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*Multi-Jurisdictional Hazard Mitigation Plan*

**Chautauqua County**

Office of Emergency Services

Prepared For

**Chautauqua County**

Office of Emergency Services

2 Academy Street

Mayville, NY 14757

June 7, 2024

**Barton & Loguidice**

Chautauqua County, New York

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2 Academy Street  
Mayville, NY 14757

Prepared By:

Barton & Loguidice, D.P.C.  
11 Centre Park Suite 203  
Rochester, New York 14614

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## **1.0 INTRODUCTION**

### **1.1 Background**

A hazard is defined by the Federal Emergency Management Agency (FEMA) as an event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural losses, damage to the environment, interruption of business, or other types of harm or loss. A hazard can be natural, technological, or human-caused. Natural hazards are a source of harm created by a meteorological, environmental, or geological event. Events such as floods or earthquakes impact the built environment and pose a threat to people’s lives (FEMA, 2022). Human-caused or technological hazards are the result of intentional or unintentional events that are caused by humans or by materials created by humans (FEMA, 2017).

Hazard mitigation is defined by FEMA as a method for reducing or alleviating property loss, preventing damage to the environment, and limiting the number and severity of injuries that occur from hazard events through long and short-term strategies. Responsibility for implementing mitigation measures runs communitywide from individuals to industries, private business and all levels of government (FEMA, 2017).

Hazard mitigation is often considered one of four phases of emergency management after a disaster event occurs. The other phases include preparedness, response and recovery. Each of these phases relate to and rely upon each other. The overarching goal for each of these emergency management phases is the prevention or minimization of loss of life and property in disaster situations.

FEMA provides assistance through the Robert T. Stafford Disaster Relief and Emergency Assistance Act to local governments that are recovering from a hazard event. The Federal Disaster Mitigation Act of 2000 (DMA 2000) recognized the importance and cost-effectiveness of mitigation in specifying that local governments must have a FEMA approved natural hazard mitigation plan to be eligible for mitigation project funding.

To meet the federal requirements of the Disaster Mitigation Act of 2000, Chautauqua County completed a Multi-Jurisdictional Hazard Mitigation Plan (HMP) that was approved by FEMA in 2007, and updated in 2016. HMPs must also be updated every five years to continue municipal eligibility for mitigation project funding. The County was awarded a Pre-Disaster Hazard Mitigation Grant from FEMA to update their 2016 HMP.



## 1.2 Purpose

This Multi-Jurisdictional HMP is an update to the Chautauqua County 2016 HMP. This updated HMP will allow the County to remain eligible for future mitigation funding. The purpose of this plan is to document the natural hazards that affect Chautauqua County and outline practical mitigation strategies that can be implemented to reduce the effects of such hazard events. The County and each of its jurisdictions identified and ranked the hazards to which their community is most vulnerable. In addition, the HMP also includes an assessment of the risks and vulnerabilities associated with each hazard and details mitigation strategies to moderate those vulnerabilities and decrease hazard risks. The identified mitigation measures were required to be technically feasible, cost-effective, and environmentally sound.

The Chautauqua County Office of Emergency Services (OES) is the coordinating agency for all emergency management activities. This office is responsible for life safety, property, and environmental protection from all hazards that may occur within the County. The development of a County HMP provides the following benefits:

- Increased understanding of the natural hazards the County faces;
- Development of more sustainable and disaster-resistant communities;
- Partnerships that support planning and mitigation efforts;
- Reduced long-term impacts to structures and human health; and
- Eligibility for Federal funds for pre-disaster mitigation planning (DMA 2000).

Comments or questions concerning this document should be addressed to:

Chautauqua County Office of Emergency Services  
Chautauqua Municipal Building, 2 Academy St # A  
Suite A, Room 106  
Mayville, NY 14757  
Phone Number: (716) 753 - 4341  
Website: <http://www.chautcofire.org/>

## 1.3 Planning Participants

There are 27 towns, 13 villages, and 2 cities located within Chautauqua County. Table 1.1 (Appendix A) includes an alphabetical list of jurisdictions within the County as well as the representatives of each jurisdiction for the HMP update. All jurisdictions were invited and encouraged to participate in this plan update, and all 42 jurisdictions met the criteria for participation. Participation criteria was established by the Mitigation Planning Committee (see Section 3.2 for members) as the first step in the planning

process. The criteria required for a jurisdiction to be included as a participating member in the County's HMP is summarized in Section 1.4. A summary of each jurisdiction's participation status is further provided below in Table 1.2. Jurisdictional annexes, which describe the specific mitigation goals of the County and each municipality in detail, are provided in Appendix B.

<b>Table 1.2 – Jurisdiction Participation Criteria</b>				
<b>Jurisdiction</b>	<b>Submitted Participation Form or Committed to Participate</b>	<b>Met with County OES and Consultant Team to Update 2016 Information</b>	<b>Reviewed Jurisdictional Annex</b>	<b>Passed Resolution to Formally Adopt HMP Update*</b>
City of Dunkirk	X	X	X	
City of Jamestown	X	X	X	
Town of Arkwright	X	X	X	
Town of Busti	X	X	X	
Town of Carroll	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	X	
Town of Dunkirk	X	X	X	
Town of Ellery	X	X	X	
Town of Ellicott	X	X	X	
Town of Ellington	X	X	X	
Town of French Creek	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	X	
Town of Mina/Findley Lake	X	X	X	
Town of North Harmony	X	X	X	
Town of Poland	X	X	X	
Town of Pomfret	X	X	X	
Town of Portland	X	X	X	
Town of Ripley	X	X	X	
Town of Sheridan	X	X	X	
Town of Sherman	X	X	X	
Town of Stockton	X	X	X	
Town of Villenova	X	X	X	
Town of Westfield	X	X	X	
Village of Bemus Point	X	X	X	
Village of Brocton	X	X	X	
Village of Cassadaga	X	X	X	
Village of Celoron	X	X	X	
Village of Falconer	X	X	X	
Village of Fredonia	X	X	X	
Village of Lakewood	X	X	X	
Village of Mayville	X	X	X	
Village of Panama	X	X	X	
Village of Sherman	X	X	X	

Village of Silver Creek	X	X	X	
Village of Sinclairville	X	X	X	
Village of Westfield	X	X	X	
<i>* Jurisdictions will pass resolutions to adopt the updated HMP after the final plan is approved by NYS DHSES and FEMA</i>				

Figure 1.1 (Appendix A) shows the boundaries of all jurisdictions within Chautauqua County. Jurisdictional outreach was completed on an individual basis to foster meaningful discussions focused on each community. Representatives from all jurisdictions met with Chautauqua County’s Office of Emergency Services (OES) and consultant team staff to review and update their municipal data from the 2016 HMP, and to discuss new information and mitigation strategies to be included in this HMP update. Detailed information regarding project meetings and participants is further provided in Appendix C, Meeting Summary.

**1.4 Hazard Mitigation Planning Process**

Jurisdictions were required to meet the following criteria to be considered eligible participants in the HMP update:

- Indicate their intent to participate via participation form submission or direct communication to the County and/or consultant team
- Meet with the County OES and consultant team to:
  - Review and update 2016 HMP data
  - Assess natural hazards and determine which have the greatest possibility of impacting the jurisdiction;
  - Provide a status update on 2016 mitigation actions;
  - Develop at least one pre-disaster mitigation action per hazard identified for inclusion in the HMP update;
  - Complete a cost-benefit analysis of proposed mitigation actions; and
- Review the information presented in their jurisdictional annex.

Participating jurisdictions will receive a copy of the link to the draft HMP on the County website so they may share it with their constituents by posting it on their website or social media pages (if available). Participating jurisdictions will also pass a resolution to adopt the final HMP update, once the plan is formally approved by FEMA. The County’s 2016 HMP focused on natural hazards during the risk assessment process, and also

covered selected technological/human-caused hazards. The current HMP update focuses solely on natural hazards. The Mitigation Planning Committee elected to exclude technological and human-caused hazards from the scope of the HMP update due to the fact that mitigation projects related to such hazards are not eligible for mitigation grant funding through FEMA. The mitigation actions proposed by the County and individual jurisdictions were developed to mitigate natural hazards. Chautauqua County has noted concerns and mitigation planning needs regarding technological and human-caused hazards, particularly related to utility failure. However, the Committee decided that mitigation planning regarding non-natural hazard events would be more effectively covered under separate planning efforts.

## **2.0 CHAUTAUQUA COUNTY PROFILE**

### **2.1 Geographic Location**

Chautauqua County is situated in the westernmost part of New York State, bordered by Lake Erie to the north, Pennsylvania to the west and south, and the Seneca Nation of Indians, Erie County, and Cattaraugus County to the east (Chautauqua County, 2011). The county's landscape is diverse, ranging from the flat shoreline of Lake Erie in the north to the rolling hills of the Appalachian Plateau in the south (Chautauqua County, 2011). One of the most significant features of the county is the Allegheny Plateau's escarpment, which traverses most of the county, creating a microclimate that favors grape cultivation (Chautauqua County, 2011). Moreover, the escarpment serves as a vital watershed divide, with the water to the south and east draining into the Mississippi River and eventually into the Gulf of Mexico, while the water to the north and west flows into the St. Lawrence River and out to the Atlantic Ocean (Chautauqua County, 2011).

Chautauqua County covers 1,500 square miles, of which 440 square miles is water (U.S. Census Bureau 2010). The Chautauqua County seat is located in the Village of Mayville, the geographic center of the County. The county is comprised of 42 municipalities, 27 of which are towns, 13 are villages, and 2 are cities. The Village of Forestville was dissolved in 2016, and the Town of Hanover has since taken control of governmental operations. Additionally, the Village of Cherry Creek voted to dissolve and join the Town of Cherry Creek in 2017. The Town of Chautauqua is the largest municipality in the County, encompassing 67.2 square miles, and the Village of Bemus Point is the smallest municipality, covering 0.4 square miles (3.6% of the total County area).

## 2.2 Climate Characteristics

New York State has a humid continental climate, with warm summers and cold winters (NYSDEC, 2021). Figures 2.2, 2.3, and 2.4 (Appendix A) show average January temperatures, average July temperatures, and average annual precipitation throughout New York State. Average January temperatures range from 10°F in the central portion of Chautauqua County to 34°F in areas of the County that are along the coast of Lake Erie. Average July temperatures range from 56°F in the central parts of the County and 78°F in areas of the County that are along the coast of Lake Erie. Average precipitation ranges from 39 inches in areas of the County that are along the coast of Lake Erie and 49 inches in the central and southwestern portion of the county.

Western New York is bound by two Great Lakes which moderate near-shore temperatures. Contrasting lake and land temperatures, prevailing southwest winds, and lake to land breezes reduce the frequency and intensity of extreme heat. The county's close proximity to these lakes means that temperatures are cooler in the spring and early summer and warmer in late summer and autumn compared to inland locations. Over half of Western New York's annual snowfall comes from this 'lake effect' process. Locations in the region's southern areas, such as parts of Chautauqua County, receive much more lake effect snow than locations to the north (SUNY Buffalo, 2020). Municipalities that are located along the coast of Lake Erie, such as the City of Dunkirk or Village of Silver Creek, have temperatures that are moderated by the lake and as a result they receive less precipitation, especially when compared to southern Chautauqua County (SUNY Buffalo, 2020).

## 2.3 Climate Change

Natural disasters are the result of a complex interaction between the physical, built, and human environments. The physical environment is producing more natural disasters due to the cascading effects of climate change. Despite climate change causing massive destruction in communities, the built environment is still expanding in many high risk areas. This development in turn results in continuously high levels of vulnerability as more and more people are residing in areas that experience frequent hazard events (Tyler, 2016).

The effects of climate change are currently being felt throughout New York State. According to a report issued by the New York State Department of Conservation (NYSDEC) on observed and projected climate change, the state is being impacted by climate change in a number of ways:

Average Temperatures: New York is warming at an average rate of 0.25°F per decade and annual average temperatures have increased in all regions of the state. Annual Average temperatures in the state are projected to rise 4.1°F to 6.1°F by the 2080, and potentially as much as 12°F by 2100 in some regions (NYSDEC, 2021).

Average Precipitation: Most regions in the state have experienced an increase in average annual precipitation over the last century. It is anticipated that a majority of New York State will experience more frequent precipitation. Most of the increase in total precipitation is expected in winter and spring, with little change expected in the summer. The NYSDEC report additionally notes that there has been a nationwide trend of increasingly frequent extreme precipitation events that has been most prominent in the Northeast, including in New York State (NYSDEC, 2021).

Drought: It is expected that late-summer, short-term droughts will become increasingly frequent toward the end of the century, and that the effects of these droughts will be made worse by evaporation of surface water resulting from higher temperatures.

Snowfall: While annual snowfall varies widely across the state, New York averages about 40 inches of snow annually. As a result of changing climate conditions it is anticipated that snowfall in New York is likely to become less frequent, resulting in a shorter snow season, fewer days with snow on the ground, and earlier snowmelt. There is however evidence of an increase in lake-effect snowfall surrounding the southern and eastern shores of the Great Lakes since the 1950s (NYSDEC, 2021).

According to the 2014 NYS ClimAID Report, Chautauqua County is located in Region 1, which includes Western New York and the Great Lakes Plain. By the 2050s, the mean annual temperature in this region is projected to rise by an average of 3.7 to 7.3 °F, and annual precipitation is expected to increase by 2 to 12% (Horton et al., 2014). Within this region it is also anticipated that extreme lake-snow events will increase in frequency due to greater moisture availability as a result of the decreasing trend in ice cover on the Great Lakes (NYSDEC, 2021).

Chautauqua County is actively planning for the inevitable impacts of climate change. Each of the municipalities within the county is a participating National Flood Insurance Program community, and many have sought to address the impacts of flooding through local laws and zoning. The Chautauqua County Office of Emergency Services is encouraging municipalities to take the

additional step of joining the Community Rating System (CRS) program to further reduce their flood risk. In addition, the County and its jurisdictions are intent on joining the Village of Sherman as registered certified Climate-Smart Communities. The NYS Climate Smart Community program focuses on shifting toward clean, renewable energy sources, and implementing climate-smart land use policies and projects that make communities more resilient to climate change.

### 2.4 Land Use

The majority of Chautauqua County consists of agricultural and forested land. Large tracts of forested land are most prevalent in the north east and southwest portions of the County, including 8 state forests in the former and 11 state forests in the latter. Developed properties are most concentrated in the Cities of Dunkirk and Jamestown. Figure 2.5 (Appendix A) and Table 2.1, below, depicts the land cover across the entire County, as provided by the National Land Cover Dataset (NLCD). Figure 2.6 (Appendix A) shows properties that are part of Chautauqua County Agricultural Districts 1, 7, 8, and 10. Agricultural districts serve to protect farmland from non-farm development and potential restrictions on agricultural operations. As shown on Figures 2.5 and 2.6, agricultural properties are located Countywide.

<b>Table 2.1 - Change in Land Use in Chautauqua County (2016 – 2020)</b> <i>(National Land Cover Dataset, 2022)</i>					
<b>Land Use Type</b>	<b>2016</b>		<b>2020</b>		<b>2016 to 2020</b>
	<b>Acres</b>	<b>% of total Acres</b>	<b>Acres</b>	<b>% of total Acres</b>	<b>Change in Acres</b>
Open Water	284,291.78	29.51%	283,800.95	29.49%	-490.83
Developed Open Space	36,655.79	3.81%	36,294.39	3.77%	+361.39
Developed Low Intensity	17,681.72	1.84%	17,778.69	1.85%	+86.96
Developed Medium Intensity	7,124.86	0.74%	7,488.26	0.78%	+363.39



Developed High Intensity	2,074.50	0.22%	2,156.12	0.22%	+81.62
Barren Land	651.62	0.07%	672.08	0.07%	+20.46
Deciduous Forest	268,771.51	27.90%	269,414.213	27.99%	+642.72
Evergreen Forest	19,202.24	1.99%	19,147.31	1.99%	-54.93
Mixed Forest	81,366.49	8.45%	81,380.06	8.46%	+13.57
Shrub/Scrub	2,953.40	0.31%	2,532.19	0.26%	-421.22
Grasslands/Herbaceous	2,904.25	0.30%	2,5224.18	0.26%	-380.07
Pasture/Hay	130,485.28	13.55%	130,194.61	13.53%	-290.67
Cultivated Crops	62,571.68	6.50%	62,889.70	6.53%	+318.02
Woody Wetlands	40,551.70	4.21%	40,624.87	4.22%	+73.17
Emergent Herbaceous Wetlands	5,996.69	0.62%	5,529.85	0.57%	-467.03

The Cities of Dunkirk and Jamestown, and the Villages of Falconer, Silver Creek, Fredonia, and Celeron have the highest population densities in the County (more than 1,500 people per square mile). The following Towns are the most sparsely populated (less than 50 people per square mile).

The most sparsely populated jurisdictions (less than 50 people per square mile) include:

- The Town of Harmony
- The Town of Ripley
- The Town of Stockton
- The Town of Gerry
- The Town of Ellington
- The Town of Charlotte
- The Town of Sherman
- The Town of Cherry Creek
- The Town of Arkwright
- The Town of French Creek
- The Town of Villanova
- The Town of Mina/Findley Lake

According to the 2020 Census, Chautauqua County has a vacancy rate of 20%. Housing vacancy rates by jurisdiction are reported in Table 2.2 (Appendix A). A housing unit is considered occupied if it is the normal place of residence of the person or persons living there. A vacant housing unit is classified as such if no one is living in it on a permanent

basis, excluding temporary absence. Housing vacancy rates are calculated during U.S. Census years as a potential indicator of distressed regions.

Most communities in Chautauqua County have adopted comprehensive land use plans, as well as environmental regulations, zoning regulations and/or land development regulations that implement land use policies. These policies and ordinances are typically enacted to address a wide range of issues including those related to quality of life and economic development. Policies can also play an important role in a community's preparedness for natural disasters. The local planners and others who author comprehensive plans are typically less involved in hazard mitigation planning than comprehensive planning. This common gap in coordinated planning can limit a community's ability to fully analyze and reduce risks associated with disasters. Coordinated planning is needed to ensure consistency among local plans, policies and programs. In particular, a comprehensive plan's goals, policies, and recommendations should relate to those of the hazard mitigation plan for the community (Georgia Department of Community Affairs, 2013). The types of land use regulations implemented by each jurisdiction are summarized Table 2.3, below, and in the jurisdictional annexes (Appendix B).

Table 2.3 - Local Laws and Regulations for Municipalities in Chautauqua County													
Municipality	ZONING	SITE PLAN REVIEW	SUBDIVISION REVIEW	OVERLAY DISTRICTS	STORMWATER MANAGEMENT	EROSION CONTROL	FLOOD RISK PREVENTION	SURFACE WATER PROTECTION	ENVIRONMENTAL QUALITY REVIEW	HISTORIC PRESERVATION	NATURAL AREA PROTECTION	RENEWABLE ENERGY GOALS	OTHER
City of Dunkirk	●	●	●	●	●		●			●			
City of Jamestown	●	●	●	●	●		●		●	●			●
Village of Bemus Point	●	●	●				●						
Village of Brocton	●	●			●		●						
Village of Cassadaga	●	●	●				●						
Village of Celoron	●	●	●		●	●	●						●
Village of Falconer	●	●	●		●		●						●
Village of Fedonia	●	●	●		●		●		●				●
Village of Lakewood	●	●		●	●		●						●
Village of Mayville	●	●		●	●		●						●
Village of Panama	●	●	●		●		●						●
Village of Sherman	●	●		●			●						●
Village of Silver Creek	●					●	●						
Village of Sinclairville	●	●	●				●						
Village of Westfield	●	●	●			●	●						●
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		●					●						●
Town of French Creek							●						
Town of Gerry	●	●	●	●			●				●		●
Town of Hanover	●	●	●	●			●						
Town of Harmony	●	●	●				●						●
Town of Kiantone	●	●	●				●					●	
Town of Mina, Findley Lake	●	●	●				●					●	●
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	●	●	●	●			●					●	●

Note: The jurisdictional annexes (Appendix B) also identify each municipality’s applicable land use regulations, including those encompassed under the “other” category.

## 2.5 Population Trends

The most recent census, released in 2020, reported a population of 127,657 for Chautauqua County. This reflects a decrease of 8,098 people when compared to the County's total population reported by the 2010 U.S. Census (134,905). Table 2.4 summarizes population trends for Chautauqua County from 2010 to 2020. Table 2.5 compares demographic data for Chautauqua County with New York State as a whole.

