Road 80; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Carroll	35
	F-75	Repair County Bridge #194, County Road 80; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Carroll	35
	F-76	Repair County Bridge #267, County Road 49; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Charlotte	20
	F-77	Repair County Bridge #822, County Road 49; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Charlotte	20
	F-78	Repair County Bridge #903, County Road 49; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Charlotte	20
	F-79	Repair County Bridge #331, County Road 49; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Charlotte	20
	F-80	Repair County Bridge #924, County Road 49; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Charlotte	20

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-81	Repair County Bridge #895, County Road 326; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Charlotte	20
	F-82	Repair County Bridge #896, County Road 326; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Charlotte	20
	F-83	Repair County Bridge #142, County Road 326; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Charlotte	20
	F-84	Repair County Bridge #143, County Road 326; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Charlotte	20
	F-85	Repair County Bridge #1023, Mill Creek Road; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Charlotte	20
	F-86	Repair County Bridge #1030, Mill Creek Road; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Charlotte	20
	F-87	Repair County Bridge #837, County Road 29; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Village of Cherry Creek	31
	F-88	Repair County Bridge #342, County Road 62; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Village of Cherry Creek	31
	F-89	Repair County Bridge #343, County Road 62; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Village of Cherry Creek	31

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-90	Repair County Bridge #344, County Road 62; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Village of Cherry Creek	31
	F-91	Repair County Bridge #346, County Road 62; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Village of Cherry Creek	31
	F-92	Repair County Bridge #347, County Road 62; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Village of Cherry Creek	31
	F-93	Repair County Bridge #348, County Road 62; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Village of Cherry Creek	31
	F-94	Repair County Bridge #349, County Road 62; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Village of Cherry Creek	31
	F-95	Repair County Bridge #237, County Road 62; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Village of Cherry Creek	31
	F-96	Repair County Bridge #289, County Road 62; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Village of Cherry Creek	31
	F-97	Repair Stream from County Bridge #804 to #861; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion; remove flood deposits choking structures/streambed	Village of Cherry Creek	31

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-98	Repair County Road 651 northerly 1500' through County Fairgrounds; undersized/deteriorated causing flooding of rad and fairgrounds often disrupting the annual county fair	Town of Dunkirk/City of Dunkirk	31
	F-99	Repair County Road 145 at Millard Fillmore & Vineyard Drive from Central Avenue to Rte. #60; undersized/outdated for the commercial development that is taking place; heavy rainfall causes flooding of the road and disrupts business	Town of Dunkirk/City of Dunkirk	29
	F-100	Repair County Road 81; west ditch line 4 ¼ mile length; remove gravel and channery fragment deposits that choke drainage structures and cause roadway flooding and shoulder erosion	Town of Ellicott	38
	F-101	Repair County Road 132, approximately ½ miles length; remove gravel, sand and silt deposits that choke drainage systems and structures and cause roadway flooding and shoulder erosion	Town of Ellicott	39
	F-102	Repair County Road 143 industrial corridor; remove gravel, sand and silt deposits that choke drainage systems, structures and detention ponds and cause roadway flooding and shoulder erosion	Town of Ellicott	39
	F-103	Repair County Road 340 near confluence of Chadakoin Rover and Conewango Creek; remove flood deposits and debris and repair roadway damage that interrupts traffic flow and commerce	Town of Ellicott	42
	F-104	Repair County Road 605 near Conewango Creek; remove flood deposits and debris and repair roadway damage that interrupts traffic flow and commerce	Town of Ellicott	41

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-105	Repair Harris Hallow Road - BR. 940, 1045, 1019, 838; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Ellington	41
	F-106	Repair 28th Cr. Road - BR. 1104, 1029, 906, 1064, 1065; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Ellington	41
	F-107	Repair County Bridge #1066, County Road 140 – debris catches on the pier, plugs the structure and causes flooding in downtown Fredonia area; replace the structure without the pier and widen the channel downstream	Village of Fredonia	30
	F-108	Repair County Bridge #1039, Risley Street – the streambed has eroded, undermining the bridge foundation – stabilize the streambed to prevent further damage to the bridge and adjacent properties	Village of Fredonia	30
	F-109	Repair County Bridge #913, Damon Hill Road; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Gerry	32
	F-110	Repair County Road 5M from Overhiser Road to King Road; replace failing out of Right of way drainage structure to restore storm event stream flow to original location	Town of Hanover	32
	F-111	Repair County Bridge #198, County Road 307, Walnut Creek - install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Hanover	26