<b>Table 2.4 – Population Trends in Chautauqua County, 2010 - 2021</b> (U.S. Census Bureau, 2021)			
<b>Jurisdiction Name</b>	<b>2010 Population</b>	<b>2021 Population</b>	<b>Percent Change</b>
City of Dunkirk	12,563	12,651	0.7%
City of Jamestown	31,146	28,818	-7.5%
Town of Arkwright	1,061	1,042	-1.8%
Town of Busti	7,351	7,477	1.7%
Town of Carroll	3,524	3,440	-2.4%
Town of Charlotte	1,729	1,446	-16.4%
Town of Chautauqua	4,464	4,052	-9.2%
Town of Cherry Creek	1,118	1,101	-1.5%
Town of Clymer	1,698	2,179	28.3%
Town of Dunkirk	1,318	1,291	-2%
Town of Ellery	4,528	4,141	-8.5%
Town of Ellicott	8,714	8,723	0.1%
Town of Ellington	1,643	1,599	-2.7%
Town of French Creek	906	889	-1.9%
Town of Gerry	1,905	1,533	-19.5%
Town of Hanover	7,127	6,933	-2.7%
Town of Harmony	2,206	2,353	6.7%
Town of Kiantone	1,350	1,428	5.8%
Town of Mina/Findley Lake	1,106	915	-17.3%
Town of North Harmony	2,267	2,387	5.3%
Town of Poland	2,356	2,104	-10.7%
Town of Pomfret	14,965	13,409	-10.4%
Town of Portland	4,827	4,412	-8.6%
Town of Ripley	2,415	2,316	-4.1%
Town of Sheridan	2,673	2,568	-3.9%
Town of Sherman	1,653	1,289	-22.0%

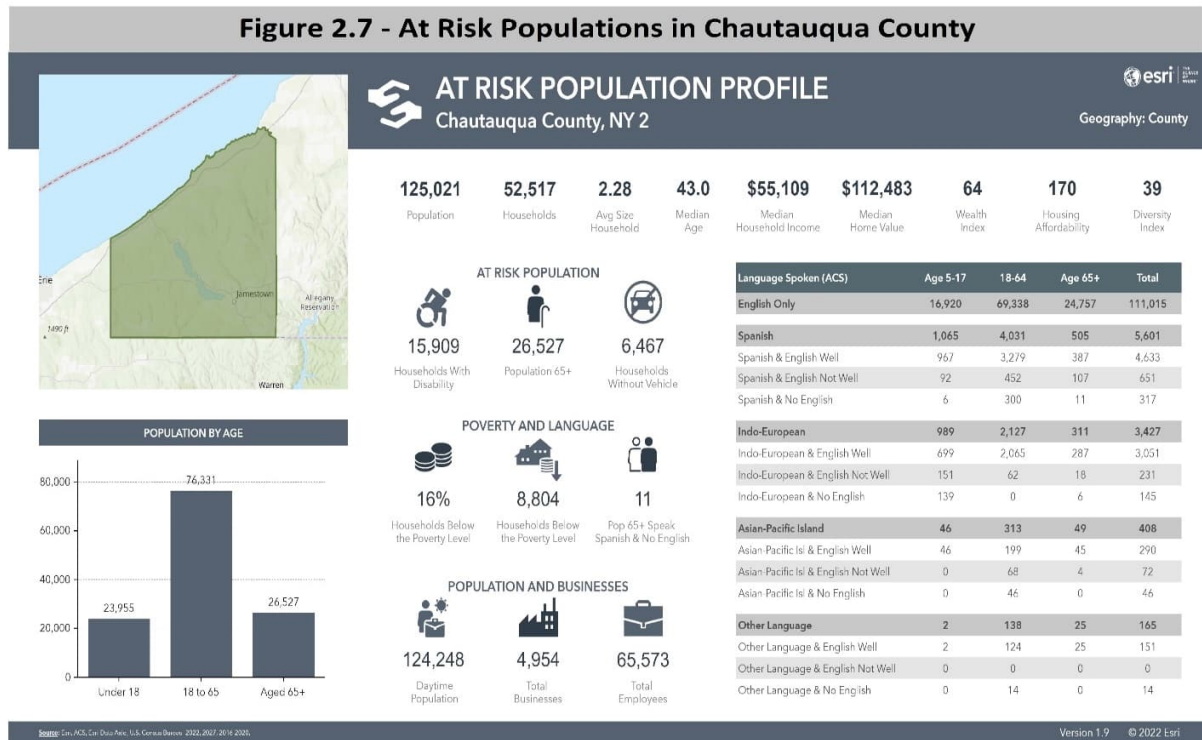
Town of Stockton	2,248	2,052	-8.7%
Town of Villenova	1,110	926	-16.6%
Town of Westfield	4,896	4,568	-6.7%
Village of Bemus Point	364	210	-42.3%
Village of Brocton	1,486	1,476	-0.67%
Village of Cassadaga	634	483	-23.8%
Village of Celoron	1,112	1,275	14.7%
Village of Falconer	2,420	2,301	-4.9%
Village of Fredonia	11,230	10,018	-10.8%
Village of Lakewood	3,002	2,988	-0.5%
Village of Mayville	1,711	1,466	-14.3%
Village of Panama	479	439	-8.4%
Village of Sherman	730	541	-25.9%
Village of Silver Creek	2,656	2,617	-1.5%
Village of Sinclairville	588	536	-8.8%
Village of Westfield	3,224	2,632	-18.4%

<b>Table 2.5– Chautauqua County Demographics</b> <i>(U.S. Census Bureau, 2020)</i>		
<b>Statistic</b>	<b>Chautauqua County</b>	<b>New York State</b>
Total Population	127,657	20,201,249
Female (%)*	50.2%	51.4%
Male (%)*	49.8%	48.6%
<b>Population Diversity</b>		
White	93.2%	89.9%
Black/African American	2.9%	2.8%
American Indian and Alaska Native	0.8%	1.1%
Asian	0.7%	1.0%
Native Hawaiian and Other Pacific Islander	0.1%	0.03%
Two or More Races	2.4%	4.2%

## 2.6 Vulnerable Populations

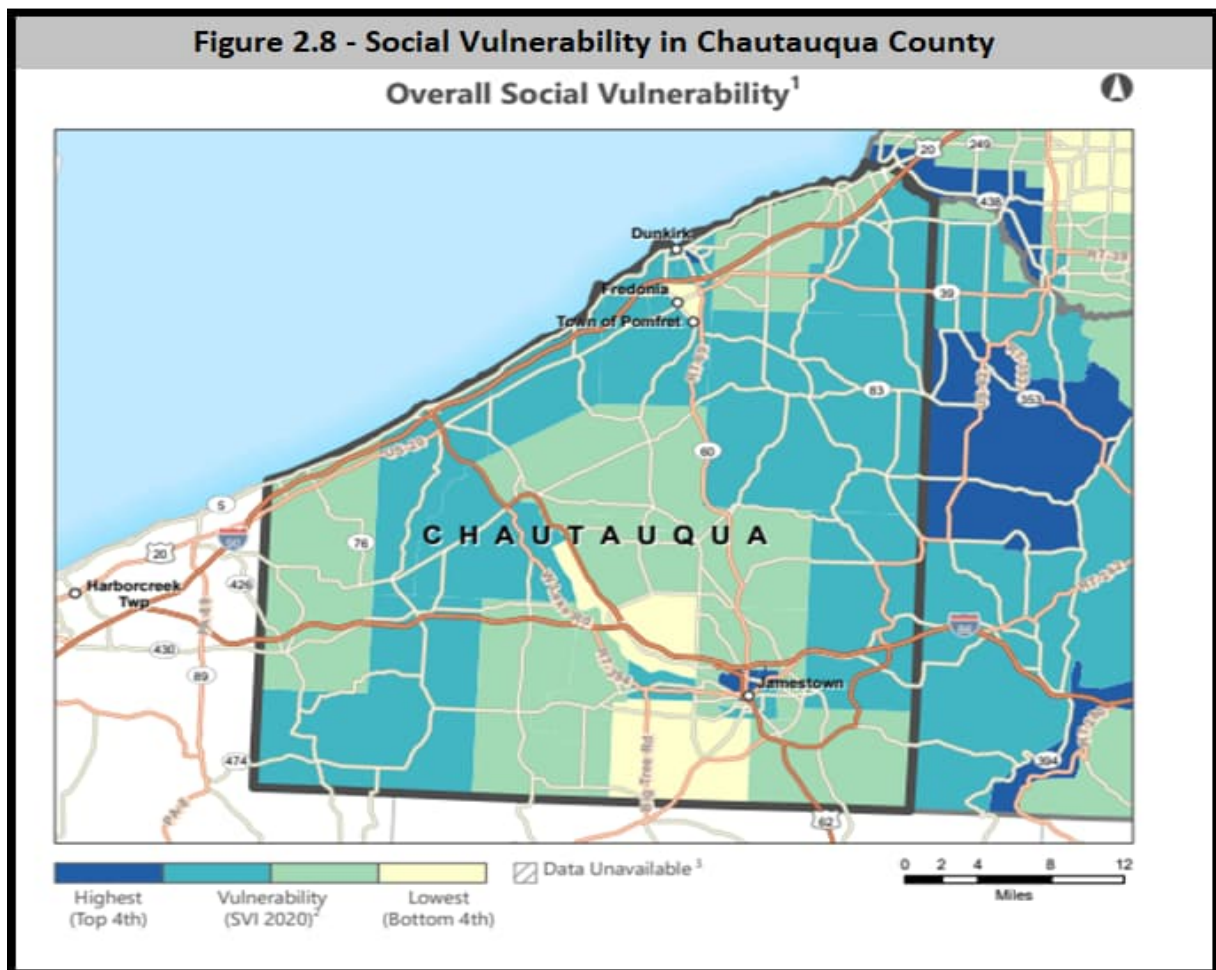
The effects of climate change do not impact everyone equally. Across the United States, it is evident that people who struggle to achieve a high quality of life under normal circumstances are highly vulnerable when natural hazards occur. Within New York State, a warmer climate will mean increasingly intense storms and higher temperatures. While these hazards may impact the entire State, some neighborhoods and communities lack the resources, capacity, and support to implement adaptation measures to cope with these impacts. Frontline communities, such as Black, Indigenous, and People of Color (BIPOC), have historically been given little choice but to reside in places that are at a high-risk from natural hazards, and there is often a need for social and physical infrastructure in these areas that can be relied upon during emergencies. Even in the absence of major natural hazard events, many of these communities will feel the effects of hotter days and heavier rains to a larger degree than communities that are more affluent.

Figure 2.7, below, displays data on Chautauqua County's at-risk population. Within the County there are nearly 27,000 people over the age of 65, in addition to almost 16,000 households with disabilities and over 6,000 households without a vehicle. The people living within the County that lack mobility or transportation are likely more vulnerable to natural hazards as their ability to leave a potentially dangerous location could be limited. Furthermore, within the County there are just under 9,000 households below the poverty level. These households may lack the resources to pursue sound mitigation and adaptation measures that will reduce their risk to natural hazards. The hazard mitigation actions that have been developed for Chautauqua County's updated Multi-Jurisdictional Hazard Mitigation Plan reflect a strong desire by the County and its jurisdictions to ensure that children, older adults, people with pre-existing health conditions, outdoor workers, individuals of racial and ethnic minority groups, and people with low incomes are protected from current and future climate conditions.



Social vulnerability is understood as the level of sensitivity that social groups have to the negative impacts of natural hazards, such as disproportionate death, injury, and loss (CDC, 2022). In rural areas in the United States many counties are characterized by their high poverty rates, aging population bases, and high rates of age-adjusted mortality, disability, and chronic disease (Horney et al., 2017). Economically vulnerable communities tend to experience higher levels of property damage resulting from natural hazards because they frequently occupy housing that is located in hazard prone areas (Ji and Lee, 2019). The impacts of natural hazards are felt heaviest by communities that have the least resources to prepare for them.

The Social Vulnerability Index (SoVI) is a metric developed by the University of South Carolina, College of Arts & Sciences, Hazards and Vulnerability Research Institute (HVRI). The index is used to compare the vulnerability of different geographic areas to natural hazard events. The SoVI is calculated based on multiple variables obtained from recent Census data. The average 2020 SoVI score for Counties in NYS is 0.45. Chautauqua County had a 2020 SoVI score of 0.6598, and indicates medium to high vulnerability. The 2020 SoVI map for Chautauqua County is provided in Figure 2.8 below. According to these data, the SoVI score for census tracts in Chautauqua County ranges from 0.0322 in Census Tract 370.00 (the Town of Busti) to 0.9366 in Census Tract 301.00 (the City of Jamestown).



The National Risk Index is a dataset and online tool that provides information about the risk that 18 different hazards pose to communities in the United States that are highly vulnerable. The National Risk Index for Chautauqua County was created in February, 2023 (FEMA, 2023c). The report assesses risk, expected losses, social vulnerability, and community resilience for the county. Chautauqua County was given a ranking of 44.15 out of 100 for social vulnerability, which corresponds to relatively moderate. This ranking is higher than both the state and national average. The County’s score for resilience is 56.72, which corresponds to Relatively High and is about equal to both the state and national average.

**2.7 Economic Characteristics**

The unemployment rate in Chautauqua County was approximately 4.7% as of February 2023 (NYS DOL, 2023), which is significantly lower than it was in April 2020, when unemployment peaked at 15.5%. The County’s current unemployment rate is slightly

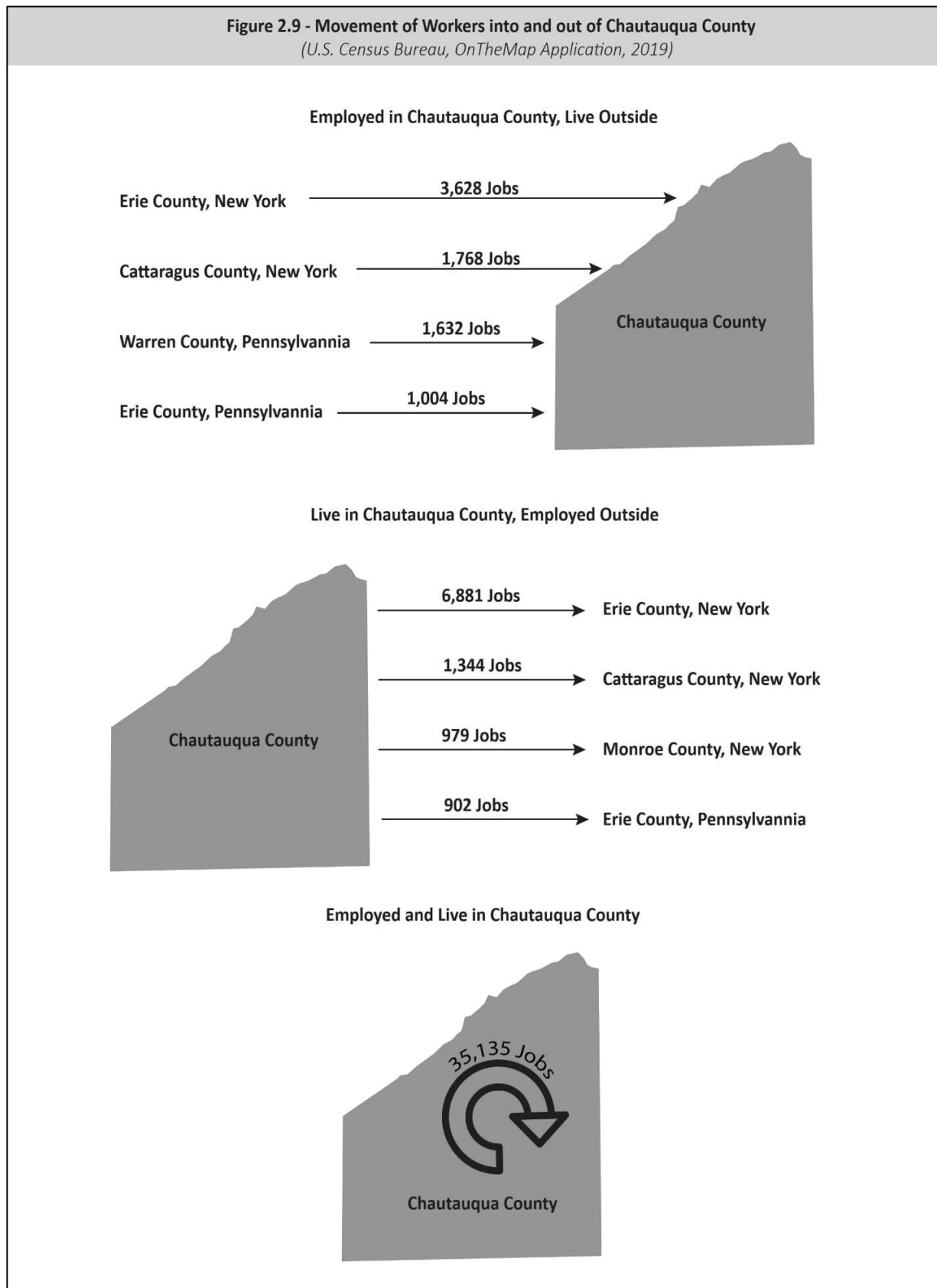


higher than that of New York State, which was 4.2% as of February 2023 (NYSDOL, 2022). Table 2.6, below, provides an overview of economic characteristics for Chautauqua County compared to those of New York State based on the 2020 U.S. Census.

<b>Table 2.6 – Economic Characteristics of Chautauqua County</b> <i>(U.S. Census Bureau, 2020)</i>		
<b>Statistic</b>	<b>Chautauqua County (2016-2020 Estimates)</b>	<b>New York State (2016-2020 Estimates)</b>
Labor Force (people 16 years and older)	71,646	15,908,940
Mean Travel Time to Work (minutes)	18.5	33.5
Median Household Income	\$48,315	\$71,117
Mean Per Capita Income	\$27,061	\$40,898
Individuals Below Poverty Line (percent of total population)	14.8%	13.6%

Nearly one third of the labor force in Chautauqua County (28.7%) works in the education, healthcare, and social services industry as indicated in Table 2.7. Figure 2.9 summarizes the movement of workers into and out of Chautauqua County, a high number (75%) of County residents work within Chautauqua County (U.S. Census Bureau OnTheMap Application, 2019). According to the Chautauqua County’s 2020 Economic Profile, the top employers in the County include the State University of New York at Fredonia, UPMC in the City of Jamestown, and multiple private industries, as detailed in Table 2.8.

<b>Table 2.7 – Jobs by NAICS Industry Sector in Chautauqua County</b> <i>(U.S. Census Bureau, OnTheMap Application, 2019)</i>		
<b>Industry</b>	<b>People</b>	<b>Share of Total Number of Jobs (%)</b>
Health Care and Social Assistance	8,216	15.7%
Educational Services	6,766	13.0%
Accommodation and Food Services	4,573	8.8%
Public Administration	4,001	7.7%
Administration & Support, Waste Management and Remediation	2,202	4.2%
Other Services (excluding Public Administration)	2,074	4.0%
Transportation and Warehousing	1,556	3.0%
Professional, Scientific, and Technical Services	1,375	2.6%
Finance and Insurance	1,081	2.1%
Arts, Entertainment, and Recreation	806	1.5%
Information	597	1.1%
Management of Companies and Enterprises	498	1.0%
Real Estate and Rental and Leasing	455	0.9%



<b>Table 2.8 – Chautauqua County Employers with Over 500 Employees</b> <i>(Chautauqua Partnership for Economic Growth, 2020)</i>		
<b>Company Name</b>	<b>Location</b>	<b>Number of Employees</b>
Cummins Inc.	City of Jamestown	1,000 – 4,999
The Resource Center	City of Jamestown	1,000 – 4,999
State University of new York at Fredonia	Village of Fredonia	1,000 – 4,999
UPMC Chautauqua	City of Jamestown	1,000 – 4,999
Bush Industries Inc.	City of Jamestown	500 - 999
Chautauqua County Court House	Village of Mayville	500 - 999
Heritage Village Retirement Campus	Town of Gerry	500 - 999
Hultquist Place	City of Jamestown	500 - 999
TLC Health at Lake Shore Health Center	Town of Hanover	500 - 999
Lutheran Jamestown	City of Jamestown	500 - 999
Peek’n Peak Resort	Town of Clymer	500 - 999
SKF Aeroengine Service North America	Village of Falconer	500 - 999
TLC Health Network	Town of Hanover	500 - 999
Truck-Lite Co. LLC	Village of Falconer	500 - 999

## 2.8 Transportation

Major transportation infrastructure in Chautauqua County is illustrated in Figure 2.10 (Appendix A). Major transportation corridors in the County include two interstates (I-86 and I-90) with 14 exits, and State Routes 5, 20, 39, 60, 62, 76, 83, 322, 394, 426, 430, and 474 (DOT, 2003). The NYS Thruway (I-90) runs northeast-southwest through the northwestern portion of the County, passing through the Towns of Hanover, Sheridan, Dunkirk, Pomfret, Portland, Westfield, and Ripley, the Village of Westfield, and City of Dunkirk. The Southern Tier Expressway (I-86) runs east-west through the Southern portion of the County, passing through the Towns of Poland, Ellicott, Ellery, North Harmony, Sherman, and Mina/Findley Lake, the Villages of Falconer and Sherman, and the City of Jamestown. The Chautauqua County Division of Transportation maintains approximately 552 miles of County roads, 308 bridges, and 258 large culverts (Chautauqua County, 2022a). The main County highway facility is located in the Village of Falconer, with garages in the Town of Sheridan and the Village of Sherman. The

Department of Transportation (NYSDOT) has four sub-headquarters and maintenance facilities in Chautauqua County, located in the Villages of Falconer, Fredonia, Sherman, and Mayville.

There is currently one active passenger railroad and three freight rail systems in Chautauqua County. Amtrak's once-daily Lakeshore Limited train that connects Chicago, Boston, and New York City runs through Chautauqua County, however its closest stops are in Erie and Buffalo New York. There is an Amtrak Thruway Bus that provides a connecting service stop each day between Jamestown, Fredonia, Dunkirk, and Buffalo's Exchange Street Station. The County is also served by three freight railroads: Norfolk Southern, CSX, and the Western New York & Pennsylvania Railroad (WNYPRR). CSX is the owner of the former New York Central "Water Level Route" that runs from Chicago to Albany and Boston / New York City. The WNYPRR currently partners with the Southern Tier Extension Rail Authority to connect communities in southern Chautauqua County to the national rail network (Chautauqua County, 2011).

Chautauqua County operates two airports: The Jamestown Airport and the Dunkirk Airport. The Jamestown Airport is a commercial facility that offers scheduled passenger service to Continental Airlines' hub at the Cleveland-Hopkins International Airport. In addition, daily flights to Buffalo, NY are offered by Federal Express at the Jamestown Airport, providing express freight services to County residents and businesses. For travelers who are seeking more options for destinations the Erie International Airport and Buffalo Niagara International airport are both within an hour's drive of Chautauqua County (Chautauqua County, 2011).

## **2.9 Critical Community Facilities**

Critical facilities within Chautauqua County were identified by the Mitigation Planning Committee and by representatives of each jurisdiction. Critical facilities located within each municipality are listed in each jurisdictional annex (Appendix B). A complete list of all critical facilities in each municipality in Chautauqua County, including hospitals, police and fire departments, emergency medical services, and schools, and major utility providers is provided in Table 2.9 (Appendix A). The Chautauqua County Planning Department completed an analysis to determine whether any critical facilities identified by the County and each jurisdiction were located within 100-year or 500-year floodplains mapped by FEMA. Digital floodplain data obtained from FEMA was used to determine whether the critical facilities identified by the County and each jurisdiction are located within 100-year or 500-year floodplain. This information is summarized in

Table 2.9 (Appendix A) and within each jurisdictional annex (Appendix B). Utility services within Chautauqua County are described in more detail below.

### ***Electric and Natural Gas***

Chautauqua County is largely serviced by the National Grid, which provides electric transmission and distribution to most of the County. Some municipalities within the County, however, have relationships with the following municipal electric utilities:

- Brocton Electric;
- Jamestown Board of Public Utilities;
- Mayville Electric;
- Westfield Electric; and
- Steuben Rural Electric Co-op

Small areas of the County are also served by New York State Electric & Gas (NYSEG), a subsidiary of Energy East Corporation. The County has made efforts to secure energy from alternative sources (Chautauqua County, 2011).

Chautauqua County has pursued alternative sources of energy in the past and is looking to further expand its options. In 2010 a methane capture project opened at the County-owned landfill in Ellery, NY. Methane is piped at this site to a new power generation facility that is capable of producing 6.4 megawatts of electricity. In addition, there are currently several large commercial wind development that are being considered in the Towns of Arkwright, Pomfret, Hanover, Villenova, Ripley, and Westfield (Chautauqua County, 2011).

### ***Solid Waste Facilities***

Chautauqua County operates one commercial landfill, located in the City of Jamestown, and four transfer stations located in the Town of Ellery and the Villages of Falconer, Fredonia, and Sherman. A recycling plant is also located at the County landfill, and each transfer station accepts recyclable items and materials (Chautauqua County, 2022b).

### ***Water and Sewer***

Water resources such as springs, lakes, and rivers are abundant in Chautauqua County and are utilized by many municipalities as drinking water sources. Private wells are used in areas that are not served by municipal water. Table 2.10 shows the different sources of water that municipalities within the county rely on. The majority of municipalities in Chautauqua County (28 total) are partially or wholly supplied by municipal water distribution systems.

In addition, 24 of the County’s 42 jurisdictions are served by sanitary sewer collection systems and/or operate wastewater treatment facilities. Some municipalities have collection systems that convey sewage to treatment plants in a different municipality. Residents who are not served by a municipal wastewater treatment system rely on private on-site septic systems. Table 2.11 provides a list of the municipalities within Chautauqua County that are served by either water or wastewater systems.

<b>Table 2.10– Municipal Water Sources within Chautauqua County</b>	
<b>Source</b>	<b>Entity/Area Served</b>
Reservoirs	Westfield and Fredonia
Lake Erie	Dunkirk, North Chautauqua County (purchased through Dunkirk), Ripley, Hanover, and Silver Creek
Chautauqua Lake	Chautauqua Utility District & Chautauqua Water District #2
Wells	Jamestown Board of Public Utilities (BPU), Carroll, Cherry Creek, Mayville, Clymer, Cassadaga, Forestville, Sinclairville, and Sherman

<b>Table 2.11 – Jurisdictions within Chautauqua County with Municipal Water or Sewer</b>		
<b>Municipality</b>	<b>Water</b>	<b>Sewer</b>
City of Dunkirk	Dunkirk Water & Sewer	Dunkirk Water & Sewer
City of Jamestown	Dunkirk Water & Sewer	Dunkirk Water & Sewer
Town of Busti	Jamestown BPU Water serves some portions of Town	South and Center Sewer Districts
Town of Carroll	Carroll Water	None
Town of Chautauqua	Mayville, Chautauqua Utility District & Chautauqua Water District #2	North Chautauqua Lake Sewer District
Town of Clymer	Clymer Water	None

Town of Dunkirk	North Chautauqua County Water District	Dunkirk & Fredonia Sewer
Town of Ellery	None	South and Center Sewer Districts
Town of Ellicott	Jamestown BPU Water serves Airport District	South and Center Sewer Districts  Some portions are served by Jamestown BPU Wastewater
Town of Gerry	Sinclairville Water	None
Town of Hanover	Hanover & Forestville Water	Silver Creek Sewer
Town of North Harmony	Jamestown BPU Water service ends at Sunrise Cove	South and Center Sewer Districts
Town of Poland	Jamestown BPU Water	None
Town of Pomfret	Fredonia & Cassadaga Water  Portions along Route 5 are served by North Chautauqua County Water District	Dunkirk & Lily Dale Sewer
Town of Portland	North Chautauqua County Water District	None
Town of Ripley	Ripley Water & Sewer	Ripley Water & Sewer
Town of Sheridan	North Chautauqua County Water District	Dunkirk Sewer
Town of Westfield	Westfield Water & Sewer	Westfield Water & Sewer
Village of Bemus Point	None	South and Center Sewer Districts



Village of Brocton	North Chautauqua County Water District	Brocton Sewer
Village of Cassadaga	Cassadaga Water & Sewer	Cassadaga Water & Sewer
Village of Celoron	Jamestown BPU Water	South and Center Sewer Districts
Village of Falconer	Jamestown BPU Water	Jamestown BPU Wastewater
Village of Fredonia	Fredonia Water & Sewer	Fredonia Water & Sewer
Village of Lakewood	Jamestown BPU Water	South and Center Sewer Districts
Village of Mayville	Village of Mayville	Mayville Water
Village of Sherman	Sherman Water & Sewer	Sherman Water & Sewer
Village of Silver Creek	Silver Creek Water (ECWA)	Silver Creek Sewer
Village of Sinclairville	Sinclairville Water	None
Village of Westfield	Westfield Water & Sewer	Westfield Water & Sewer

The following municipalities have no municipal water or wastewater facilities:

- Town of Arkwright
- Town of Cherry Creek
- Town of Ellington
- Town of French Creek
- Town of Harmony
- Town of Kiantone
- Village of Panama
- Town of Charlotte
- Town of Mina/Findley Lake
- Town of Sherman
- Town of Stockton
- Town of Villenova

**Telephone and Internet Communications**

The major telephone and internet service provider in Chautauqua County is Spectrum. While cell phone and internet service coverage has improved throughout the County over time, there are still some areas with limited cell service. In March, 2022 the County issued a press release stating that it had recently approved funding from its American

Rescue Plan Act (RPA) allocation to expand its broadband infrastructure across the county. The press release asked residents to complete a survey about broadband access that was created and distributed by the New York State Department of Public Service, who has been tasked with studying the reliability and affordability of high-speed broadband infrastructure. The study and its findings are expected to be released in spring of 2023 (Chautauqua County, 2022c).

### **2.10 Chautauqua County Office of Emergency Services**

The Chautauqua County Office of Services (OES) serves as the disaster response and emergency preparedness center for the County. The OES office is located in the Chautauqua County Office Complex in the Village of Mayville. The OES supports local law enforcement, fire and emergency medical services departments, educational facilities, and local governments. The OES also provides training for local fire and EMS personnel (Chautauqua County Office of Emergency Services, 2022). The OES website is available at: [Emergency Services \(chautcofire.org\)](https://www.chautcofire.org)

## **3.0 PLANNING PROCESS**

### **3.1 Resources, Planning Mechanisms, and Capabilities**

The HMP update was developed in accordance with the guidelines presented in the Local Mitigation Planning Handbook, set to be effective on April 19, 2023 (FEMA, 2023a), and the current New York State Hazard Mitigation Planning Standards Guide (NYS DHSES, 2022a). In addition to these state and federal resources, other documents reviewed during the Chautauqua County HMP update process included the 2016 Chautauqua County HMP Update, Chautauqua County's 2022 County Emergency Preparedness Assessments (CEPA) Report, and Resilient New York Flood Mitigation Initiatives for the following water bodies: Canadaway Creek; Crooked Brook; Silver Creek; and Walnut Creek (Ramboll, 2021a,b,c,d). In addition, jurisdictions' comprehensive plans, local regulations, and various other resources were utilized in the development of the updated HMP. A full list of references used during the compilation of this plan update is provided in Section 10.0, Works Cited. Event specific information and details came largely from the Mitigation Planning Committee and jurisdiction representatives.

The HMP serves as an important resource for developing and updating various plans and procedures throughout the County. This plan should be incorporated into, considered during, and referenced by future updates and efforts at the County and municipal levels concerning the existing County plans, policies, ordinances, programs, studies, reports,

and staff included in Table 3.1 (Appendix A). The information presented for the County in Table 3.1 is also summarized for each municipality in the jurisdictional annexes (Appendix B).

### 3.2 Mitigation Planning Committee

A Mitigation Planning Committee was established to facilitate the HMP update process and to make decisions throughout the planning process. The Mitigation Planning Committee members and their affiliations are as follows:

- Chris Wichlacz- Planning Technician, Chautauqua County Emergency Services
- Dan Imfeld- Deputy Fire Coordinator, Chautauqua County Emergency Services
- Noel Guttman- Director of Chautauqua County Emergency Services
- Jayme Breschard- Project Manager, Barton and Loguidice
- Andrew Stone- Community Planner 1, Barton and Loguidice

Details regarding all meetings held throughout the planning process, including attendee lists, are provided in Appendix C.

### 3.3 Jurisdiction Participation

As noted in Section 1.3, all 42 jurisdictions in the County met the participation criteria for the present HMP update. Participating jurisdictions met individually with County OES staff and the consultant team to update their 2016 HMP data and provide new information required for inclusion in their jurisdiction's annex for the HMP update (Appendix B). All jurisdictions are required to adopt the HMP update by passing a board resolution after it is approved by FEMA. A sample HMP adoption resolution is presented in Appendix D.

### 3.4 Stakeholder Participation

A list of stakeholders identified for the HMP update is provided in Table 3.2 (Appendix A). A stakeholder and elected officials meeting was held during the initial plan development stage in June 2022. A County round-table meeting was held in January 2023 with representatives from each County office and department. During this meeting, new goals and objectives were developed, mitigation actions were created, and the status of previous actions were updated. Additionally, during several Mitigation Planning Committee monthly meetings, representatives from several County departments and offices were invited to attend, offer subject matter expertise, and assist with relevant sections of the plan. These included the Department of Public Facilities, North Chautauqua County Water District, Department of Health, Department of Social Services, Office for the Aging, South and Center Chautauqua Lake Sewer

District, and Department of Planning and Development. (Notably, the Department of Social Services and Office for the Aging provide support to socially vulnerable populations in the County.) These stakeholders were encouraged to disseminate information about the HMP update to their networks – which would include businesses, academia, private organizations, and nonprofit organizations – and to advertise the opportunity to give input.

Neighboring communities to Chautauqua County were made aware of the plan and opportunities to participate via U.S. Postal mail. Specifically, Chautauqua County sent a general letter on 5/31/22 to Cattaraugus County Emergency Services; Erie County, NY Emergency Services; Seneca Nation of Indians Emergency Services; and Erie County, PA Emergency Services. The letter notified these jurisdictions about the Kick-off meeting for elected officials. Additionally, Chautauqua County notified the aforementioned jurisdictions about the scheduled virtual public meetings, via U.S. Postal mail, and included at least 5 flyers per jurisdiction. Copies of this correspondence can be found in Appendix E. Chautauqua County also made posts on the County website and Facebook page, which some neighboring communities may follow. In the future, Chautauqua County also plans to include Warren County, PA in notifications about the HMP.

All stakeholders – including neighboring communities, agencies, businesses, academic institutions, other private and nonprofit organizations, and organizations that represent vulnerable communities – had the opportunity to learn and give input in the plan via two public information meetings and a community survey provided the opportunity for to learn about the plan and give input. Table 3.2 (Appendix A) indicates whether or not stakeholders attended the various meetings, including the Elected Officials Meeting, a Highway Superintendents Meeting, a County Roundtable Meeting, and a Monthly Planning Committee Meeting.

### **3.5 Public Participation**

Members of the public were invited to attend two public meetings, which were advertised via a press release published on the County website and in local news outlets; flyers were also developed for distribution through other appropriate information channels. The first public meeting was held in October 2022, during which poll questions were used to collect input. After the first public meeting, a survey was made available to the public via the OES website to allow for additional suggestions and input. The second public meeting was held after the completion of the first draft of the HMP in May 2023 to solicit comments on draft plan content and present the overall plan structure, information solicitation process, and conclusion. Prior to the second public meeting, the draft plan was posted on the Chautauqua County OES website for public

review at the following link: <http://www.chautcofire.org/2023MitigationPlan.html>. Polling questions were used at the second public information meeting to collect input on local natural hazards and preferred hazard mitigation mechanisms, and attendees were encouraged to submit any other comments to OES or the consultant team.

In addition to these two public information meetings and survey, jurisdictions were encouraged to discuss the HMP update process at their local board meetings. Information flyers were developed for local municipalities to raise public awareness of the hazard mitigation planning process. Additionally, postcards were printed and placed at municipal Town/Village/City halls.

Stakeholder and public outreach documentation is provided in Appendix E.

### 3.6 High Hazard Potential Dams

FEMA's Rehabilitation of High Hazard Potential Dams (HHPD) grant program provides assistance for eligible rehabilitation activities that reduce dam risk and increase community preparedness. The goal of the program is to provide technical, planning, design, and construction assistance in the form of grants for rehabilitation projects. Eligible dams are often repaired, replaced, reconstructed, or removed to meet state safety and security standards. To be eligible for funding dams must adhere to the following standards:

- Be located in a state with a state dam safety program.
- Be classified as "high hazard potential" by the state dam safety program.
- Have an Emergency Action Plan (EAP) approved state dam safety program.
- Fail to meet minimum state dam safety standards and pose an unacceptable risk to the public.
- Eligible projects must meet non-federal cost-share requirements.

Chautauqua County has a total of five dams that have been rated as high hazard by the New York State Department of Environmental Conservation (NYSDEC, 2023). Four of the five dams meet the requirements to be eligible for funding through the Rehabilitation of High Hazard Potential Dams (HHPD) grant program (FEMA, 2023b). The names, location, and ownership of these dams are listed in Table 3.3 below, in addition to existing EAPs.

<b>Table 3.3 – High Hazard Dams in Chautauqua County</b> (NYS Inventory of Dams, 2022)						
<b>Dam Name</b>	<b>Dam Location</b>	<b>Dam Owner</b>	<b>Year Completed</b>	<b>Dam Construction Type</b>	<b>Dam Purpose</b>	<b>Date of Last EAP Revision</b>
Brocton Reservoir Dam	Town of Portland	Village of Brocton	1952	Earth	Water Supply	01/02/2017
Conewango Creek Site 9a Dam	Town of Villenova	Chautauqua County	1974	Earth	Flood Risk Reduction	01/14/2021
Conewango Creek Site 33 Dam	Town of Cherry Creek	Chautauqua County	1972	Earth	Flood Risk Reduction	01/12/2021
Fredonia Reservoir Dam	Town of Pomfret	Village of Fredonia	1937	Earth	Water Supply	04/01/2010
Panama Dam	Village of Panama	Village of Panama	1910	Earth	Recreation	No EAP has been completed

#### 4.0 RISK ASSESSMENT

Chautauqua County is vulnerable to numerous natural hazards. The County conducted a County Emergency Preparedness Assessment (CEPA) analysis in 2022, which was facilitated by the NYS Division of Homeland Security and Emergency Services (NYS DHSES). During the CEPA update, the County ranked a number of natural and technological hazards. The 2022 CEPA was used to inform natural hazard selection and ranking for the HMP update (NYS DHSES, 2022). Details regarding the natural hazards considered during the CEPA analysis are provided within this section of the HMP.

#### 4.1 Chautauqua County 2022 CEPA Results

Chautauqua County conducted a County Emergency Preparedness Assessment (CEPA) on February 16, 2022. This event updated the County's previous CEPA that was conducted in 2018. CEPA is a program that was developed by NYS DHSES to analyze hazard risks and the County capabilities during emergency and disaster events. The hazard analysis completed during the CEPA was used to inform the County's risk and vulnerability assessment for the HMP update.

A number of natural hazards were evaluated during the 2022 CEPA update. The CEPA update also considered multiple technological or human-caused hazards, but these hazards were not considered further for the HMP update. The group analyzed all hazards determined to affect Chautauqua County. The CEPA rated each hazard based on the group's assessment for each hazard related to the likelihood and consequence potential of each hazard. The selected hazards were categorized as follows:

Score of 15 or greater = High Hazard

Score of 7 to 14 = Moderate Hazard

Score of 6 or below = Low Hazard

From the 28 hazards analyzed as part of the CEPA, eleven natural hazards were chosen for profiling in the HMP update. One additional natural hazard (animal disease/foreign animal disease) was included in the 2022 CEPA, however, this hazard was not selected for profiling in the HMP update because it did not align well with any of FEMA's natural hazard categories. These hazards are presented in Table 4.1 below, along with their associated CEPA likelihood of occurrence categories. The Mitigation Planning Committee elected not to profile hurricanes/tropical storms for the HMP update, even though this hazard was considered during the CEPA analysis, due to the County's overall low risk to this hazard. The Mitigation Planning Committee chose to profile tornado separately from severe thunderstorms and windstorms, and included ice jam in the HMP update. Ice jam was not included as a hazard in the CEPA analysis but routinely affect portions of the County. This resulted in 11 total natural hazards profiled for the HMP update.

<b>Table 4.1 – Chautauqua County Hazard Selection for HMP Update</b>	
<b>Hazard</b>	<b>CEPA Likelihood Category (2022)</b>
Flood	Very High
Severe Thunderstorm, Windstorm, or Hail	High
Severe Winter Storm	High
Extreme Temperatures	High
Ice Storm	High
Tornado	High
Drought	Medium
Wildfire	Medium
Landslide	Low
Earthquake	Low
Ice Jam	N/A- not included in CEPA

Based on the knowledge of CEPA participants, historical County data, and discussions that occurred amongst the group, the hazards were assessed and ranked based on their likelihood of occurrence and level of consequences. Each hazard is assigned to one of five categories (very high, high, medium, low, or very low) for both likelihood of occurrence and consequence of occurrence. For the ten natural hazards profiled in this HMP update, that were also included in the CEPA, their likelihood of occurrence/consequence of occurrence category is listed above in Table 4.1.

Descriptions of these risk assessment categories referenced for the CEPA update are summarized in Table 4.2, below.

<b>Table 4.2 – CEPA Hazard Risk Assessment Categories</b>	
<b>Hazard Likelihood</b>	
Very High	Hazard is expected to occur without question based on historical precedence or current intelligence reporting.
High	Hazard is likely to occur based on historical precedence or current intelligence reporting.
Medium	Hazard could occur, but generally does not occur with regular frequency.
Low	Hazard could occur, but very unlikely.



Table 4.2 – CEPA Hazard Risk Assessment Categories	
Hazard Likelihood	
Very Low	Hazard is not expected to occur.

#### 4.2 National Risk Index

The National Risk Index for Chautauqua County profiled the risk that 18 different hazards pose to the county’s physical and agricultural assets (FEMA, 2023c). According to the report the county has a risk score of 11.73 out of 100, which corresponds to relatively low. The rankings for the eleven hazards that are profiled as a part of this plan are provided in the table 4.3 below. Chautauqua County’s risk score is only slightly higher than both the state and national average.

Table 4.3 – Chautauqua County Natural Hazard Risk Rating and Score (National Risk Index, 2023)		
Hazard	Risk Index Rating	Risk Index Score (out of 100)
Tornado	Relatively Moderate	22.59
Flood	Relatively Moderate	17.71
Severe Winter Storm	Relatively Moderate	16.65
Landslide	Relatively Moderate	15.91
Extreme Temperatures	Relatively Low	14.67
Ice Storm	Relatively Low	14.08
Severe Thunderstorm, Windstorm, or Hail	Relatively Low	9.00
Earthquake	Very Low	2.73
Wildfire	Very Low	1.78
Drought	No Rating	0.00
Ice Jam	N/A- not included in National Risk Index	N/A

#### 4.3 Presidential Disaster Declarations

The President of the United States is able to make an emergency and/or major disaster declaration under the Stafford Act. If a natural disaster causes a severe amount of damage beyond the State and local government response capabilities, the Governor of the impacted State can request a major disaster declaration from the President. The request from the Governor must include an estimate of the amount and severity of

damage to public and private sectors, a description of the State and local efforts and resources used to respond to the disaster, an estimate of the type and amount of Stafford Act assistance needed, and certification that the State and local governments will comply with all applicable cost sharing requirements. Counties typically have to meet a per capita threshold of damage that is set by the Federal government to be eligible for assistance. Major disaster declaration assistance generally provides three types of aid: Individual Assistance, Public Assistance, or Hazard Mitigation Assistance. Most declarations will provide either Individual or Public Assistance along with Hazard Mitigation Assistance. Chautauqua County has been included in two Presidential Declared Disasters (PDD) since 2016 (FEMA, 2022a). Details of these events are provided below in Table 4.4.

<b>Table 4.4 - Federal Disaster Declarations Including Chautauqua County, 2016 - Present (FEMA, 2022a)</b>							
Declaration Date	Start Date	End Date	Hazard Type	Event	Disaster Number	Public Assistance Category*	Individual Assistance for Chautauqua County
03/20/2020	01/20/2020	Continuing	Biological	Covid-19 Pandemic	4480	PA-B	No
12/19/2019	10/31/2019	11/1/2019	Severe Storms and Flooding	Severe storms, straight-line winds, and flooding	4472	PA, PA-A, PA-B, PA-C, PA-D, PA-E, PA-F, PA-G	No
<i>*Public assistance funding categories are as follows:</i> Emergency Work PA-A Debris Removal PA-B Emergency Protective Measures Permanent Work PA-C Roads and bridges PA-D Water control facilities PA-E Public buildings and contents PA-F Public utilities PA-G Parks, recreational, and other facilities							

#### 4.4 Hazard Identification and Ranking for HMP Update

The hazards to be profiled in the HMP update were selected by the Mitigation Planning Committee. The County's 2016 HMP (Chautauqua County, 2016), 2022 CEPA Report (DHSES, 2022b), and the NYS 2019 HMP (DHSES, 2019) were reviewed during the hazard selection process.

Only natural hazards were profiled for the HMP update, as summarized in Table 4.1. Low-risk hazards (avalanche, coastal storm, and hurricane/tropical storm) were not included for further analysis. The Mitigation Planning Committee completed an updated hazard analysis in 2022 to rank the hazards selected for profiling in the HMP update. The criteria used to complete this analysis are summarized in Table 4.5, and the 2022 hazard analysis results are summarized in Table 4.6 below.

<b>Score</b>	<b>Extent</b>	<b>Onset</b>	<b>Impact</b>	<b>Frequency</b>	<b>Total Score</b>	<b>Overall Vulnerability</b>
1	One location	Days of warning	Minor damages/injuries	Rare (once every 5 or more years)	4 to 5	Low
2	Several locations	Hours of warning	Moderate damages/injuries	Infrequent (once every 2 to 5 years)	6 to 8	Moderate
3	Large area	No warning	Severe damages/injuries	Regular (one or more times per year)	9 to 12	High

<b>Table 4.6 – Hazard Vulnerability by Event for Chautauqua County</b>						
<b>Hazard Event</b>	<b>Extent</b>	<b>Onset</b>	<b>Impact (Damages and Injuries)</b>	<b>Frequency</b>	<b>Overall Score and Vulnerability</b>	<b>Jurisdiction Rank</b>
Severe Thunderstorm/ Windstorm/Hail	3	2	2	3	10 - High	1
Severe Winter Storm	3	2	2	3	10 - High	2
Flood	2	2	3	3	10 - High	3
Ice Jam	2	2	2	3	9 - High	4
Wildfire	2	3	2	2	9 - High	5
Extreme Temperatures	3	1	2	3	9 - High	6
Ice Storm	3	1	2	2	8 - Moderate	7
Tornado	2	2	2	2	8 - Moderate	8
Drought	3	1	2	2	8 - Moderate	9
Earthquake	3	2	2	1	8 - Moderate	10
Landslide	1	3	1	1	6 - Moderate	11

Table 4.7, (below) provides a comparison of the hazard rankings for the HMP update alongside the 2016 HMP and 2022 CEPA hazard analyses.