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-112	Repair County Bridge #849, County Road 307, Walnut Creek - install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Hanover	26
	F-113	Repair County Bridge #985, Laona Road, Walnut Creek - install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Hanover	26
	F-114	Remove gravel, sand and silt deposits that choke, erode and wash out drainage systems, structures and detention ponds and dams that cause roadway flooding, shoulder erosion and disrupt commerce along unnamed tributary to the Chadakoin river that flows across County Road 105, Buffalo Street and into the County Road 143;	City of Jamestown	21
	F-115	Repair County Road 341, south most approximately ½ mile; an area north west of the confluence of Stillwater Creek and Conewango Creek – remove flood deposits and debris and repair roadway damage that interrupts traffic flow and commerce	Town of Kiantone	23
	F-116	Repair County Bridges #972 & 997, County Road 37 – remove flood deposits and debris and repair roadway/ shoulder damage that interrupts traffic flow and commerce	Town of North Harmony	29
	F-117	Repair County Bridges #892, 937 & 1002, County Road 325 – remove flood deposits and debris and repair roadway/ shoulder damage that interrupts traffic flow and commerce	Town of Poland	30

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-118	Repair County Bridges #162 & 284, County Road 325 – remove flood deposits and debris and repair roadway/ shoulder damage that interrupts traffic flow and commerce	Town of Poland	30
	F-119	Repair County Road 340 – remove flood deposits and debris and repair roadway/ shoulder damage that interrupts traffic flow and commerce	Town of Poland	30
	F-120	Repair County Bridge #844, County Road 307, Walnut Creek; install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Town of Sheridan	34
	F-121	Repair County Bridge #959, Hall Road, Mill Creek - install rip rap, bed sills, weirs on banks/streambeds that experience flooding erosion	Village of Sinclairville	33
	F-122	Repair County Road 342, 3 miles, south end - remove flood deposits and debris and repair roadway/ shoulder damage that interrupts traffic flow and commerce	Town of Stockton	29
	F-123	Repair County Bridge #77, County Road 312; remove gravel, sand and silt deposits that choke drainage structure causing roadway flooding and shoulder erosion	Town of Villenova	26
	F-124	Repair County Road 74, Mt. Baldy Road to Hardscrabble Road – remove gravel and channery fragment deposits that choke drainage structures, cause roadway flooding, shoulder erosion, undermine culverts and guide railing	Town of Westfield	35

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	F-125	Repair County Road 641 approximately ½ miles length; remove gravel, sand and silt deposits that choke drainage structure causing roadway flooding and shoulder erosion	Towns of Ellicott/Gerry	30
	F-126	Purchase two parcels of land that are not currently developed and partially in the 100-year floodplain	Village of Panama	41
	F-127	Purchase pond property using public funds for upkeep and maintenance and creating green space for village per village plan	Village of Panama	36
	F-128	Purchase vacant wetland north of railroad tracks	Village of Lakewood	35
	F-129	Peerless Street Bridge: The bridge over Peerless Street that crosses over the Slippery Rock Creek has restricted the creek to a bottle neck situation; bridge needs to be replaced	Village of Brocton	N/A
Reduce vulnerability of critical infrastructure to flood events.	F-130	Conduct a comprehensive assessment of critical facilities in the County to assess vulnerability to flood and identify strategies for mitigating impacts and ensuring continuity of service and access.	Chautauqua County	TBD
SW Severe Weather				
Tree Maintenance	SW-1	Develop and implement a Tree Maintenance Plan throughout the county with a focus on utility right-of-ways and including a countywide brush and yard debris pickup service.	Chautauqua County	29