<b>Table 4.7 – Hazard Ranking Comparison</b>					
<b>Hazard</b>	<b>Hazard Category</b>	<b>2016 HMP Rank</b>	<b>2022 CEPA Rank</b>	<b>2023 HMP Update Rank</b>	<b>Affected by Climate Change</b>
Severe Thunderstorm/ Windstorm/Hail	Natural	8	5	1	X
Severe Winter Storm	Natural	8	17	2	X
Flood	Natural	2	2	3	X
Ice Jam	Natural	9	Not Included	4	X
Wildfire	Natural	Not Included	26	5	X
Extreme Temperatures	Natural	10	22	6	X
Ice Storm	Natural	8	6	7	X
Tornado	Natural	6	5	8	X
Drought	Natural	13	27	9	X
Earthquake	Natural	Not Included	30	10	X
Landslide	Natural	3	29	11	X
Transportation Accident	Technological or Human Caused	Not Included	3	Not Included	
Fire	Technological or Human Caused	14	11	Not Included	X
Utility Failure	Technological or Human Caused	10	Not Included	Not Included	
Infestation	Natural	Not Included	Not Included	Not Included	X
Transmissible Disease (Ill Worker)	Technological or Human Caused	Not Included	8	Not Included	
Pandemic	Technological or Human Caused	15	9	Not Included	X

Human Trafficking	Technological or Human Caused	Not Included	10	Not Included	
Sustained Power Outage (Three Days or more)	Technological or Human Caused	Not Included	13	Not Included	
Wave Action	Natural	Not Included	Not Included	Not Included	X
Dam Failure	Technological or Human Caused	12	Not Included	Not Included	X
Hurricane	Natural	Not Included	31	Not Included	X
Blight	Natural	Not Included	Not Included	Not Included	X
Cyber Attack	Technological or Human Caused	Not Included	15	Not Included	
Active Shooter	Technological or Human Caused	Not Included	20	Not Included	
Opioid Epidemic	Technological or Human Caused	7	7	Not Included	
HAZMAT in Transit	Technological or Human Caused	1	1	Not Included	
Vehicle Ramming Attack	Technological or Human Caused	Not Included	23	Not Included	
Unmanned Aircraft Systems (UAS) Incident	Technological or Human Caused	Not Included	24	Not Included	
Food Contamination	Technological or Human Caused	Not Included	18	Not Included	
HAZMAT Fixed Site	Technological or Human Caused	3	4	Not Included	

Biological Agent Release	Technological or Human Caused	Not Included	16	Not Included	
Critical Infrastructure Failure	Technological or Human Caused	11	12	Not Included	X
Communication Systems Failure	Technological or Human Caused	Not Included	Not Included	Not Included	
Animal Disease/Foreign Animal Disease	Natural	Not Included	19	Not Included	X
Improvised Nuclear Device	Technological or Human Caused	Not Included	28	Not Included	
Radiological (Fixed Site)	Technological or Human Caused	Not Included	25	Not Included	
Improvised Explosive Device/Vehicle Born IED	Technological or Human Caused	Not Included	14	Not Included	
Radiological Dispersal Device	Technological or Human Caused	Not Included	21	Not Included	

#### 4.5 FEMA HAZUS Analysis

##### ***HAZUS Overview***

HAZUS is a nationally standardized, open source, GIS-based risk modeling software developed by the Federal Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The HAZUS program is a multi-hazard loss estimation model capable of identifying areas which are vulnerable to a variety of natural hazards including floods, hurricanes, and earthquakes. HAZUS can quantify and map risk vulnerability information including physical damages, economic losses, and social impacts, and is a useful tool in hazard mitigation, recovery, preparedness, and response planning. HAZUS was utilized to assess what areas, infrastructure, and populations are most vulnerable to selected natural hazards using the flood, hurricane, and earthquake modeling tools.

A HAZUS study region was developed for Chautauqua County, which consisted of approximately 1,085 square miles and included 6,374 census blocks. The region contains over 54,000 households with a total population of 134,905 according to the 2010 Census Bureau data utilized by the model. The model's building stock inventory estimates a total of 61,846 buildings in the region with a total replacement value of over \$17.21 billion, excluding building contents. Approximately 90.73% of the buildings and 71.75% of the building value included in the study area's building inventory are associated with residential housing. No additional user defined infrastructure inventory data was added to the model.

### ***Flood Model***

The HAZUS flood model was set up using United States Geological Survey Digital Elevation Model (DEM) coverage for the study area, the extent and source of which are determined within HAZUS' model setup resources. Due to the geographic setting of the study region and the lack of coastal areas, the model was set up for riverine flood hazard analysis only. The study region's stream network was determined using the model's automated stream network development routine which utilized a user defined drainage area of 5 square miles for stream density determination. The DEM coverage and developed stream network were processed by the model for riverine hydrologic analysis and floodplain extents. Following establishment of the study region's hydrology and floodplains, the model was run to determine physical, economic, and social impacts of flood events for the 100- and 500-year return periods. HAZUS analysis was run on the County-level, and model output represents Countywide damages, economic losses, and social impacts. Summaries of damage and economic losses for buildings, as well as debris generation estimates and estimates of displaced populations, are discussed in Section 5.3. The HAZUS flood model summary reports are provided in Appendix F.

### ***Hurricane Model***

The HAZUS hurricane loss estimation model estimates potential economic and social losses resulting from hurricane winds. The hurricane modeling function allows for evaluation of historic events which impacted the study region that are included in the model's storm inventory (i.e., deterministic scenario), as well as probabilistic scenarios which consider wind impacts from thousands of potential storm tracks and intensities typical of the region. In order to evaluate a large range of data for the study region, a probabilistic scenario was run and evaluated for the 500 and 1,000-year return periods. The HAZUS hurricane model was most relevant to severe thunderstorms and windstorms for Chautauqua County. The findings of the HAZUS hurricane model are discussed Section 5.1, and the summary reports are provided in Appendix F.



### **Earthquake Model**

The HAZUS loss estimation methodology utilized by the earthquake model provides a framework for evaluating risk and potential economic, physical and social losses anticipated from modeled historic or user defined earthquake events. Due to a lack of historic earthquake data included in the model inventory for the study region, a probabilistic earthquake hazard was evaluated using HAZUS probabilistic ground motion and soil amplification data associated with a user-defined, probabilistic seismic hazard for a 500-year return period. HAZUS probabilistic earthquake scenarios utilize a user-defined magnitude driving the probabilistic event. The event magnitude defined for the scenario does not impact the ground motion observed by the model, however this data provides the framework for the anticipated earthquake duration. In order to evaluate the most realistic results for the study region, which does not experience frequent, large magnitude seismic events, the minimum magnitude of 5.0 was selected for the model. The findings of the HAZUS earthquake model are discussed in Section 5.10, and the summary report is provided in Appendix F.

## **5.0 HAZARD PROFILES**

The natural hazards that were selected for profiling in the HMP update are further detailed below. The following sections include a description of the hazard, geographic extent and frequency within Chautauqua County, historical occurrences and damage estimates, and the probability of future hazard events. Hazards are discussed in the order that they were categorized by the County, from highest to lowest.

Hazard event information was compiled from local records and publicly available data from the 2019 NYS Hazard Mitigation Plan, National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC), U.S. Army Corps of Engineers (USACE) Cold Regions Research and Engineering Laboratory (CRREL), and the U.S. Geological Survey (USGS) Earthquake Catalog. The NCDC data incorporates damage estimates for many events (NOA NCDC, 2022). The NCDC damage estimates are subject to the NCDC disclaimer that while the National Weather Service makes an effort to use the best available information to document the occurrence of storms and other significant weather data, some information may be unverified. The National Weather Service (NWS) estimates damage costs using all available data, but property and crop damages listed for individual storms are considered broad estimates and total damages are often higher than those reported by the NCDC.

## 5.1 Severe Thunderstorm, Windstorm, or Hail

### *Description*

Severe storms as defined by HIRA-NY include severe thunderstorms (with associated severe wind events such as derechos, gustnados, and downbursts – described below), hailstorms, and windstorms. For clarity, thunderstorms and windstorms are addressed separately from hailstorms in the following sections. Tornadoes are profiled separately in Section 5.8.

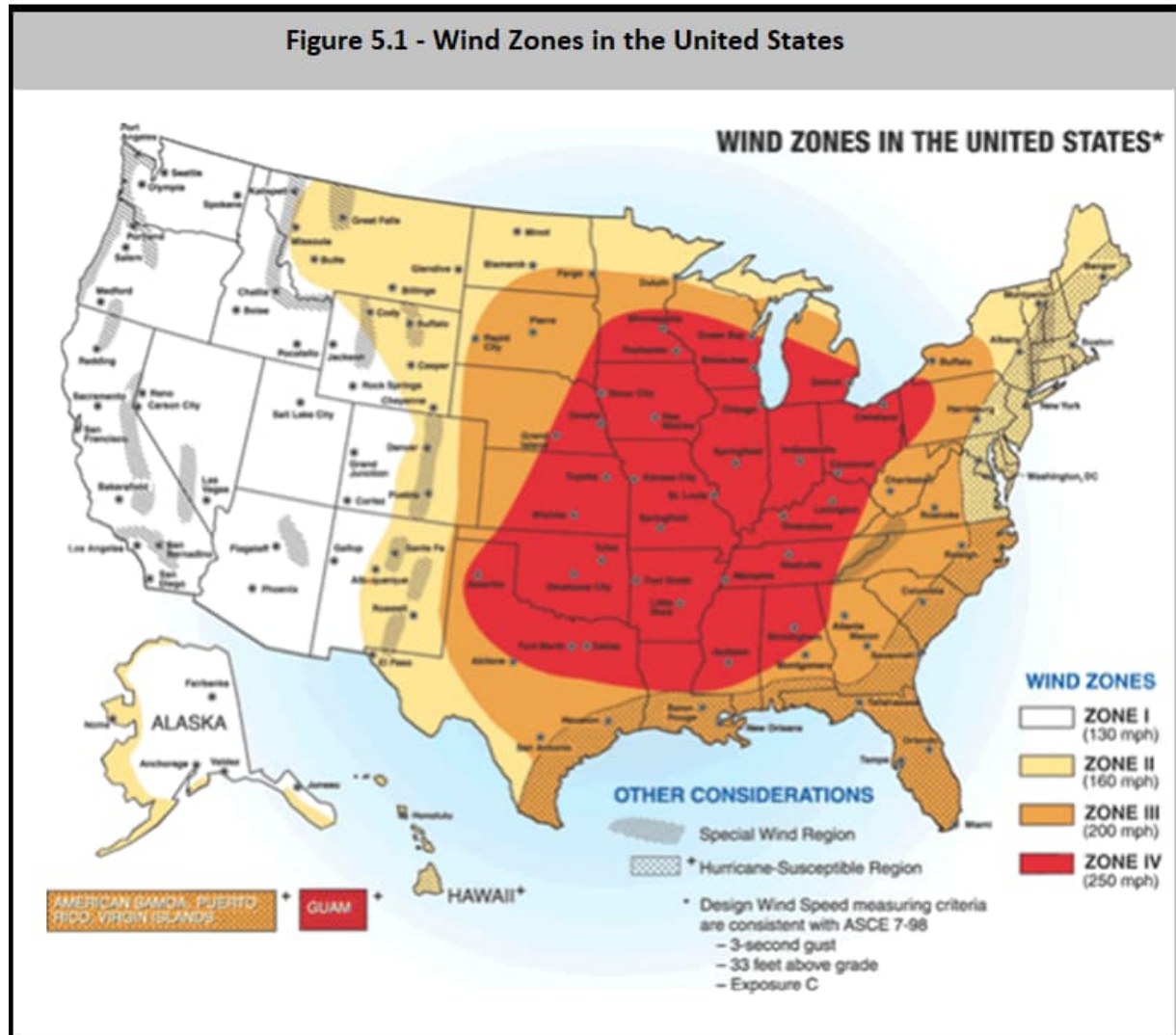
### *Thunderstorms and Windstorms*

The NWS defines a severe thunderstorm as a storm with a tornado, surface hail .75 to 1 inch or more in diameter, or wind gusts 50 knots (58 mph) or greater, or all three. Severe thunderstorms can cause damage from high winds, hail, heavy rainfall, and/or lightning strikes. The NWS estimates that over 100,000 thunderstorms occur each year throughout the U.S. mainland, 10% of which are classified as severe. Thunderstorms can produce deadly and damaging tornadoes, hailstorms, intense downburst and microburst winds, lightning, and flash floods. Downburst winds are strong, concentrated, straight-line winds created by falling rain and sinking air that can reach speeds of 125 mph. Wind gusts or downbursts can be described as microbursts or macrobursts (NOAA NWS, 2022a). Microbursts extend 2.5 miles or less and generally last between 5 and 15 minutes, and can generate winds up to 168 mph. Macrobursts extend greater than 2.5 miles and last between 5 and 30 minutes. These events can cause winds up to 134 mph.

Lightning is generated by the buildup of charged ions in a thundercloud, the discharge of a lightning bolt interacts with the best conducting object or surface on the ground. A derecho is a widespread and long-lived windstorm that is associated with a band of rapidly moving showers or thunderstorms, and a gustnado is a short-lived, ground-based vortex that develops on a gust front associated with either showers or thunderstorms (NOAA NWS, 2022b).

Extreme windstorm events are associated with tropical cyclones, winter cyclones, and severe thunderstorms that generate straight-line winds. Winds vary from zero at ground level to 200 mph in the upper atmospheric jet stream at 6 to 8 miles above the earth's surface. Large-scale extreme wind phenomena are experienced over every region of the United States and its territories. Figure 5.1 shows wind zones of the United States; Chautauqua County is located in Zones III and IV, where maximum wind speeds can reach 200 to 250 mph, respectively. Windstorms are synoptically driven, associated with

the interaction between a strong mid-latitude cyclone (low pressure) and a strong mid-latitude anti-cyclone (high pressure). They have a duration of several hours to 12 hours.



*Hailstorms*

Hailstorms are often associated with severe thunderstorms. Hailstorms are characterized by balls or irregularly shaped lumps of ice greater than 0.75 inch in diameter that fall with rain. Peak periods for hailstorms are late spring and early summer, the time of year when the jet stream migrates northward across the U.S. Hailstorms can cause extensive crop damage, particularly to herbaceous and long-stemmed crops. Severe hailstorms can also cause damage to buildings, automobiles, and aircraft, but rarely cause fatalities or serious injury. Hailstorms are categorized on

the TORRO Hailstorm Intensity Scale (TORRO, 2022), which is provided below in Table 5.1.

<b>Table 5.1 – TORRO Hailstorm Intensity Scale</b> <i>(TORRO, 2022)</i>				
<b>Intensity Category</b>		<b>Typical Hail Diameter (mm)</b>	<b>Probable Kinetic Energy, J-m<sup>2</sup></b>	<b>Typical Damage Impacts</b>
H0	Hard Hail	5	0-20	No Damage
H1	Potentially Damaging	5-15	>20	Slight general damage to plants, crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	Severe damage to fruit and crops. Damage to glass and plastic structures, paint, and wood scored
H4	Severe	25-40	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60	-	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75	-	Severe roof damage, risk of serious injuries
H8	Destructive	60-90	-	Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100	-	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100	-	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

### **Hazard Vulnerability**

Chautauqua County is highly vulnerable to severe thunderstorms, windstorms, or hail, as documented in their updated hazard analysis (Section 4.4). Specific details regarding extent and frequency for each type of severe storm event considered are provided below.

#### *Thunderstorms and Windstorms*

Severe thunderstorms and windstorms generally affect a large portion of the County at once, and could occur anywhere. The County is highly vulnerable to severe thunderstorms and windstorms based on this hazard's high extent (a large area is affected at once), moderate onset (hours of warning), moderate potential for property damage/injuries, and high frequency (one or more times per year). High winds are characterized using the Beaufort Wind Scale (Table 5.2). High wind and thunderstorm wind events occur multiple times per year in Chautauqua County and typically have velocities between 50 and 60 knots. Wind velocities between 48-55 knots have a force of 10 (storm) on the Beaufort Scale, and velocities between 56-63 knots have a force of 11 (violent storm) (Edwards, 2021). Storms with a wind force of 12 (hurricane, 64 knots or greater) have occurred in Chautauqua County the past five years, but are infrequent.

<b>Table 5.2 – Beaufort Wind Scale</b>			
<b>Force</b>	<b>Wind Speed (Knots)</b>	<b>WMO Classification</b>	<b>Appearance on Land</b>
0	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Wind felt on face. Leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Small trees in lead begin to sway
6	22-27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Twigs breaking off trees, generally impedes progress
9	41-47	Strong Gale	Slight structural damage occurs, slate blows off roof
10	48-55	Storm	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	-
12	64+	Hurricane	-

### *Hailstorms*

All areas of Chautauqua County are susceptible to hailstorms. The County is highly vulnerable to hailstorms windstorms based on this hazard's high extent (a large area is affected at once), moderate onset (hours of warning), moderate potential for property damage/injuries, and high frequency (one or more times per year). The most damaging hailstorms that have occurred in Chautauqua County over that past five years produced hail that was 2.0 inches in diameter, which corresponds with category H4 (severe) on the TORRO Scale. Hailstorms occur about once per year in Chautauqua County.

### ***Historical Hazard Occurrences and Damage Estimates***

#### *Thunderstorms and Windstorms*

Severe thunderstorm events have been documented in numerous locations across Chautauqua County. The NCDRC reported 154 thunderstorm wind events and 22 high wind events for Chautauqua County from January 2016 through August 2022, which are summarized in Table 5.3 (Appendix A) and shown in Figure 5.2 (Appendix A). Total reported damages from these events were \$2,418,000.

Depending on the size and location of a severe storm, damages in Chautauqua County typically range from one thousand to tens of thousands of dollars. It is noted that damage estimates from NCDRC are often underreported and/or underestimated, and actual losses from severe thunderstorms and windstorms are likely greater than reported. Storms that occur between late spring and early fall have a greater probability of causing crop damage. The NCDRC did not report any crop damages for severe thunderstorm or windstorm events in the last five years.

Fifty-two of the 176 reported thunderstorm wind and high wind events in the last five years caused damages to trees and overhead utilities. Roof damages have also occurred but this is less frequent (associated with only one of the 176 reported events in the last five years). One injury and zero fatalities were reported for severe thunderstorm or windstorm events in the last five years. The most significant thunderstorm wind event occurred on July 16, 2020 in West Portland (Town of Portland). This event was classified as a mesoscale convective vortex with wind speeds of up to 87 knots (100 mph), and

resulted in \$150,000 of property damages. Reported impacts included a destroyed barn, uprooted trees, and damage to a home and shop.

Chautauqua County was included in one federal disaster declaration for severe storms (Table 4.4). This event occurred on October 31, 2019 and involved severe storms, straight-line winds, and flooding. Chautauqua County received public assistance for emergency and permanent work for this event.

#### *HAZUS Hurricane Model Results*

The HAZUS hurricane model for Chautauqua County best fit with the severe windstorm hazard, because the model only factors in coastal storm surge for coastal areas. An evaluation of estimated hurricane losses generated by the model run for the study region did not reveal any significant damages or casualties for any of the evaluated return periods. No essential facilities evaluated by the model were anticipated to be damaged by the 500-year or 1,000-year hurricane event. Additionally, no people were anticipated to be displaced or require temporary shelter as a result of either of the evaluated hurricane return periods. The model estimated no notable debris generation for the 500-year return period, and 3,400 tons of debris for the 1,000-year return periods. The model estimated that 0.26% of buildings in the County would experience minor damages during a 500-year event, compared to 0.78% of buildings during a 1,000-year event. Finally, HAZUS estimated total economic losses at \$0 and \$500,000 for the 500-year and 1,000-year events, respectively. HAZUS output reports are provided in Appendix F.

#### *Hailstorms*

The NCDRC reported 20 hailstorms in Chautauqua County from January 2016 through August 2022 (Table 5.4, Appendix A). Zero of the twenty reported hail events in the last five years each caused property damages. The NCDRC did not report any crop damages, injuries, or fatalities for hail events in Chautauqua County in the last five years. Total damages were likely greater than reported.

The most significant recent hailstorm in Chautauqua County occurred on May 4, 2019 in the Town of Mina/Findley Lake. A low pressure system produced winds of 65 knots hail measuring 2.0" in diameter, though no property damages were recorded.

#### ***Future Potential Impacts and Relation to Climate Change***

The County's overall vulnerability to severe thunderstorm, windstorm, and hail events remains high. New York State Energy and Research Development Authority's (NYSERDA)

ClimAID report states that temperatures will continue to rise over the next several decades. As a result, weather patterns are projected to increase in severity. Due to projected increases in precipitation and increases in yearly average temperatures, severe storm events are anticipated to increase in frequency and intensity.

## 5.2 Severe Winter Storm

### **Description**

A severe winter storm is described as a storm system that develops in late fall to early spring and deposits snow, sleet, or freezing rain, with a significant impact on transportation systems and public safety. According to the HIRA-NY definitions of hazards, a severe winter storm can be categorized by the following conditions:

- Heavy snow: at least 6 inches in 12 hours or Lake Effect Snows;
- Blizzard: low temperatures, winds 35 mph or greater, and sufficient falling and/or blowing snow in the air to frequently reduce visibility to  $\frac{1}{4}$  mile or Lake Effect Snows for a duration of at least three hours; or
- Severe blizzard: temperatures near or below 10°F, winds exceeding 45 mph, and visibility reduced by snow to near zero for at least 3 hours.

Severe winter storms can be characterized using the Regional Snowfall Index (NOAA NWS, 2022c), shown in Table 5.5, below. According to the National Oceanic and Atmospheric Administration's map depicting average annual snowfall for New York State, between 1981 and 2010 Chautauqua County received a range of 75 to 200 inches of snow per year. The southwestern portion of the county receives considerably more snow on average than areas in the southeast of the county. In addition, portions of the county closest to the Lake Erie shoreline receive less snow than the interior and the southwestern part of the county. The RSI is calculated based on the amount of snowfall, extent of the storm, and population affected, and categorizes storms in five categories ranging from Notable to Extreme. Winter storms affecting the County that register on the RSI most often fall in Category 1 (Notable). One recent snowstorm in Chautauqua County reached Category 2 (Significant), and another storm reached Category 4 (Crippling).



<b>Table 5.5 – Regional Snowfall Index</b> (NOAA NWS, 2022c)		
Category	RSI Value	Description
1	1-3	Notable
2	3-6	Significant
3	6-10	Major
4	10-18	Crippling
5	Over 18	Extreme

### ***Hazard Vulnerability***

According to the updated hazard analysis in Section 4.4, Chautauqua County is highly vulnerable to severe winter storms based on this hazard’s high extent (a large area is affected at once), moderate onset (hours of warning), moderate potential for property damage/injuries, and high frequency (one or more times per year). Severe winter storms can occur anywhere in Chautauqua County. Severe winter storms have the ability to immobilize an entire portion of the County, severely limiting the ability of emergency agencies to respond to local emergencies. Lake-effect snow often results in high precipitation totals and temporary whiteout conditions. Power outages and roadway safety are of primary concern during severe winter storms.

### ***Historical Hazard Occurrences and Damage Estimates***

The severity of winter storm events in Chautauqua County varies greatly. These events can be minor with little to no damages to severe with debilitating power outages across large areas. Chautauqua County has not been included in any severe winter storm-related disaster declarations since 2016 (Table 4.4).

The NCDC reports 48 severe winter storm events since 2016 in Chautauqua County (Table 5.6, Appendix A). Half (24) of the NCDC records reported property damages, which totaled \$565,000. Of the 48 severe winter storm events, 21 were classified as lake-effect snow, 1 was classified as a blizzard, and the remaining 26 were classified as winter storms.

### ***Future Potential Impacts and Association with Climate Change***

The County's overall vulnerability to severe winter storms remains high. Increases in average temperature associated with climate change are expected to result in more moisture in the atmosphere, resulting in heavier than normal precipitation. Warmer temperatures may also decrease the ice coverage on the Great Lakes, which would create conditions conducive to greater evaporation of moisture, increasing the probability for extreme snowfall.

### **5.3 Flood**

Floods are natural events that occur when excess water from snowmelt, rainfall, or storm surges accumulates and overflows onto the banks and adjacent floodplains of waterbodies.

Several factors determine the severity of floods, including intensity and duration of rainfall, and topography of the watershed. A large amount of rainfall over a short time can result in flash flood conditions. Flash floods are the most common type of flooding in Chautauqua County. Even a small amount of precipitation can result in flood events in locations where the soil is already saturated or in areas with large amounts of impervious surfaces (i.e., large parking lots, roadways, or areas of high-density development). Topography and land cover also contribute to the severity of flood events. Runoff tends to be greater in areas with steep slopes with limited vegetative cover. The frequency of flood inundation depends on the climate, soil, and slope of a particular area.

### ***Hazard Vulnerability***

According to the County's hazard analysis in Section 4.4, Chautauqua County is highly vulnerable to floods based on this hazard's moderate extent (several locations are affected at once), moderate onset (hours of warning), high potential for property damage/injuries, and high frequency (one or more times per year). 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. Smaller tributaries can also cause flash flooding when water volumes are high. Floodwaters can inundate homes and businesses and disrupt utilities.

Mapped floodplains in Chautauqua County are shown in Figure 5.3 (Appendix A). Approximately 5% of the County is located in a mapped 100-year floodplain, and 1.4% of the County is in a mapped 500-year floodplain. Table 5.7, below, shows the number and estimated structure value of parcels in the County that intersect 100-year and 500-year floodplains.

<b>Table 5.7 – Estimated Structure Value of Parcels within Mapped Floodplains Chautauqua County</b>				
<b>Property Class</b>	<b>Number of Parcels in 100- Year Floodplain</b>	<b>Approx. Structure Value* in 100- Year Floodplain</b>	<b>Number of Parcels in 500- Year Floodplain</b>	<b>Approx. Structure Value* in 500- Year Floodplain</b>
Agricultural	161	\$2,805,037	5	\$118,200
Commercial	123	\$18,059,410	74	\$43,567,450
Community Services	43	\$5,346,110	8	\$11,505,270
Industrial	14	\$2,136,100	5	\$1,551,000
Parks and Open Space	81	\$530,000	2	\$0
Public Services	46	\$13,727,085	6	\$205,618
Residential	1915	\$174,608,566	627	\$54,506,865
Vacant	1600	\$2,269,932	519	\$553,890
Recreation	73	\$4,205,580	9	\$1,122,400
<b>Total</b>	<b>4056</b>	<b>\$223,687,820</b>	<b>1255</b>	<b>\$113,130,693</b>
<i>*Structure Value estimated by subtracting parcel Land Assessed Value from Total Assessed Value (Chautauqua County, 2021)</i>				

The USGS has seven stream gauges in Chautauqua County, located on Walnut Creek, Canadaway Creek, Chautauqua Creek, French Creek, Chautauqua Lake, Chadakoin River. Minor, moderate, and major flood stage elevations are defined for the Chadakoin River, which are summarized in Table 5.8 below (USGS, 2022). The USGS does not list flood stage elevations for the other bodies of water within the county.

<b>Table 5.8 – Flood Stages for Chadokin Creek</b>				
<b>Gauge Location</b>	<b>Gauge Elevation (NAVD88)</b>	<b>Minor Flood Stage Elevation (NAVD88)</b>	<b>Moderate Flood Stage Elevation (NAVD88)</b>	<b>Major Flood Stage Elevation (NAVD88)</b>
Chadokin Creek	1,255.88 ft	1,259.88 ft	1,260.38ft	1,260.88 ft

Although dam failure is not recognized as a natural hazard, medium and high hazard potential dams throughout the County were reviewed and considered when analyzing flood risks. Dam hazards can additionally include a breach – (an opening resulting in partial or total failure), inundation upstream of the dam in events greater than the design event, or a release from the spillway – (a structure over or through which flow is discharged from a reservoir).

The New York State Department of Environmental Conservation (NYSDEC) classifies dams based on the level of impact in the event of a failure. NYSDEC dam classification categories are summarized in Table 5.9. There are a total of five high hazard dams and nine moderate hazard dams within the county. The high-hazard potential dams are profiled in the appropriate municipal annexes (Appendix B). Figure 5.4 (Appendix A) shows all intermediate and high-hazard potential dams (Class B or Class C dams) located in Chautauqua County.

<b>Table 5.9 – NYSDEC Dam Hazard Potential Classification</b>	
<b>NYSDEC Dam Classification</b>	<b>Description</b>
Class A – Low Hazard	A dam failure is unlikely to result in damage to anything more than isolated or unoccupied buildings, undeveloped lands, minor roads such as town or country roads; is unlikely to result in the interruption of important utilities, including water supply, sewage treatment, fuel, power, cable or telephone infrastructure; and/or is otherwise unlikely to pose the threat of personal injuring, substantial economic loss or substantial environmental damage.
Class B – Moderate Hazard	A dam failure may result in damage to isolated homes, main highways, and minor railroads; may result in the interruption of Important utilities, including water supply, sewage treatment, fuel, power, cable, or telephone infrastructure; and/or is otherwise likely to pose the threat of personal injury and/or substantial economic loss or substantial environmental damage. Loss of human life is not expected.
Class C – High Hazard	A dam failure may result in widespread or serious damage to home (s); damage to main highways, industrial or commercial buildings, railroads, and/or important utilities, including water supply, sewage treatment, fuel, power, cable or telephone

	infrastructure; or substantial environmental damage; such as the loss of human life or widespread substantial economic loss is likely.
Class D – Negligible or No Hazard	A dam that has been breached or removed, or has failed or otherwise no longer materially impounds waters, or a dam that was planned but never constructed. Class “D” dams are considered to be defunct dams posing negligible or no hazard. The department may retain pertinent records regarding such dams.

**Historical Hazard Occurrences and Damage Estimates**

Chautauqua County was included in one federal disaster declaration for flooding between 2016 and 2022 (Table 4.4). This event (D-4472) occurred on October 31, 2019 and involved severe storms, straight-line winds, and flooding. Chautauqua County received public assistance for emergency and permanent work for this event (FEMA, 2022a). The NCDRC reported 41 flood events in Chautauqua County between 2016 and 2022, which are summarized in Table 5.10 (Appendix A) and illustrated in Figure 5.5 (Appendix A). The events reported by NCDRC resulted in a total of \$6,988,000 in property damage. A majority of these events were flash floods (24), while lakeshore flooding accounted for twelve flood events and normal flood events were reported on four occasions. Six of the flash flood records reported by NCDRC occurred on June 1, 2018 in the Towns of Portland, Ellington, and Poland. These floods were caused by slow moving downpours. Although no damages were reported, several roads were reportedly closed, including sections of I-86, Route 62, and Route 394.

Lakeshore flood events on October 27, 2018, October 31, 2019, November 1, 2019 and November 27, 2019 caused a combined \$4,000,000 in property damages. On October 27<sup>th</sup> flooding resulted when ice pushed onshore from Lake Erie, which caused damage to lake shore roads and shoulders. The flood on November 1<sup>st</sup> occurred when Lake Erie crested at Buffalo Harbor at a height of 10.56 feet above low water datum and damage was reported to the Dunkirk breakwater.

A flood event that brought up to two inches of rain in the drainage basin of Walnut Creek occurred on May 15, 2020. The rain primarily fell upstream from Silver Creek, and due to the geometry of the basin this caused a rapid rise of water downstream within the Village of Silver Creek. The river gauge installed in Silver Creek recorded a rapid rise to a crest of 7.63 feet, which is above the nominal flood stage of 7 feet, and areas that

include Rix, Oliver, and Dana Streets were evacuated due to flooding. In total, the Village experienced \$50,000 in property damages.

On July 16, 2021 moderate to heavy rain entered far western NY and advanced eastward across the region as an area of low pressured move northeast from Ohio along a stationary front. A flash flood in the Village of Bemus Point occurred when water in Bemus Creek was backed-up due to rising water levels in Chautauqua Lake. The flood caused \$100,000 in property damages and triggered voluntary evacuations of homes.

**HAZUS Flood Model Results**

HAZUS estimates total economic annualized losses for buildings in Chautauqua County to be \$851.29 million and \$984.56 million for the 100-year and 500-year flood return periods, respectively. The HAZUS loss estimates are much greater than damages that have been reported with historic severe flood events. Direct economic annualized losses estimated for the 100- and 500-year return periods are summarized below in Table 5.11, including capital stock losses of buildings and their contents, as well as associated income losses.

<b>Table 5.11 – HAZUS Flood Model: Direct Economic Annualized Losses for Buildings</b>								
<b>Return Period</b>	<b>Capital Stock Losses (millions of dollars)</b>			<b>Income Losses (millions of dollars)</b>				<b>Total Loss (millions of dollars)</b>
	<b>Building Loss</b>	<b>Contents Loss</b>	<b>Inventory Loss</b>	<b>Relocation Loss</b>	<b>Capital Related Loss</b>	<b>Wages Losses</b>	<b>Rental Income Loss</b>	
<b>100-Year</b>	298.72	176.29	12.72	75.89	70,775	363.53	35.38	<b>\$851.29</b>
<b>500-Year</b>	135.52	211.73	14.49	89.73	87.50	40.77	404.82	<b>\$984.56</b>

HAZUS estimates the total building damage count for the 100-year and 500-year flood return periods to be 1,788 and 2,108, respectively. These results suggest that between 2.9% and 3.4% of buildings within the study region would be damaged during a 100-year or 500-year flood event. Estimated number of damaged buildings for the 100- and 500-year return periods are summarized in Table 5.12, including what range of damage is anticipated for each building as a percentage of the building footprint.

<b>Table 5.12 – HAZUS Flood Model: Building Damage Count</b>							
<b>Return Period</b>	<b>Count of Buildings (#) by Range of Damage (%)</b>						
	<b>1-10%</b>	<b>11-20%</b>	<b>21-30%</b>	<b>31-40%</b>	<b>41-50%</b>	<b>Substantial (over 50%)</b>	<b>TOTAL (#)</b>
<b>100-Year</b>	1061	668	43	5	1	0	<b>1,778</b>
<b>500-Year</b>	1170	847	61	28	2	0	<b>2,108</b>

HAZUS estimates the total area of building damage for the 100-year and 500-year flood return periods to be approximately 7.7 million square feet and 11.0 million square feet, respectively. The estimated area of building damages for the 100- and 500-year return periods are summarized in Table 5.13, including what square footage of damage is associated with each range of damage reported as a function of total individual building area.

<b>Table 5.13 – HAZUS Flood Model: Building Damage by Square Footage</b> <i>(All values are in thousands of square feet)</i>								
<b>Return Period</b>	<b>Average Damage (ft<sup>2</sup>) Within Each Damage Range (%)</b>							<b>TOTAL (ft<sup>2</sup>)</b>
	<b>&lt;1%</b>	<b>1-10%</b>	<b>11-20%</b>	<b>20-30%</b>	<b>31-40%</b>	<b>41-50%</b>	<b>Substantial (&gt;50%)</b>	
<b>100-Year</b>	1,808	4,536	2,806	398	100	36	37	7,711
<b>500-Year</b>	2,009	4,887	3,332	520	187	54	62	11,052.53

HAZUS estimated the total debris generated from 100-year and 500-year flood events to be 10,539 tons and 13,435 tons, respectively. The estimated tonnage of debris generated from the 100-year and 500-year return periods are summarized in Table 5.14, including debris generated from building finishes, structures, and foundations.

<b>Table 5.14 – HAZUS Flood Model: Debris Generation</b>				
<b>Return Period</b>	<b>Debris Generated (Tons)</b>			
	<b>Finishes</b>	<b>Structure</b>	<b>Foundation</b>	<b>Total Debris</b>
<b>100-Year</b>	8,378	679	1,481	<b>10,539</b>
<b>500-Year</b>	10,484	1,029	1,921	<b>13,435</b>

HAZUS estimates the total population displaced from a 100-year and 500-year flood event to be 8,158 and 9,529 people, respectively. These results suggest that between 6.0% and 7.1% of the total study region population would be displaced as a result of a 100-year or 500-year flood event. Within these displaced populations, some individuals will require accommodations in temporary public shelters. HAZUS results indicate that approximately 0.55% of the study region population would require shelter as a result of a 100-year or 500-year flood event. A summary of the estimated number of displaced persons and persons requiring shelter for each flood return period is provided in Table 5.15.

<b>Return Period</b>	<b>Persons Seeking Shelter (including percentage of total County population)</b>	<b>Displaced Population (including percentage of total County population)</b>
<b>100-Year</b>	718 (0.5%)	8,158 (6.0%)
<b>500-Year</b>	816 (0.6%)	9,529 (7.1%)

The HAZUS flood model result output summary reports are provided in Appendix F.

#### ***Future Potential Impacts and Association with Climate Change***

The County's overall vulnerability to a flood remains high. The County and its jurisdictions proposed numerous flood-related mitigation actions. The County's mitigation actions are described in Table 7.4 (Appendix A), and each jurisdiction's mitigation actions are described in their annexes (Appendix B). Many of these projects involve flood awareness education and improved stormwater management planning, in addition to upgrades to culverts and stormwater drainage systems. Once implemented these projects will reduce the County's overall vulnerability to flood damages.

Climate change is likely to impact the severity and frequency of flooding in Chautauqua County. With the anticipated increase in severe storms due to climate change, heavy precipitation and associated flash floods will likely become more common (Horton et al., 2014). The annual average amount of precipitation is projected to increase by up to 10% over the next 30 years. Due to this projected increase, the frequency and severity of flash flooding events in New York State are expected to rise (Rosenzweig et al., 2011). Increased winter precipitation could lead to more winter floods, especially if the ground is frozen and less permeable. In addition, rising air and water temperatures would cause ice and snow to melt more rapidly, which could cause more frequent flooding during the winter and early spring months.



## 5.4 Ice Jam

### ***Description***

An ice jam is described as a large accumulation of ice in rivers or streams that interrupts the normal flow of water and often leads to flooding and/or damage to nearby structures (NOAA NWS, 2022d). Ice jams can form when ice formation begins in the early winter (freeze-up jams), during the breakup of ice (break-up jams), or through a combination of both events (combination jams). Although a large amount of information associated with ice jam events has been collected since the early 1900's, documentation of the actual rate of occurrence of such events is not easily obtained. Ice jams are often short-lived and often affect only a localized reach of a waterbody.

### ***Hazard Vulnerability***

According to the updated hazard analysis in Section 4.4, Chautauqua County is highly vulnerable to an ice jam based on this hazard's moderate extent (several locations are affected at once), moderate onset (hours of warning), high potential for property damage/injuries, and high frequency (one or more times per year). Local municipalities that rated ice jams as a high level of overall vulnerability include the Town of Ellington, Town of Hanover, Town of Westfield, Village of Falconer, Village of Panama, and the Village of Silver Creek. Ice jams typically occur within streams and creeks, and only affect small portions of the County.

### ***Historical Hazard Occurrences and Damage Estimates***

A query of the U.S. Army Corps of Engineers' (USACE) Cold Regions Research and Engineering Laboratory (CRREL) Ice Jam Database was completed to determine records of past ice jam events within Chautauqua County. No ice jams were reported for Chautauqua County between 2016 and 2022 by the USACE CRREL. None of the floods record reported by the NCDC was reportedly caused by an ice jam.

### ***Future Potential Impacts and Association with Climate Change***

The County's overall vulnerability to an ice jam remains high. Properties adjacent to Canadaway Creek, Silver Creek, and Walnut Creek remain most vulnerable to impacts from ice jams. A majority of municipalities in the County experience somewhat frequent ice jams which can result in substantial property damages. Climate change may also increase the frequency of ice jams, particularly mid-winter breakup jams – (breakup and flooding usually happens in the spring, but occasionally perturbations in winter

temperatures invoke mid-winter ‘thaws’. These are influenced by rainfall, augmented river flow, and ice decay) (Turcotte et al., 2020).

### 5.5 Wildfire

#### **Description**

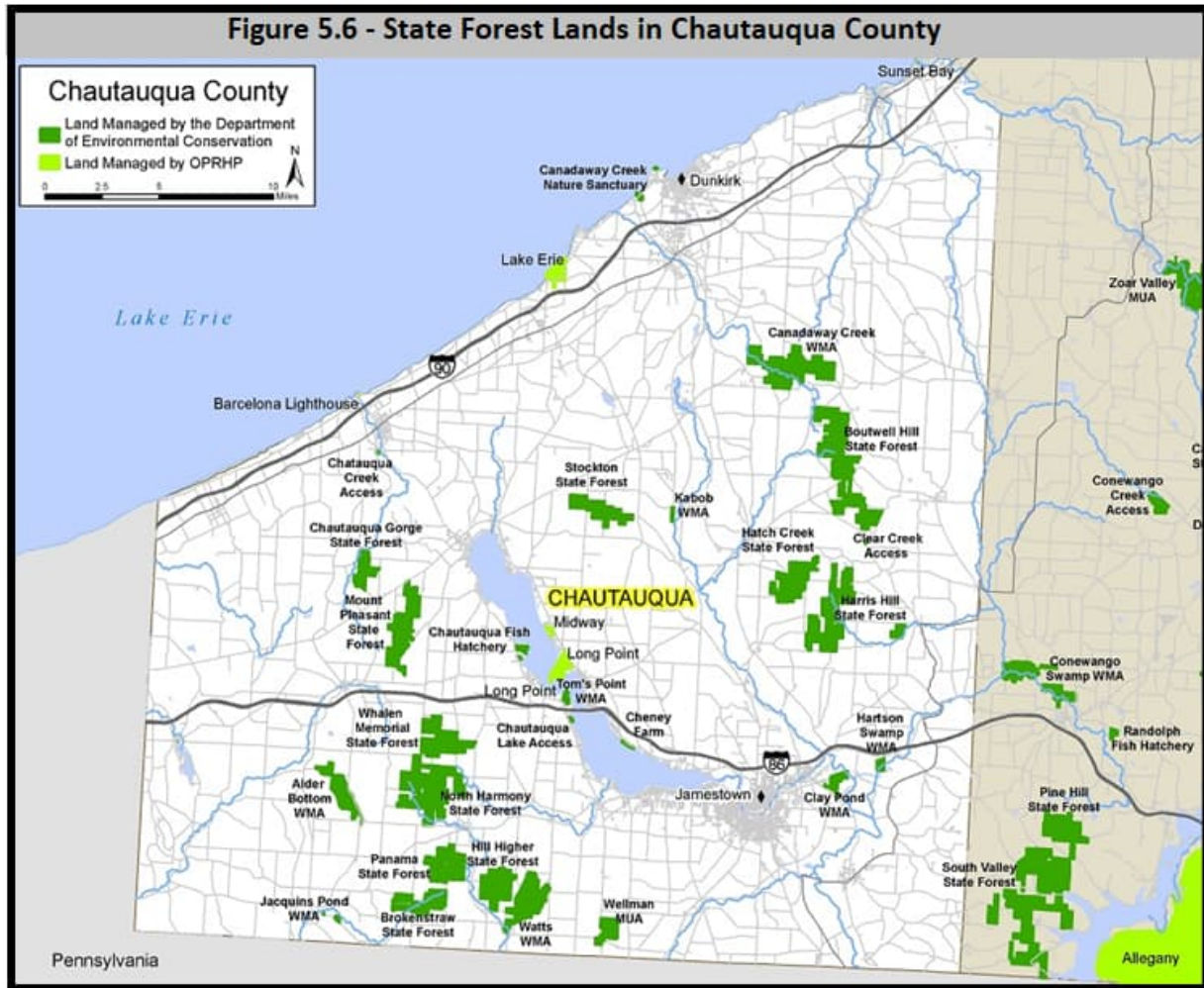
A wildfire is defined as an uncontrollable combustion of trees, brush, or grass involving a substantial land area which may have the potential for threatening human life and property. Dry conditions at various times of the year can increase the potential for wildfire events. Often wildfires begin abruptly and spread quickly, creating a dense smoke that can fill the surrounding area for miles. Four out of every five wildfires are caused by humans, typically due to debris burns, arson, or carelessness (NYSDEC, 2017).

#### **Hazard Vulnerability**

According to the updated hazard analysis in Section 4.4, Chautauqua County is highly vulnerable to a wildfire based on this hazard’s moderate extent – (several locations are affected at once), high onset – (no warning), moderate potential for property damage/injuries, and moderate frequency – (one every 2 to 5 years). Wildfires have the potential to occur throughout Chautauqua County, especially in rural areas with substantial open fields, brush land, or forested land. There are multiple state forests located in Chautauqua County, generally in the southern part of the County as shown in Table 5.16 below. In total the County contains over 22,000 acres of state forests, state wildlife management areas, and unique areas. These properties are shown in Figure 5.6 (Appendix A).