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	SW-2	Provide municipal personnel with annual defensive driver training, which includes information about how to respond to severe weather conditions; program will be geared towards public transit drivers, snowplow drivers and those who transport hazardous materials however all personnel would be encourage to attend.	Chautauqua County	27
Resolve local storm water issues identified by participating Chautauqua County Municipalities	SW-3	Replace existing 3' galvanized steel pipe with 3' plastic pipe along Prospect Road from Hardenberg Road to Route 20 because old pipe is deteriorating and clogged with debris during severe storms evaluate the use of a larger pipe width to alleviate clogging with debris during severe storms	Town of Westfield	33
WSC Water Supply Contamination				
Reduce or eliminate potential water contamination by relocation of existing facilities or elimination of private sewage treatment systems causing elevated levels of contamination in local water bodies	WSC-1	Relocate deteriorating transmission line to under Conewango Creek that is currently hung on DOT bridge and subject to inflows from surface water; expand water storage capacity of Well #4 with new 500,000 gallon water storage tank	Town of Carroll	35
	WSC-2	Design and build alternate potable water facility. Currently all wells are located immediately adjacent to Mud Creek and are subject to disruption and contamination by flooding of Mill creek.	Village of Mayville	26

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	WSC-3	Design and build municipal sewage system in area of Findley Lake	Town of Mina	41
Retrofit existing facilities to mitigate potential water supply contamination	WSC-4	Repair and rehabilitate Hall Spring House. Mitigate for consistent and regular flood events to ensure safe drinking water is available	Village of Forestville	
T Terrorism				
Provide the public with information about potential terrorist threats and how to respond	T-1	Conduct a Terrorism Vulnerability Analysis for all critical facilities in the County and develop force protection plans for each facility.	Chautauqua County	24
W&F Wildfire and Fire				
Emergency services are provided in a timely and effective manner	W&F-1	Conduct a County-wide Fire Prevention study that identifies the locations of water resources capable of being utilized during a fire (urban or wildland).	Chautauqua County	31
TA Transportation Accident				
Promote transportation safety	TA-1	Provide municipal personnel with annual defensive driving training; The program would be designed for school bus drivers, public transit drivers, snowplow drivers and those who transport hazardous materials but all personnel could participate.	Chautauqua County	28
New development projects are designed and located to promote transportation safety	TA-2	Update local hospital disaster plans	Chautauqua County	27
CU Civil Unrest				
Promote public safety during times of civil unrest	CU-1	Conduct annual training exercises for local law enforcement handling large crowds, riots, and other volatile public situations.	Chautauqua County	25

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
SC Structural Collapse				
Retrofit or rebuild existing aging buildings in Chautauqua County to avoid structural collapse	SC-1	Create Countywide incentive program to help homeowners demolish and remove unsafe structures from their property	Chautauqua County	27
	SC-2	Design and build new highway building; present building constructed in mid-1800s and becoming a structural hazard	Town of Sherman	28
UF Utility Failure				
Reduce incidents of utility failure to a minimum by ensuring that infrastructure is up to date and critical facilities are operative	UF-1	Purchase backup power sources for all critical facilities in the County	Chautauqua County	27
Bury utility cables so they are not susceptible to damage by wind, ice or fallen limbs, causing power failures	UF-2	Relocate electric utility lines underground throughout the county.	Chautauqua County	25
Resolve tree maintenance issues identified by participating Chautauqua County municipalities	UF-3	Implement annual spring tree pruning program	Village of Sherman	31
D Drought				
Ensure infrastructure is in good condition with minimal leaking	D-1	Institute a groundwater tracking and monitoring program which measures groundwater levels throughout the county and provides an early warning system when drought conditions persist.	Chautauqua County	22

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
DF Dam Failure				
Determine area to be affected in the event of dam failure	DF-1	Conduct dam failure analysis, delineating the inundation zone in the event of a credible worst case scenario	Chautauqua County	26
Resolve local issues identified by Chautauqua County municipalities relating to dam integrity and related structures	DF-2	Upgrade spillway at Fredonia Reservoir Dam-capacity of spillway is inadequate	Village of Fredonia	34
	DF-3	Repair dam structure which was significantly damaged during April 2005 winter storm which created a combination of ice as well as foreign material	Town of Ripley	38
	DF-4	Repair Findley Lake Dam structure. Fixing current holes and strengthening against further damage from storm events.	Town of Mina	38
Determine area to be affected in the event of dam failure	DF-5	Conduct dam failure risk analysis and elevate those in the inundation zone for a credible worst case scenario	Town of Pomfret	N/A
I Infestation				
Determine levels of responsibility between federal, state and local government	I-1	Develop and implement a public outreach program aimed at agriculture and animal culture operations which provides information and guidance on various disease treatments and control options.	Chautauqua County	27