<b>State Forest</b>	<b>Municipalities</b>	<b>Acres within Chautauqua County</b>
Alder Bottom Wildlife Management Area	Towns of Clymer and Sherman	818
Boutwell Hill State Forrest	Towns of Charlotte and Cherry Creek	2,944
Brokenstraw State Forest	Towns of Clymer and Harmony	951
Canadaway Creek Wildlife Management Area	Town of Arkwright	2,180
Chautauqua Gorge State Forest	Town of Chautauqua	538
Chautauqua Lake Fish & Wildlife Management Area	Towns of Ellery and North Harmony	123

<b>Table 5.16 - State Forests in Chautauqua County (NYSDEC, 2022)</b>		
<b>State Forest</b>	<b>Municipalities</b>	<b>Acres within Chautauqua County</b>
Clay Pond Fish Wildlife Management Area	Town of Poland	165
Harris Hill State Forest	Towns of Ellington and Gerry	2,271
Hartson Swamp Wildlife Management Area	Town of Poland	98
Hatch Creek State Forest	Town of Gerry	1,283
Hill Higher State Forest	Town of Harmony	1,156
Jacquins Pond Wildlife Management Area	Town of Clymer	30
Kabob Wildlife Management Area	Town of Stockton	38
Lake Erie State Park	Town of Portland	355
Long Point State Park on lake Chautauqua	Town of Ellery	360
Midway State Park	Village of Bemus Point	44
Mount Pleasant State Forest	Towns of Chautauqua and Sherman	1,522
North Harmony State Forest	Towns of Harmony, North Harmony, and Sherman	2,561
Panama State Forest	Town of Harmony	1,224
Stockton State Forest	Town of Stockton	977
Sunset Bay Marine Park	Town of Hanover	N/A
Watts Flats Wildlife Management Area	Town of Harmony	1,401
Wellman State Forest	Town of Busti	447
Whalen Memorial State Forrest	Towns of North harmony and Sherman	1,325
<b>Total</b>		<b>22,811 acres</b>



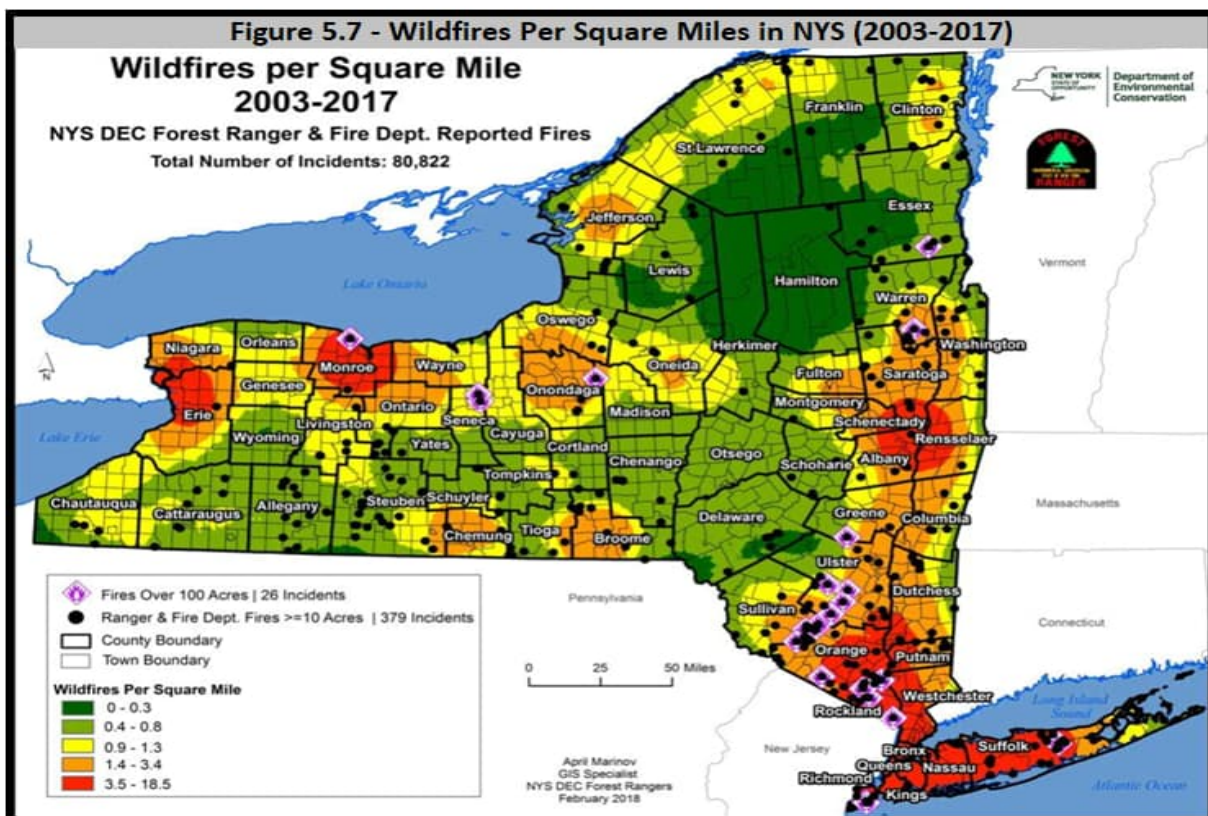
The following towns are located within a NYS Forest Fire District designated under 6 NYCRR Part 191.1. Within the Fire District, the NYSDEC may maintain an approved fire protection system, including fire observation stations and other equipment necessary to prevent and extinguish forest fires.

- Villenova
- Cherry Creek
- Ellington
- Poland
- Carroll
- Kiantone
- Ellicott
- Gerry
- Charlotte
- Arkwright
- Stockton
- Ellery
- Busti
- Harmony
- Clymer
- French Creek
- Mina/Findley Lake
- Sherman

- North Harmony
- Chautauqua
- Westfield

**Historical Hazard Occurrences and Damage Estimates**

According to local records, minor brush fires are relatively common throughout the County, but large-scale wildfires resulting in significant damages are rare. Four records of wildfires over 10 acres, and zero major wildfires over 100 acres, occurred in Chautauqua County between 2003 and 2017 (shown in Figure 5.7 below). Figure 5.7 indicates that the eastern portion of the County (much of which consists of undeveloped forested land and open fields), experienced 0 to 0.8 wildfires per square mile from 2003 to 2017, while the western half of the County generally experienced 0.9-1.3 wildfires per square mile.



No records of structural damage or injuries were reported in association with local records of wildfires throughout the County. Given the predominantly rural nature of

Chautauqua County, a wildfire is unlikely to cause extensive infrastructure or property damage.

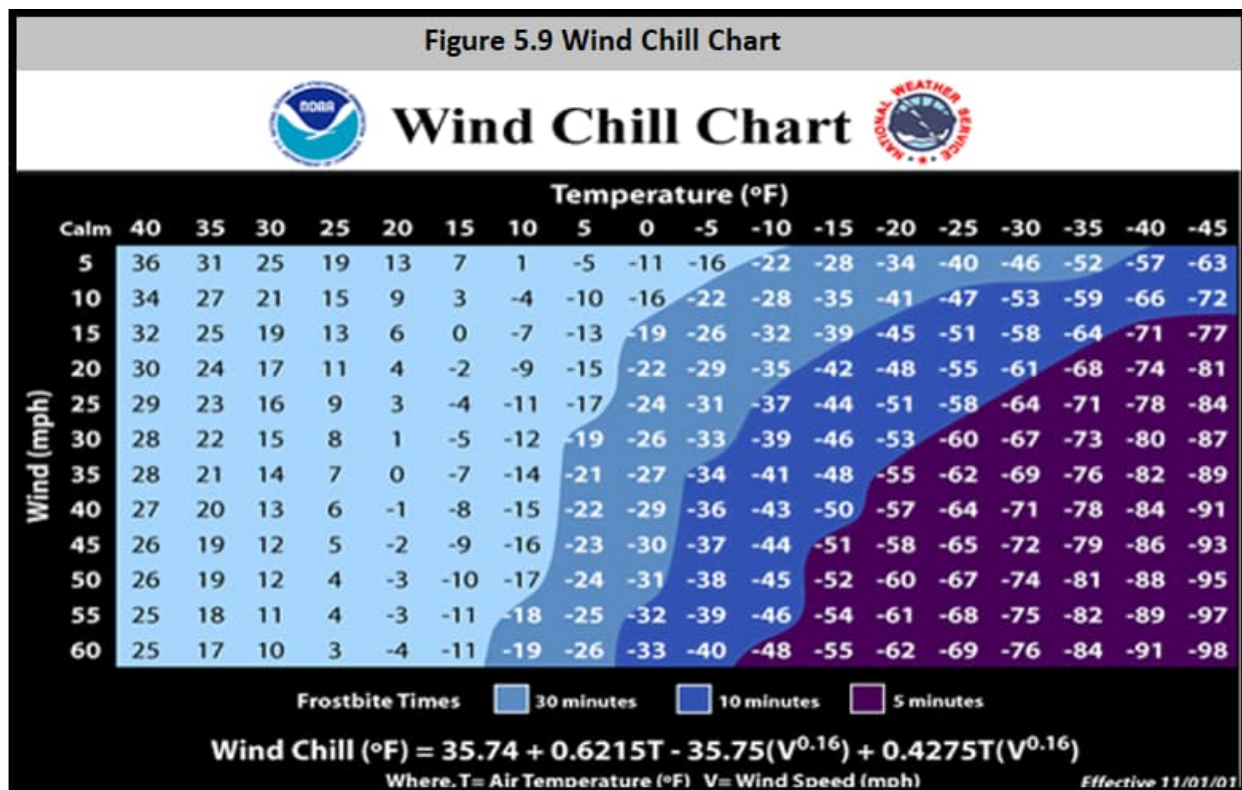
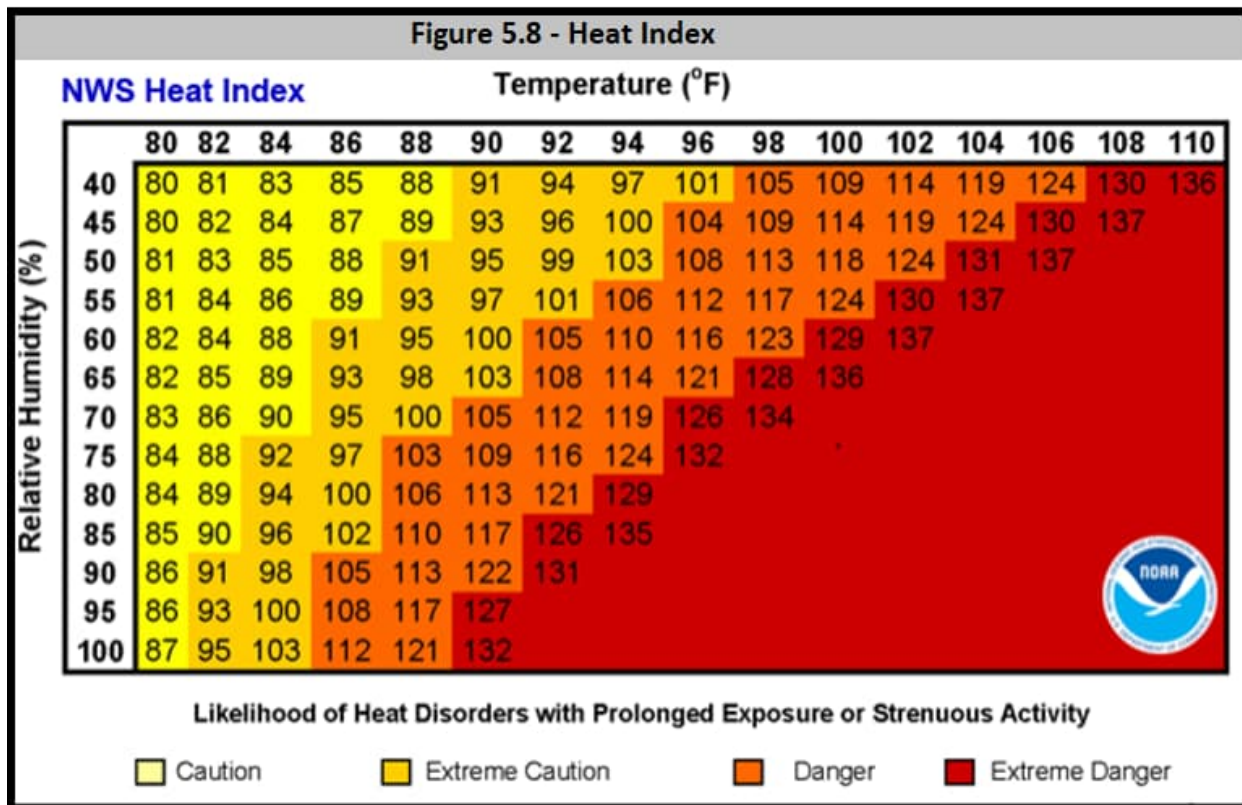
### ***Future Potential Impacts and Association with Climate Change***

The County's overall vulnerability to a wildfire remains high. Forested and other undeveloped portions of the County are at the highest risk of wildfire damage. The frequency and extent of wildfires is likely to increase with climate change due to an overall increase in temperatures (Rosenzweig et al., 2011).

## **5.6 Extreme Temperatures**

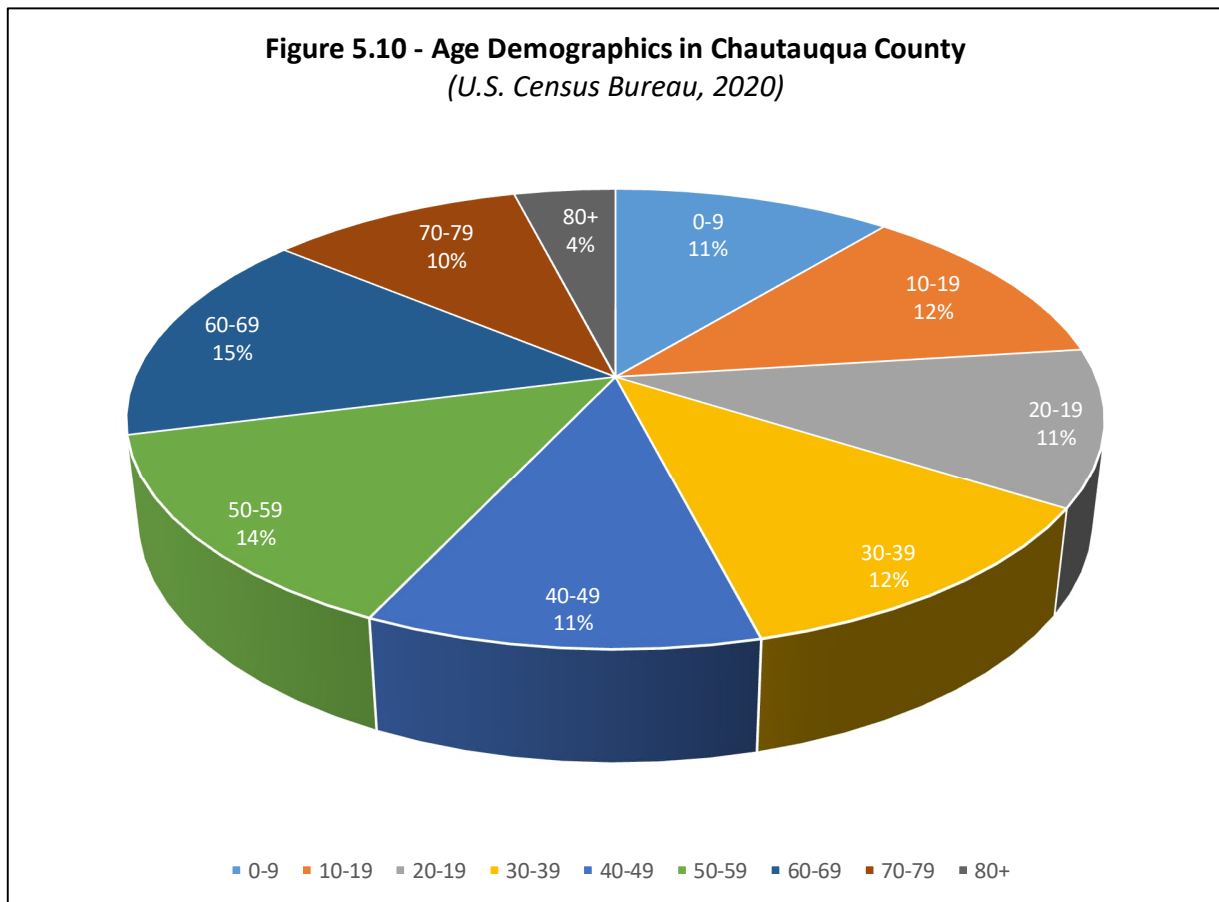
### ***Description***

Extreme temperature events are defined as extended periods of excessive cold or hot weather with a serious impact on human and/or animal populations. Prolonged extreme temperature events lasting for at least three days with a temperature colder than -10°F (cold wave) or hotter than 95°F (heat wave) were considered under this hazard. In extreme heat and high humidity, evaporation is slowed and the body must work harder to maintain a normal temperature. People exposed to extreme heat exposure may develop symptoms that include, sunburn, dehydration, heat exhaustion, or heat stroke. The NWS Heat Index, a function of temperature and relative humidity, is used to predict the likelihood that someone could develop heat disorders. In extreme cold conditions, people can experience wind chill, frostbite, or hypothermia. Exposure to extreme temperatures for prolonged periods of time can result in death. The NWS Wind Chill Index is a function of temperature and wind velocity. The NWS Heat and Wind Chill Indices are included in Figures 5.8 and 5.9, both below.



**Hazard Vulnerability**

According to the updated hazard analysis in Section 4.4, the County is highly vulnerable to extreme temperature event storms based on this hazard’s high extent – (a large portion of the County is affected at once), low onset – (days of warning), moderate onset – (potential for property damage/injuries), and high frequency – (one or more times per year). Extreme temperature events tend to have greater impacts on vulnerable populations, including older adults (over 65 years), young children (under 5 years), people with health problems, or people who cannot afford to sufficiently heat or cool their homes. Approximately 11% of the population in Chautauqua County is under 9 years old, and 29% of the population is over 60 years old, as shown below in Figure 5.10. These figures mean that around 40% of the population is at higher risk for greater impacts to extreme temperatures based on age. Additionally, 14.8% of the County’s population is below the poverty level. Extreme temperatures principally affect the health and safety of the human population, although they can also impact livestock, agricultural crops, and may also cause damage to infrastructure and property.





**Historical Hazard Occurrences and Damage Estimates**

*Heat Waves*

NOAA NCDC extreme temperature records are summarized in Table 5.17 below. The NCDC did not report any heat waves for Chautauqua County in the last five years. Extreme heat events are often more impactful than extreme cold events. In general, buildings are constructed to retain heat. Heat waves leave vulnerable populations at risk. There are multiple cooling center locations established throughout the County. The County OES recommends that residents utilize facilities such as libraries, public pools, grocery stores, and shopping centers to seek relief from extreme heat.

*Cold Waves*

One extreme cold or wind chill event has been reported by the NCDC in Chautauqua between 2016 and 2022 (Table 5.17). The entire county was affected by this event, which occurred on January 30, 2019. Temperatures dropped below freezing and wind gusts were reportedly 35 to 50 miles per hour. Wind chills for these events were as low as -32°F, which was recorded in the City of Jamestown. No damage estimates were reported for these events, however a homeless person in Erie County (located adjacent to Chautauqua County), died of exposure during the cold wave.

<b>Table 5.17 – Extreme Temperature Records, 2016 - 2022</b> (NOAA NCDC, 2022)						
Jurisdiction	Date	Event Type	Deaths (#)	Injuries (#)	Property Damage (\$)	Crop Damage (\$)
Chautauqua County	1/30/2019	Extreme Cold/Wind Chill	0	0	\$0.00	\$0.00
<b>Total</b>			<b>0</b>	<b>0</b>	<b>\$0.00</b>	<b>\$0.00</b>

**Future Potential Impacts and Association with Climate Change**

The County’s overall vulnerability to extreme temperatures remains high. It is anticipated that extreme heat events will increase in frequency and duration due to climate change, and that extreme cold events may decrease due to an average increase in overall temperature (Horton et al., 2014). Going forward, an increased use of air conditioning associated with the rise in extreme heat events will increase demands on local power grids, which should be taken into consideration by municipalities as well as utility providers regarding future planning efforts.

## 5.7 Ice Storm

### **Description**

Ice storms include freezing rain that accumulates in a substantial glaze layer of ice resulting in serious disruptions of normal transportation and possible downed power lines. The NWS defines ice storms as damaging accumulations of ice that occur during freezing rain events. Significant accumulations of ice can pull down trees and utility lines, resulting in the loss of power and communications. These accumulations of ice make walking and driving extremely dangerous.

### **Hazard Vulnerability**

According to the updated hazard analysis in Section 4.4, the County is highly vulnerable to ice storms based on this hazard’s high extent – (a large portion of the County is affected at once), moderate onset – (hours of warning), moderate potential for property damage/injuries, and moderate frequency – (once every five or more years).

The intensity of ice storms is measured using the Sperry-Piltz Ice Accumulation Index, which is detailed below in Table 5.18. Ice storms in Chautauqua County typically correspond with an ice damage index of 1 or 2 on this scale. In addition, ice storms often correspond with severe winter storms, which can be characterized using the Regional Snowfall Index (NOAA NWS, 2022c) and rate of snowfall per duration of time. The Regional Snowfall Index is provided in Table 5.5.

<b>Table 5.18 - Sperry-Piltz Ice Accumulation Index</b>	
<b>Ice Damage Index</b>	<b>Damage and Impact Descriptions</b>
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours each. Roads and bridges may become slick and hazardous
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulations.

3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1-5 days.
4	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structures. Outages lasting 5-10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

The NWS forecasted ice thickness for ice storms refers to accumulation on a horizontal flat surface. This value must be converted to mean radial ice accumulation to be more applicable to ice loads that could form on tree branches or utility lines. Mean radial ice accumulation is equivalent to the horizontal flat surface multiplied by 0.4. The design loading for overhead utility lines is calculated based on the National Electrical Safety Code Loading Districts (NYS is located in the heavy loading district, equating to ½” of ice) multiplied by a standard construction grade value (NARUC, 2018). Damages to trees and overhead utilities, reduced road safety, and power outages are the primary concerns during ice storms in Chautauqua County.

**Historical Hazard Occurrences and Damage Estimates**

The NCDC did not report any ice storms affecting Chautauqua County since 2016. A severe ice storm has the potential to damage a significant amount of critical infrastructure within Chautauqua County, resulting in the need to open emergency shelters and make emergency utility repairs. Fallen trees and power lines could cause structural failures for homes, businesses, and public buildings.

**Future Potential Impacts and Association with Climate Change**

The County’s overall vulnerability to an ice storm remains high. Climate change is likely to cause a rise in temperatures and total annual precipitation over the next several decades. The impact of climate change on the frequency and severity of ice storms is unpredictable (Rosenzweig et al., 2011, Horton et al. 2014).

## 5.8 Tornado

### Description

Tornados are described as local atmospheric storms, generally of short duration, formed by winds rotating at very high speeds, usually in a counter-clockwise direction. The vortex of the tornado can be up to several hundred yards wide and is visible to the observer as a whirlpool-like column of winds rotating about a hollow cavity or funnel. Tornado wind speeds can reach up to 300 mph.

The magnitudes of tornados are measured using the Enhanced Fujita Tornado Damage Scale or Enhanced F-scale (Table 5.19). This system uses a set of wind estimates based on damage, and the estimates vary with height and exposure (NOAA NWS, 2022e).

Fujita Scale		Derived EF Scale		Operational EF Scale		
F Number	Fastest ¼-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

### Hazard Vulnerability

According to the updated hazard analysis in Section 4.4, Chautauqua County is moderately vulnerable to a tornado based on this hazard’s moderate extent – (several locations are affected at once), moderate onset – (hours of warning), moderate potential for property damage/injuries, and moderate frequency – (once every 2 to 5 years). Figure 5.11 shows historic tornado tracks in Chautauqua County (Appendix A).

Tornados occur sporadically throughout New York State and could potentially occur anywhere within the County. In portions of the County with hilly topography (primarily in the northwestern and eastern portions of the County), tornados often touch down along topographic high points and affect more localized areas at one time, rather than longer swaths of damage experienced in areas with flatter topography (primarily in the central part of the County and areas along the coast of Lake Erie). Even if only a small

area is affected, a tornado could result in severe damage to homes, over-turned automobiles and leveling of utility lines.

**Historical Hazard Occurrences and Damage Estimates**

Chautauqua County, and the majority of New York State, are not within a high-risk area for tornado events. The NCDRC reported one tornado events in Chautauqua County between 2016 and 2022, as shown in Table 5.20, below. This event occurred on July 16, 2020 in the Town of Portland. This tornado had a magnitude of EF1, and caused no fatalities and approximately \$150,000 in property damages. One garage was destroyed, several barns were damaged as well as reported tree damage.

<b>Table 5.20 – Tornado Records, 2016 - 2022</b> (NOAA NCDRC, 2022)						
<b>Jurisdiction</b>	<b>Date</b>	<b>Event Type</b>	<b>Deaths (#)</b>	<b>Injuries (#)</b>	<b>Property Damage (\$)</b>	<b>Crop Damage (\$)</b>
West Portland	7/16/2020	Tornado	0	0	\$150,000.00	\$0.00
<b>Total</b>			<b>0</b>	<b>0</b>	<b>\$150,000.00</b>	<b>\$0.00</b>

**Future Potential Impacts and Association with Climate Change**

The County’s overall vulnerability to a tornado remains moderate, and it is located in what FEMA classifies as an area with relatively moderate risk. The New York State Energy and Research Development Authority’s (NYSERDA) ClimAID report states that temperatures will continue to rise over the next several decades. As a result, weather patterns are projected to increase in severity. The potential impact of climate change on the frequency and severity of tornados is unclear, as these events are very sporadic and hard to predict in New York State (NYS DHSES, 2019).

**5.9 Drought**

**Hazard Description**

A drought is defined as a prolonged period of limited precipitation affecting the supply and quality of water. Four types of droughts are recognized. Meteorological droughts are caused by a lack of precipitation that leads to dry conditions. Hydrological droughts are caused by changes in surface and groundwater supplies, and the effects of these events can persist for multiple years. Agricultural droughts relate to impacts to crops, forestry, and/or livestock caused by meteorological and hydrological droughts. Finally,

socioeconomic droughts reflect water shortages that adversely impact the population at both small and large scales (NYS DHSES, 2019).

The U.S. Drought Monitor classifies droughts in five different categories based on severity, ranging from abnormally dry (D0), to exceptional droughts (D4) (shown in Table 5.21 below). Droughts are most commonly characterized using the Palmer Drought Severity Index (also provided in Table 5.21).

**Table 5.21 - Drought Classification**

Category	Description	Possible Impacts	Ranges				
			Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: <ul style="list-style-type: none"> <li>• short-term dryness slowing planting, growth of crops or pastures</li> </ul> Coming out of drought: <ul style="list-style-type: none"> <li>• some lingering water deficits</li> <li>• pastures or crops not fully recovered</li> </ul>	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	<ul style="list-style-type: none"> <li>• Some damage to crops, pastures</li> <li>• Streams, reservoirs, or wells low, some water shortages developing or imminent</li> <li>• Voluntary water-use restrictions requested</li> </ul>	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	<ul style="list-style-type: none"> <li>• Crop or pasture losses likely</li> <li>• Water shortages common</li> <li>• Water restrictions imposed</li> </ul>	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	<ul style="list-style-type: none"> <li>• Major crop/pasture losses</li> <li>• Widespread water shortages or restrictions</li> </ul>	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	<ul style="list-style-type: none"> <li>• Exceptional and widespread crop/pasture losses</li> <li>• Shortages of water in reservoirs, streams, and wells creating water emergencies</li> </ul>	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

**Hazard Vulnerability**

According to the updated hazard analysis in Section 4.4, Chautauqua County is moderately vulnerable to a drought based on this hazard’s high extent – (a large area is affected at once), low onset – (days of warning), moderate potential for property damage/injuries, and moderate frequency – (once every 2 to 5 years). Significant droughts causing emergency conditions have not occurred in Chautauqua County.

Droughts are more likely to adversely impact residents who rely on private wells for their drinking water, as well as agricultural properties. The rural portions of the County, particularly expansive agricultural areas and/or areas that lack access to public water, would be most susceptible to drought impacts. Farms that do not have local irrigation systems are more likely to experience negative effects from drought conditions. Municipalities in Chautauqua County that are partially or wholly supplied by public water systems are summarized in Section 2.8. Approximately 4.0% of all parcels in the County are in an agricultural property class, but these properties make up approximately 23% of the County's land area (over 150,600 acres).

### ***Historical Hazard Occurrences and Damage Estimates***

The NCDC reported three drought events in Chautauqua County between 2016 and 2022, as shown in Table 5.22, below. All of the drought events occurred in the summer of 2016. The droughts on July 21<sup>st</sup>, August 1<sup>st</sup>, and September 1<sup>st</sup> resulted in no deaths or property or crop damages

<b>Table 5.22 – Drought Records, 2016 - 2022</b> (NOAA NCDC, 2022)						
<b>Jurisdiction</b>	<b>Date</b>	<b>Event Type</b>	<b>Deaths (#)</b>	<b>Injuries (#)</b>	<b>Property Damage (\$)</b>	<b>Crop Damage (\$)</b>
Chautauqua County	7/21/2016	Drought	0	0	\$0.00	\$0.00
Chautauqua County	8/01/2016	Drought	0	0	\$0.00	\$0.00
Chautauqua County	9/01/2016	Drought	0	0	\$0.00	\$0.00
<b>Total</b>			<b>0</b>	<b>0</b>	<b>\$0.00</b>	<b>\$0.00</b>

### ***Future Potential Impacts and Association with Climate Change***

The County's overall vulnerability to a drought remains moderate. Properties that rely on private wells (particularly those that are vulnerable to supply issues) and agricultural areas are most likely to be impacted by a drought in the future. The frequency of droughts in New York State, (particularly short-duration events occurring in the late summer months), is expected to increase in the future due to projected temperature increases associated with climate change (Horton et al, 2014).

## 5.10 Earthquake

### ***Hazard Description***

An earthquake is a sudden motion or trembling that is caused by a release of strain accumulated within or along geologic faults. Major fault lines are located along the edges of Earth's tectonic plates, which do not underlie New York State. Seismic waves are produced from energy released from the fault or epicenter. The effects of an earthquake can be felt at distances far beyond its actual occurrence, though the effects are less severe as the distance increases. Earthquakes can generate ground motion and shaking, surface fault ruptures, and ground failure.

### ***Hazard Vulnerability***

According to the updated hazard analysis in Section 4.4, Chautauqua County is moderately vulnerable to an earthquake based on this hazard's high extent – (a large area is affected at once), moderate onset – (hours of warning), moderate potential for property damage/injuries, and low frequency – (once every 5 or more years). An earthquake could occur anywhere in Chautauqua County, and the County could experience effects of earthquakes that occur outside of its jurisdictional limits. New York State is split into four seismic zones by the Multidisciplinary Center for Earthquake Engineering Research (MCEER), depending on the potential earthquake risk within the state. Each zone is assigned a Peak Ground Acceleration Value (PGA), which is used to determine the earthquake risk for each County in the State. The PGA Value measures the horizontal force of an earthquake in terms of percentage of gravity. The higher the value, the greater the earthquake risk in that area. As shown in Figure 5.12, the PGA Values in Chautauqua County range from 4-8%g. The PGA values associated with this figure are based on average soil conditions. Depending on the actual soil type at a location, the PGA value may vary. Soil characteristics can substantially increase the earthquake risk for a particular area. Earthquake events are measured by magnitude based on the modified Mercalli Scale, as detailed below in Table 5.23.



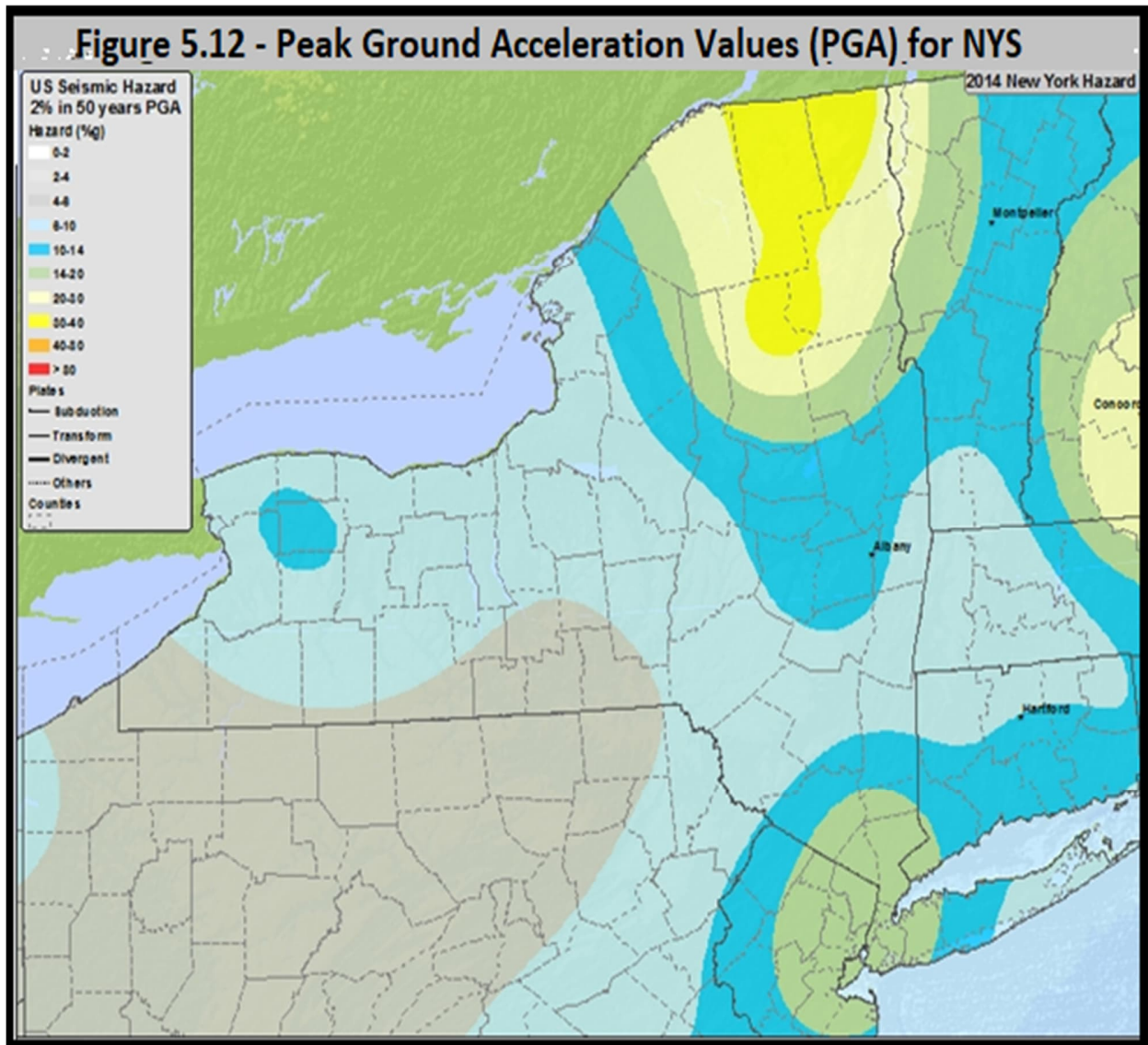


Table 5.23 - Mercalli Scale		
Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

**Historical Hazard Occurrences and Damage Estimates**

The County is highly vulnerable to earthquakes based on this hazard’s high extent – (a large area is affected at once), high onset – (no warning), moderate potential for property damage/injuries – (based on previous events), and low frequency – (once every five or more years). No earthquakes or earthquake related damages have been reported for Chautauqua County by the USGS Earthquake Catalog or the NCEM National Centers for Environmental Information.

**HAZUS Earthquake Model Results**

An evaluation of estimated earthquake losses generated by the model run for the study region did not reveal any significant damages or casualties for the 100-year return period. No earthquake-related damages to essential facilities evaluated by the model were reported. Additionally, no people were anticipated to be displaced or require temporary shelter as a result of an earthquake. The model estimated no notable debris generation and no economic losses for the 100-year return period.

### ***Future Potential Impacts and Association with Climate Change***

The County's overall vulnerability to an earthquake remains high due to the lack of warning and large potential impact area associated with this hazard. However, Chautauqua County is within an area of moderate to low seismic activity. The County is not likely to experience significant earthquake damages. Earthquakes are driven by tectonic processes beneath the surface of the Earth and are not influenced by weather conditions (Buis, 2019); therefore, the frequency and severity of earthquakes are not expected to be influenced by climate change.

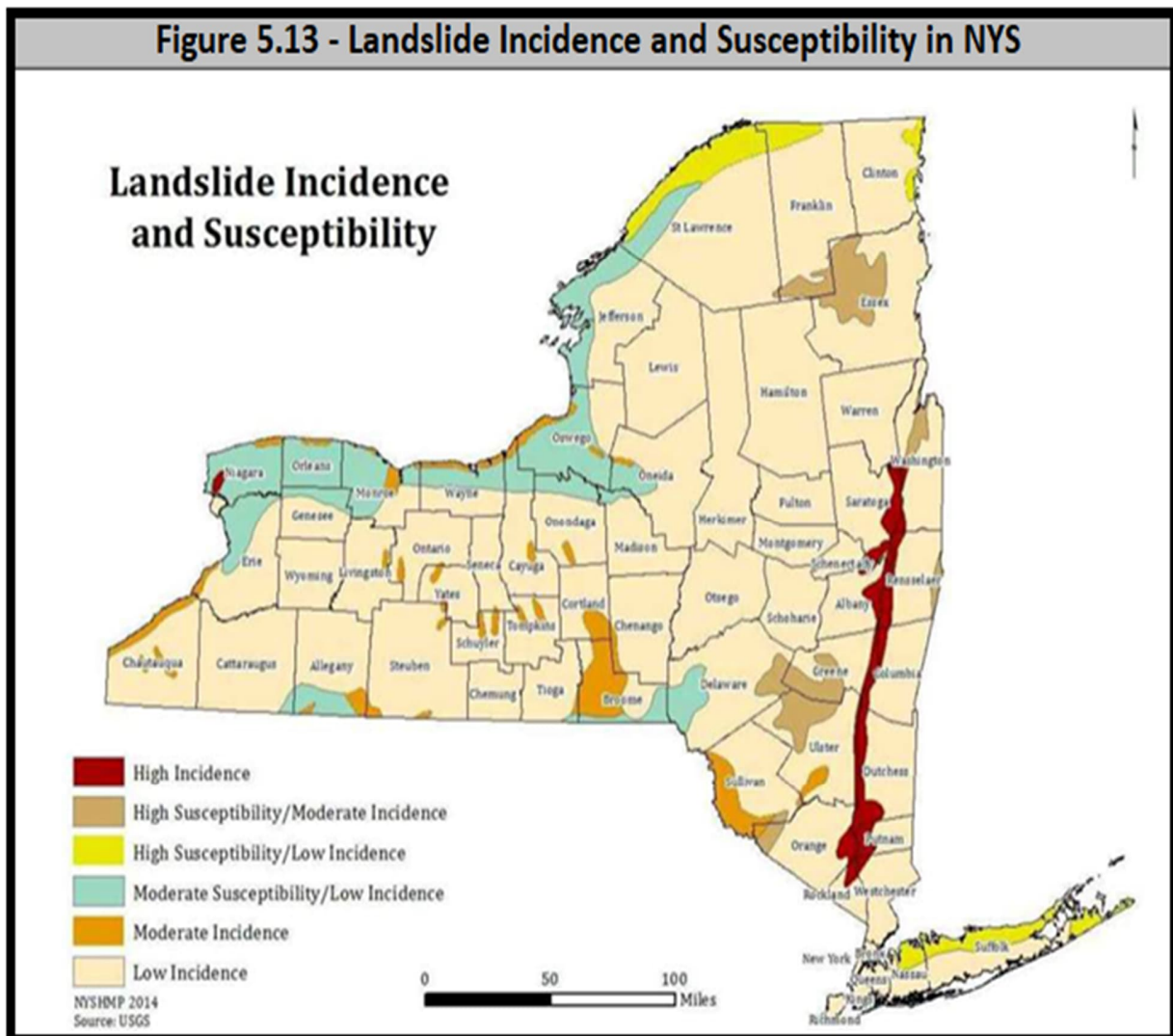
#### **5.11 Landslide**

##### ***Description***

Landslides are defined as the downward movement of a sloped land mass under the force of gravity. Landslides can involve rock, soil, artificial fill, or combinations of these materials. Landslides are activated by storms, earthquakes, volcanic eruptions, fires, freezing/thawing, and steepening of slopes by erosion or human modification.

##### ***Hazard Vulnerability***

According to the updated hazard analysis in Section 4.4, Chautauqua County is moderately vulnerable to landslides based on this hazard's low extent – (only one location is affected), high onset – (no warning), minor potential for property damage/injuries, and low frequency – (once every 5 or more years). The majority of the County is mapped as an area of low incidence for landslides, however areas of the county along the coasts of Lake Erie and Chautauqua Lake are mapped as areas of moderate incidence, as shown in Figure 5.13. The area of moderate incidence encompasses parts of the Towns of Hanover, Sheridan, Dunkirk, Westfield, the City of Dunkirk, and the Villages of Silver Creek, Brocton, and Westfield. Areas with steep slopes are most susceptible to landslides. The designated slopes of mapped soil units throughout the County are illustrated in Figure 5.14 (Appendix A). The Towns of Sheridan, Dunkirk, and the northern portions of the Towns of Ripley, Westfield, Portland, and Pomfret have primarily flat to gently sloping topography, as they are closest to the shore of Lake Erie. The remainder of Chautauqua County has very hilly topography, with steep slopes most prevalent in the northeastern part of the County.



***Historical Hazard Occurrences and Damage Estimates***

Specific damage estimates for landslides are not available however, damages reaching hundreds of thousands of dollars or more could result from a single event depending on its severity. Landslides that occur along road embankments are the most impactful.

***Future Potential Impacts and Association with Climate Change***

The County’s overall vulnerability to landslides remains moderate. Areas with steep slopes throughout the County are the most likely to be impacted by landslides. Multiple jurisdictions included mitigation actions related to landslides, which are detailed in their annexes (Appendix B). Once implemented, these projects will reduce the County’s overall susceptibility to future landslides in those locations. Landslides may occur more

frequently due to climate change, in association with an increase in heavy rainfall events (Horton et al., 2014).

## 6.0 HAZARD VULNERABILITY

### 6.1 Identified Assets

Representatives from each jurisdiction updated their critical facility list, which is provided in each jurisdictional annex (Appendix B). All critical facilities in Chautauqua County are listed in Table 2.9 (Appendix A). The county does not currently have plans which include the provision of emergency shelters of any kind, including medical, non-medical, or heating and cooling centers. In the past, the county has relied on the Red Cross to provide non-medical shelters, and the Office of Emergency Services facilitated the signing of facility use agreements between the school districts, fire departments, and the Red Cross for sheltering activities. There is, however, a joint effort from the Health Department and the Department of Social Services to provide resident with a list of spaces within the county that accept people for the purposes of warming or cooling. This effort is likely to continue into the future as a majority of those who utilize these centers are unhoused residents that are served by the Department of Social Services. The list of warming and cooling centers do not represent a traditional shelter plan, and these places are not staffed or supplied with beds or food. The warming and cooling centers are listed in Table 6.1 (Appendix A). Emergency shelters for each jurisdiction are discussed individually in each jurisdictional annex (Appendix B).

### 6.2 Damage Potential

The damage potential for housing within Chautauqua County was estimated using housing characteristics and values reported by the U.S. Census Bureau. According to the 2020 U.S. Census, Chautauqua County had 66,337 occupied housing units, of which, 70% were owner-occupied and 30% were renter-occupied. The housing vacancy rate in the County is 20%. Tables 6.2 to 6.4, below, indicate the types of housing units, age of structures, and housing unit values within Chautauqua County.

Type of Housing	Percent of Total Occupied Housing Units in County
Single unit structures	71%
Multi-unit structures	23%
Mobile homes or other	6%

<b>Table 6.3 – Age of Structures in Chautauqua County</b> (U.S. Census Bureau, 2020)	
<b>Construction Date</b>	<b>Percent of Total Owner-Occupied Housing Units in County</b>
2000 or more recent	7.2%
1980-1999	15.0%
1960-1979	17.9%
1940-1959	20.9%
1939 or earlier	38.6%

<b>Table 6.4 – Housing Value Ranges in Chautauqua County</b> (U.S. Census Bureau, 2020)	
<b>Value</b>	<b>Percent of Total Owner-Occupied Housing Units in County</b>
Under \$100,000	50%
\$100,000 - \$200,000	32%
\$200,000 - \$300,000	11%
\$300,000 - \$400,000	2%
\$400,000 - \$500,000	1%
\$500,000 - \$1,000,000	3%
Over \$1,000,000	0%

According to Table 6.3, over half – (59.5%) of the infrastructure in the County was constructed prior to 1960, and 38.6% of those structures were built in 1939 or earlier. Older homes are typically more susceptible to impacts or damage from natural hazards, particularly floods (if the structure pre-dates floodplain development standards). Mobile homes (6% of homes within the County) are also particularly vulnerable to storm damages. In addition, approximately 20% of homes within the County are vacant. Vacant structures are not always well-maintained, and may be more susceptible to damage from storm events.