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
L&LS Landslides and Land Subsidence				
Prevention of future land subsidence/ landslide incidents	L&LS-1	Draft and implement a landslide and subsidence mitigation plan for jurisdictions affected by this hazard. This would include a zoning code update to utilize best practices/materials for building in hazard areas.	Chautauqua County	27
Prevention of future land subsidence/ landslide incidents identified by Chautauqua County	L&LS-2	Mee Road stabilization project - lower level road, lay geo-fabric, layer of gravel, rebuild road base, install French drain on east side of road to intercept subsurface water	Town of Poland	28
	L&LS-3	County Road #64, 2-1/2 miles; silt/gravel deposition and slope failures from rainstorms; remove gravel and channery fragment deposits that choke drainage structures and cause roadway flooding and shoulder erosion; stabilize banks to alleviate landslides involving the roadway section	Town of Ripley	23
MH Multiple Hazards				
Resolve local issues concerning critical facilities and operations as identified by participating Chautauqua County municipalities	MH-1	Annually provide fire, severe weather, and counter terrorism drills to schools throughout the County	Chautauqua County	27
	MH-2	Remodel Fire Hall building to provide proper command facilities as well as shelter for people either by remodeling building or purchasing property and building new facility with sufficient space to house emergency equipment	Village of Panama and Town of Harmony	38

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	MH-3	Upgrade the water treatment facility. Reinforce the base holding tanks. Install fine bubble aerators to improve any unexpected discharges due to floods. Install caps over the wastewater effluent discharge to prevent water from re-entering.	Village of Silver Creek	38
	MH-4	Provide municipal officials with annual training in the Incident Command System and the operations procedures specified in the Chautauqua County Heath Preparedness and Emergency Response Plan and Hazardous Materials Emergency Response Plan	Chautauqua County	32
	MH-5	Periodically verify that the equipment identified in the Chautauqua County Health Preparedness and Emergency Response Plan and Hazardous Materials Emergency Response Plan is available and in good condition	Chautauqua County	32
	MH-6	Survey local animal hospitals and kennels, identifying facilities where pets and farm animals can be housed during an evacuation	Chautauqua County	29
Maintain political support for hazard mitigation and emergency response	MH-7	Hold an annual workshop to review contents of the Chautauqua County Public Health Preparedness and Emergency Response Plan and Hazardous Materials Emergency Response Plan with the Disaster Preparedness Commission, Emergency Medical Services Council and Fire Advisory Board each time the plans are updated	Chautauqua County	30
Implementation of local measures to ensure that future land use decisions support hazard mitigation measures	MH-8	Planning and zoning to work on prevention problems; Highway department to work on storm water/erosion control, use of best management practices at all times	Towns of Arkwright, Clymer, French Creek, and Ellery	36

Table 5-1 Mitigation Actions

Hazard-Specific Objective	Strategy	Mitigation Action	Jurisdiction	STAPLEE Score
	MH-9	Update village zoning code/map; develop new zoning code which has greater emphasis on green space, storm water control and vegetation	Village of Lakewood	39
	MH-10	Develop a storm water management plan which will stop siltation into Chautauqua Lake, control creeks and ditches, eliminate ponding after storms	Village of Lakewood	31
Multi-Hazard (Explosion, Hazardous Materials)	MH-11	Provide annual training for emergency responders about explosive substances and appropriate management techniques	Chautauqua County	29
Support efficient evacuation and adequate sheltering of displaced populations including strategies for intermediate and long-term housing.	MH-12	Update County evacuation and mass care plans including development of community-specific evacuation routes, identification of shelter locations, and identification of potential sites for temporary housing.	Chautauqua County	TBD
CC Climate Change				
Impact of climate change on County vulnerability to hazards.	CC-1	Conduct an analysis of the potential impact of climate change on the County to include an analysis of how climate change may affect the County's vulnerability to hazards identified in the mitigation plan (flood, severe storms, winter storms, and tornado). The study should also include concrete strategies and recommendations for action that the community can implement to reduce the impact of climate change and incorporate climate change into multiple planning mechanisms.	Chautauqua County	TBD

6. PLAN IMPLEMENTATION AND MAINTENANCE

Chapter 6 provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

6.1 Plan Monitoring and Evaluation

6.1.1 Participating Jurisdictions

With adoption of this plan, each participating jurisdiction will be tasked the monitoring and evaluation of plan implementation as well as the maintenance and updating of the plan. Led by the Chautauqua County Emergency Management Office (CCEMO), the participating jurisdictions agree to:

- Meet annually to monitor and evaluate the implementation of the plan.
- At their discretion, meet after a disaster event to evaluate the effectiveness of the plan.
- Act as forum for hazard mitigation issues.
- Disseminate hazard mitigation ideas and activities to all participants.
- Pursue the implementation of high, medium, low, or no cost recommended actions.
- Assist in implementing and updating this plan.
- Consider the goals, objectives, and mitigation actions of this plan during other planning efforts in their community.
- Report on plan progress and recommended changes to the Chautauqua County Board of Supervisors and governing body of participating jurisdictions.
- Inform and solicit input from the public through public meetings and web notices.

6.1.2 Plan Maintenance Schedule

Each participating jurisdiction representative will monitor and track their jurisdiction's progress toward achieving the action items listed in the plan. Then, as identified in Chapter 1, the HMPT will meet annually and, as needed after a hazard event, to monitor progress and update the mitigation strategy. After each meeting, a report will be made available to the public via the county website. The report will include a meeting summary and a list of all action items the HMPT will move forward with into the next year. In coordination with other participating jurisdictions, a five-year written update of the plan will be submitted to the New York State Department of Homeland Security and Emergency Services and FEMA Region II per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000 and adopted by participating jurisdictions. The update will be submitted within a five-year period from the final approval of this plan unless a disaster or other circumstances (e.g., changing regulations) require a change to this schedule.

6.1.3 Plan Maintenance Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting the following:

- Decreased vulnerability as a result of implementing recommended actions.
- Increased vulnerability as a result of failed or ineffective mitigation actions.
- Increased vulnerability as a result of new development (and/or annexation).

Updates to this plan will:

- Consider changes in vulnerability due to the implementation of mitigation actions.
- Document success stories where mitigation efforts have proven effective.
- Document areas where mitigation actions were not effective.
- Document any new hazards that may arise or were previously overlooked.
- Incorporate new data or studies on hazards and risks.
- Incorporate new capabilities or changes in capabilities.
- Incorporate growth and development-related changes to inventories.
- Incorporate new action recommendations or changes in action prioritization as a result of climate change.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the participating jurisdictions will be responsible for the following:

- Reporting the status of mitigation actions identified in their jurisdiction to the CCEMO on an annual basis.
- Providing input as to whether completed mitigation actions reduce vulnerabilities as intended.
- Create additional implementation measures to correct for any failed mitigation actions as necessary.

Changes will be made to the plan to adjust actions that have failed. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed during the monitoring and update of this plan to determine the feasibility of future implementation. Updating of the plan will be enacted through written changes and submittals, as CCEMO deems appropriate and necessary and as approved by the Chautauqua County Board of Supervisors and the governing boards of the other participating jurisdictions.

6.1.4 Monitoring and Updating

On a day-to-day basis, CCEMO will coordinate with local jurisdictions to incorporate the objectives and actions of this plan into local planning documents, procedures, and budgets.

These operational changes may include updates to job descriptions, work plans, site reviews, and staff training. Long-term changes may include revisions to existing comprehensive plans, capital improvement plans, zoning and building codes, permitting, and other planning tools.

CCEMO will also work with jurisdictions to include mitigation projects in annual budgets, rather than relying solely upon grant programs, and to integrate hazard mitigation in future land use and strategic planning.

6.1.5 Continued Public Involvement

Ongoing public involvement is a key component of the plan implementation and update process. Each year CCEMO will prepare and distribute a report on the implementation of the current mitigation plan, which is made available to the HMPT and the public. These reports, along with specific reports for each mitigation measure being implemented and all stakeholder comments received, will be assessed to make improvements in the plan update released every five years.

Comments received from the public will be considered and incorporated, where appropriate, into the HMPT update. The county website, local jurisdictions' websites, and local media, including newspapers and newsletters will be used to inform the public regarding upcoming meetings, recent developments, and directions on how to provide comments.

The county and the participating jurisdictions are committed to the continued involvement of the public in the hazard mitigation process. The plan will be posted on the county web site and copies of the plan will be made available for review during normal business hours at CCEMO's offices.

THIS PAGE LEFT BLANK INTENTIONALLY

Photo credit: Chautauqua County Department of Planning and Economic Development