According to the 2020 U.S. Census, the estimated median value of an owner-occupied housing unit in Chautauqua County is \$96,000. If 1% of the occupied houses in Chautauqua County each sustained \$1,000 in minor damages from a storm event, this

would total approximately \$663,370 in damages. The total assessed full market values of properties within the County by jurisdiction are listed in Table 6.5, and the ranges of potential damages, in dollars, to both buildings and agricultural assets due to a variety of natural hazards are listed in Table 6.6, both below.

<b>Table 6.5 – Total Assessed Market Value of Properties by Jurisdiction</b>	
<b>Jurisdiction</b>	<b>Total Assessed Market Value of Properties</b>
City of Dunkirk	\$558,774,014
City of Jamestown	\$978,828,149
Town of Arkwright	\$24,239,937
Town of Busti	\$430,837,207
Town of Carroll	\$119,977,269
Town of Charlotte	\$54,082,610
Town of Chautauqua	\$921,605,602
Town of Cherry Creek	\$47,509,400
Town of Clymer	\$77,004,438
Town of Dunkirk	\$88,973,287
Town of Ellery	\$378,812,110
Town of Ellicott	\$577,703,601
Town of Ellington	\$52,467,976
Town of French Creek	\$90,441,288
Town of Gerry	\$77,985,825
Town of Hanover	\$315,987,834
Town of Harmony	\$70,693,255
Town of Kiantone	\$69,891,418
Town of Mina/Findley Lake	\$98,402,239
Town of North Harmony	\$162,493,032
Town of Poland	\$83,715,750
Town of Pomfret	\$147,792,855
Town of Portland	\$180,266,801
Town of Ripley	\$66,276,036
Town of Sheridan	\$99,005,494
Town of Sherman	\$48,059,121
Town of Stockton	\$75,534,397
Town of Villenova	\$24,612,091
Town of Westfield	\$207,488,251
Village of Bemus Point	\$54,719,700
Village of Brocton	\$30,632,915
Village of Cassadaga	\$25,991,100
Village of Celoron	\$62,403,715

Village of Falconer	\$114,539,852
Village of Fredonia	\$102,998,701
Village of Lakewood	\$198,522,795
Village of Mayville	\$228,649,700
Village of Panama	\$20,112,501
Village of Sherman	\$21,998,409
Village of Silver Creek	\$71,537,875
Village of Sinclairville	\$23,337,525
Village of Westfield	\$129,449,301

<b>Natural Hazard</b>	<b>Damage Potential (Annual Loss)</b>	<b>Frequency (Annual)</b>
Flood	\$2,440,873	2.3
Tornado	\$1,423,650	0.3
Extreme Temperatures	\$160,718	1
Severe Thunderstorm/Wind/Hail	\$130,183	37.7
Landslide	\$63,449	0
Ice Storm	\$58,399	1.4
Severe Winter Storm	\$50,214	19.1
Earthquake	\$48,957	0
Wildfire	\$782	0
Drought	\$0	0
Ice Jam	N/A	N/A

### 6.3 Development Trends

#### ***Housing Availability***

The vast majority (70%) of occupied housing units in Chautauqua County are owner-occupied. The median value of owner-occupied housing units in Chautauqua County (\$96,000) is approximately \$73,100 less than in Erie County and \$4,000 more than in Cattaraugus County, Chautauqua's two neighboring counties.

#### ***Recent and Planned Development***



Structural developments or redevelopments that have been completed since 2016 or are currently planned are summarized in each jurisdictional annex (Appendix B).

## 7.0 HAZARD MITIGATION AND ADAPTATION

### 7.1 Hazard Mitigation Mission Statement, Goals, and Objectives

The mission statement for the HMP update is:

*The Hazard Mitigation Plan for Chautauqua County forms the foundation of the county's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction and repetitive damage.*

Chautauqua County developed mitigation planning goals based on the risk assessment results, general vulnerabilities, and overall capabilities of the County and jurisdictions. Goals are broad policy-type, long-term statements that represent global visions (FEMA 386-3, 2003). The goals and objectives identified by this process represent what the participants were hoping to achieve through the implementation of this HMP. Specific mitigation strategies were identified that support the goals and objectives of this plan. These strategies were adjusted based on hazard research, input from Chautauqua County and jurisdiction representatives, and comments received during the public and stakeholder review process.

#### **2024 HMP Goals:**

1. Maintain Readiness for an Effective and Safe Response to Disaster
2. Update and Maintain Current Emergency Plans
3. Reduce vulnerability to life-safety events
4. Increase Federal, State, and Local coordination
5. Educate residents and provide resources on hazard safety

As part of the HMP update process, the County reviewed and updated their objectives from the 2016 HMP. The objectives further describe the specific strategies or implementation steps associated with their HMP goals. Unlike goals, objectives are specific and measurable (FEMA, 2017). Many objectives apply to multiple goals, as noted in Table 7.1 (Appendix A). The objectives were based on grouping common mitigation strategy themes that were identified by the County and jurisdictions. All goals identified from the risk assessment process are compatible with the goals of Chautauqua County.

**2024 HMP Objectives:**

1. Increase public awareness of threats and preparedness measures through educational programming or planning efforts.
2. Ensure accurate and timely communication with the public through alert system and notifications.
3. Provide a mechanism for residents to register their needs with an emergency system.
4. Ensure community and stakeholder involvement and department integration when updating current emergency plans.
5. Identify voids in the public safety infrastructure.
6. Enforce building codes consistently across the county.
7. Participate in both county-level and local planning efforts that seek to reduce risk to natural hazards.
8. Maintain resource databases and contacts.
9. Coordinate resources for effective and efficient response.
10. Ensure that response equipment is pre-positioned in appropriate places for quick and efficient response.
11. Ensure that appropriate officials have regular training in disaster response and recovery.
12. Promote cross departmental training, response, and communication.
13. Strive for accreditations and certifications when they are available.
14. Establish a review schedule when updating current emergency plans.
15. Seek funding sources to assist program goals and objectives.
16. Incorporate climate change as a part of all appropriate county plans.
17. Ensure effective and accurate documentation, particularly with damage assessments.
18. Debrief with appropriate departments after a disaster has occurred to discuss ways to improve the response and recovery process.

**7.2 Mitigation Strategy*****2016 Hazard Mitigation Plan Implementation***

The County has implemented a number of actions that were identified in their 2016 HMP. Details regarding the status of the County's mitigation actions from their 2016 HMP are listed in Table 7.2 (Appendix A). Table 7.3 (Appendix A) contains status updates for the 2016 HMP mitigation actions that included repairs to County bridges and roads. Seventeen of the County's 2016 mitigation actions were re-included because they are either incomplete or on-going. The status of mitigation actions identified by individual jurisdictions in the County's 2016 HMP are summarized in each jurisdictional annex (Appendix B).

### ***Proposed County Mitigation Actions for HMP Update***

Multiple mitigation actions were proposed by Chautauqua County for the HMP update to reduce the impact of potential natural hazard events. The implementation of these specific mitigation actions will aid in achieving the goals and objectives listed in Section 7.1. The mitigation actions fall under the following six broad categories indicated by FEMA 386-3:

- **Prevention** – Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital government programs, open space preservation, and storm water management regulations.
- **Property Protection** – Actions that involve the modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness** – Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.
- **Natural Resource Protection** – Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Emergency Services** – Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.
- **Structural Projects** – Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

In addition to the 17 actions from the 2016 HMP that are being incorporated into the new plan, the County proposed 13 new actions to be considered for the 2024 HMP update, which are detailed in Table 7.4 (Appendix A). Each participating jurisdiction developed individual mitigation actions for each hazard that they profiled, which are described in each jurisdictional annex (Appendix B).

**Mitigation Action Prioritization**

The mitigation actions proposed as part of the County HMP update were developed by the Mitigation Planning Committee, jurisdiction representatives, and representatives of other stakeholder agencies. General priority measures were instituted in order to prioritize the proposed mitigation actions that are included as part of this plan. The recognized priority levels are based on the current knowledge of what each action would entail, including their estimated costs, timeframes, and potential funding sources. Mitigation actions will be reviewed and revised during each 5-year HMP update effort.

A cost-benefit evaluation matrix was used to review the benefits and costs associated with each mitigation action. Each proposed mitigation action was assigned a cost, benefit, or neutral rating for seven different categories: Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE). The STAPLEE concept employs a technique for identifying, evaluating, and prioritizing mitigation actions based on existing local conditions (FEMA, 2013). This method provides set factors with which to review the feasibility of implementing each proposed mitigation action. The results of the STAPLEE evaluations were factored into each mitigation action’s priority determination, based on the level of benefits that each action provided. Table 7.5 below details the factors incorporated into the STAPLEE evaluation that was completed for each mitigation action. This analysis allowed plan participants to weigh the pros and cons of implementing the proposed mitigation actions included in this plan.

Table 7.5 – STAPLEE Evaluation Factors		
Evaluation Category		Evaluation Criteria
S	Social	Evaluated in terms of community acceptance. Does the action have social benefits?

Table 7.5 – STAPLEE Evaluation Factors		
Evaluation Category		Evaluation Criteria
T	Technical	Evaluated in terms of feasibility. Will the action help to reduce losses in the long-term with minimal secondary impacts? Does the action act as a partial or complete solution?
A	Administrative	Evaluated based on staffing, funding, and maintenance requirements. Do the participating jurisdictions have the personnel and capabilities to implement the action? Are additional resources required?
P	Political	Evaluated by political leadership and emergency management acceptance. Will the action receive political support?
L	Legal	Evaluated based on legal authority to undertake an action. Which unit of government is likely to undertake the action?
E	Economic	Evaluated according to funding availability and budget constraints. Where will funding for the action come from?
E	Environmental	Evaluated based on impacts to the environment. Would implementation of the action create negative consequences to environmental assets?

In addition, benefit and cost rankings were assigned to proposed mitigation actions and included in the STAPLEE criteria consideration tables as indicated in Table 7.6, below.

Table 7.6 – Benefit and Cost Rankings			
	Assessment Levels and Description		
	High	Medium	Low
<i>Benefits</i>	Action is anticipated to have an immediate impact on reduction of losses – both life and property.	A long-term impact on the reduction of loss of life is expected or an immediate impact on loss of property.	It is difficult to assess the benefits of an action due to its long-term timeframe.
<i>Costs</i>	Existing funding sources are inadequate or are not identified to cover implementation of the action.	Funding exists, but will have to be reapportioned or budgeted over multiple years.	Funds to implement action are available in existing budget.

Actions recorded as having a benefit level equal to or higher than the cost level were viewed as cost-beneficial actions, and receiving a high priority ranking. This priority ranking process should be viewed as a preliminary analysis. As the implementation of mitigation strategies is progressed, the ranking system used during this evaluation will evolve based on input from participating jurisdictions, agency representatives, and other branches of state and federal government. Additional funding sources will be required for many of the proposed mitigation actions. Coordination with agencies such as NYS DHSES and FEMA will be necessary to secure funds for proposed mitigation actions, especially those with high costs and long-term implementation schedules.

After the STAPLEE and cost-benefit evaluations were completed, each action was prioritized. The results of the evaluation process for the County's proposed mitigation actions are detailed in Table 7.7 (Appendix A). Individual mitigation actions for each jurisdiction were also evaluated using this method, and each jurisdiction's STAPLEE worksheet is included in their jurisdictional annex (Appendix B).

### ***Mitigation and Adaptation Strategy Implementation***

The proposed mitigation actions were developed based on local needs and priorities, as identified by the County, jurisdiction representatives, and stakeholder groups. The proposed actions were chosen based on their effectiveness in accomplishing one or more of the goals established as part of this HMP. After actions were suggested, they were analyzed to determine their feasibility, cost, and implementation timelines. The specific hazards mitigated, goals and objectives achieved, implementing agency, estimated costs, planning mechanisms, potential funding sources, and implementation timeframes for each action are detailed in Table 7.4 (Appendix A). The approximate costs considered for each mitigation action were determined based on estimated price ranges. When specific cost estimates were not available, cost ranges were defined as follows:

- Low: below \$10,000.
- Medium: between \$10,000 and \$100,000.
- High: over \$100,000.

For some mitigation actions, the timeframe is presented as a range. This indicates that the action is currently being implemented or should be implemented as soon as possible and that it may continue throughout the life of

the current mitigation plan. Often, long-term actions require updates, annual reviews, or extensive coordination and/or implementation that may take longer than five years to complete. Details of mitigation actions for individual jurisdictions are presented in each jurisdictional annex (Appendix B). Potential funding sources for mitigation actions are summarized in Table 7.8 (Appendix A).

### 7.3 Potential Funding Sources

The Disaster Mitigation Act of 2000 requires that state, local, tribal, and territorial governments prepare natural hazard mitigation plans as a condition of future funding. With a FEMA approved Hazard Mitigation Plan, communities will be eligible to apply for funding through FEMA Hazard Mitigation Assistance and Resilience Grant programs, identified below.

#### Snapshot of FEMA Hazard Mitigation Assistance and Resilience Grant Programs\*

- [\*\*Building Resilient Infrastructure and Communities \(BRIC\) Program\*\*](#) – supports a broad array of hazard mitigation projects to reduce risks from disasters and natural hazards. Examples of project types include construction projects, plan creation and updates, project scoping, education and awareness, gathering feedback from community members, management costs, and many more.
- [\*\*Flood Mitigation Assistance \(FMA\) Program\*\*](#) – provides funding to reduce or eliminate the risk of repetitive flood damage to buildings insured under the National Flood Insurance Program (NFIP).
- [\*\*Hazard Mitigation Grant Program \(HMGP\)\*\*](#) – provides funding to communities to rebuild in a way that reduces, or mitigates, future natural disaster losses in their communities. Supports a broad array of hazard mitigation projects.
- [\*\*Hazard Mitigation Grant Program Post Fire \(HMGP Post Fire\)\*\*](#) – provides funding to help communities implement hazard mitigation measures focused on reducing the risk of harm from wildfire.

\*Additional FEMA HMA programs include the Pre-Disaster Mitigation Program (PDM), which was largely replaced by BRIC, and Safeguarding Tomorrow Revolving Loan Fund Program, which is administered through individual states. For a summary of eligibility activities by program type for HMGP, HMGP Post Fire, BRIC, and FMA, see page 72 of the Hazard Mitigation Assistance Program and Policy Guide

([https://www.fema.gov/sites/default/files/documents/fema\\_hma-program-policy-guide\\_032023.pdf](https://www.fema.gov/sites/default/files/documents/fema_hma-program-policy-guide_032023.pdf)).

In addition, several other funding sources may potentially be utilized for mitigation actions in this plan, in addition to municipal and county budgets. Other possible funding sources are outlined below. This is not an exhaustive list, but is a starting place for sources that may fit the mitigation actions identified in the plan. These funding sources will not be appropriate for all the mitigation actions identified. For each mitigation action, municipalities should select potential sources from this list, visit the associated website and/or other materials to determine suitability, and look for additional sources if desired. Additional lists of funding sources are identified below.

Snapshot of Federal Resources:

*For additional resources, see FEMA's Mitigation Resource Guide:*

[https://www.fema.gov/sites/default/files/documents/fema\\_mitigation-resource-guide.pdf](https://www.fema.gov/sites/default/files/documents/fema_mitigation-resource-guide.pdf)

- **FEMA [Rehabilitation of High Hazard Potential Dam \(HHPD\) Grant Program](#)** – provides grants for the rehabilitation of eligible high hazard potential dams, in the form of technical, planning, design, and construction assistance. High Hazard Potential Dams are classified in the [National Inventory of Dams](#), and refer to any dam whose failure or mis-operation will cause loss of human life and significant property destruction.
- **FEMA [Fire Management Assistance Grant](#)** – provides funding for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands that threaten to cause a major disaster.
- **FEMA [Emergency Management Performance Grant \(EMPG\)](#)** – provides federal funds to states to assist state, local, territorial, and tribal governments in preparing for all hazards.
- **EPA [Environmental Justice Small Grants \(EJSG\)](#)** – awards grants that support community-driven projects designed to engage, educate, and empower communities to better understand local environmental and public health issues and develop strategies for addressing those issues, building consensus in the community, and setting community priorities. The grants can be used for education and outreach about hazard mitigation efforts.



- **USDA/NRCS [Emergency Watershed Protection Program](#)** – offers technical and financial assistance to help local communities mitigate imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences that impair a watershed. Example activities include removing debris from stream channels, road culverts, and bridges; reshaping and protecting eroded streambanks; correcting damaged or destroyed drainage facilities; establishing vegetative cover on critically eroding lands; repairing levees and structures; repairing conservation practices; and purchasing floodplain easements.
- **USDA [Housing Preservation Grant Program](#)** – provides grants to sponsoring organizations for the repair or rehabilitation of low-income and very low-income housing.
- **USDA [Rural Development Water and Environmental Programs \(WEP\)](#)** – provide technical assistance, loans, grants, and loan guarantees for drinking water, sanitary sewer, solid waste, and storm drainage facilities in rural areas and cities and towns of 10,000 or less. Often, these projects meet flood mitigation goals.
- **[Economic Development Administration Disaster Recovery](#)** – facilitates the delivery of federal economic development assistance to support long-term community economic recovery planning and project implementation, redevelopment and resiliency. Examples include updating critical water infrastructure needed to protect local businesses from flooding.
- **USACE [Continuing Authorities Program](#)\*** – technical assistance that allows the USACE to plan, design, and implement certain types of water resources projects, such as streambank and shoreline protection, hurricane and storm damage reduction projects, and flood damage reduction projects.
- **USACE [Floodplain Management Services \(FPMS\) Program](#)\*** -- range of technical services and planning guidance needed to support effective floodplain management.
- **USACE [Small Flood Control](#)\*** -- technical assistance to plan, design and construct certain small flood control projects that have not already been specifically authorized by Congress. Both structural (levees, channels, or dams, for instance) and nonstructural (floodproofing or evacuation, for example) solutions are considered.
- **EPA [Smart Growth Support](#)** – grant funding and technical assistance to help local governments make their communities more attractive, economically stronger, socially diverse, and more resilient to climate change.

- EPA's [Clean Water State Revolving Fund \(CWSRF\)](#) – provides a permanent source of low-cost financing for a wide range of water quality infrastructure projects.
- EPA's [Greening America's Communities](#)\* – helps cities and towns develop an implementable vision of environmentally friendly neighborhoods that incorporate innovative green infrastructure, hazard mitigation, and other sustainable/resilient design strategies.

\* Denotes a technical assistance program rather than straight funding.

Snapshot of New York State Funding Resources:

- **CDBG [Public Infrastructure and Community Planning](#)** – Eligible projects for NYS CDBG Public Infrastructure may include the repair or replacement of existing systems, construction of new systems, or expansion of existing systems into areas previously unserved. Funding categories include Public Infrastructure, Public Facilities, and Community Planning. This includes CDBG-MIT for declared disaster areas.
- **DEC [Water Quality Improvement Project \(WQIP\) Program](#)** – There are eight project types under the WQIP Program. These include Wastewater Treatment Improvement, Non-Agricultural Nonpoint Source Abatement and Control, Vacuum Trucks in Municipal Separate Storm Sewer System (MS4) Areas, Land Acquisition for Source Water Protection, Salt Storage, Dam Safety Repair/Rehabilitation, Aquatic Connectivity Restoration, and Marine District Habitat Restoration. See the project website for funding/match/eligibility/and attachment requirements.
- **EFC [Green Innovation Grant Program](#)** - There are four types of green practices a municipality can apply for: Green Stormwater Infrastructure; Energy Efficiency; Water Efficiency; Environmental Innovation. \*See website for details of funding/matching/requirements for each category.
- **NYS [EFC Water Infrastructure Improvements Grant \(WIIA\)](#)** - projects include water quality infrastructure projects at municipally-owned sewage treatment works or municipally-owned public water systems for construction, replacement or repair of infrastructure; or compliance with environmental and public health laws and regulations related to water quality.
- **NYS [EFC Wastewater Infrastructure Engineering Planning Grant \(EPG\)](#)** - planning activities to determine the scope of water quality issues, evaluation of alternatives, and the recommendation of a capital improvement project. In addition, the costs to conduct an environmental review for the recommended alternative are eligible. Design and construction costs are not eligible. Requires a 20% local match.

- **NYS Hazard Mitigation Revolving Loan Fund (NYS HM RLF)** – provide hazard mitigation assistance for local governments to reduce risks from natural hazards and disasters. Priorities for the first year of the program include disadvantaged, underserved, and socially vulnerable areas; cost-share for existing hazard mitigation projects; flood risk reduction; social stabilization; infrastructure retrofit; generators; and projects that are not eligible under other HMA grants due to not passing a benefit cost analysis.
- **DOS Smart Growth Comprehensive Planning Grant Program** – This program advances the preparation of municipal comprehensive plans, new or updated zoning regulations, or area plans (e.g. transit-oriented development plans or downtown/hamlet area plans) that support smart growth principles. Smart growth principles include development in areas with adequate infrastructure, protection of historic and natural resources, planning for equity, development of clean energy, and more.
- **NYS Climate Smart Communities Program** – helps local governments take action to reduce greenhouse gas emissions and adapt to a changing climate. Includes funding for various actions incorporating mitigation and climate resiliency into existing local policies, comprehensive planning with sustainability elements, certain transportation infrastructure upgrades, creating a heat emergency plan, and more. The list of actions eligible for competitive funding can be found at <https://climatesmart.ny.gov/actions-certification/actions/>.
- **NYS Clean Water State Revolving Fund** – provides interest-free or low-interest rate financing for wastewater and sewer infrastructure projects to municipalities.

## 8.0 NATIONAL FLOOD INSURANCE PROGRAM

Long-term mitigation of potential flood impacts can be best achieved through comprehensive floodplain management regulations and enforcement at a local level. The National Flood Insurance Program (NFIP), (regulated by FEMA), aims to reduce the impact of flooding on private and public structures by providing affordable insurance for property owners. The program encourages local jurisdictions to adopt and enforce floodplain management regulations in order to mitigate the potential effects of flooding on new and existing infrastructure (FEMA, 2021f).

Communities that participate in the NFIP adopt floodplain ordinances. If an insured structure incurs damage costs that are over 50% of its market value, the owner must comply with the local floodplain regulations when repairing or rebuilding the structure. A structure could be rebuilt at a higher elevation, or it could be acquired and demolished by the municipality or relocated outside of the floodplain. Insured structures that are located within floodplains

identified on FEMA's Flood Insurance Rate Maps (FIRMs) may receive payments for structure and content losses if impacted by a flood event.

The NFIP and other flood mitigation actions are important for the protection of public and private property and public safety. Flood mitigation is valuable to communities because it:

- Creates safer environments by reducing loss of life and decreasing property damage;
- Allows individuals to minimize post-flood disaster disruptions and to recover quicker (homes built to NFIP standards generally experience less damage from flood events, and when damage does occur, the flood insurance program protects the homeowner's investment); and
- Lessens the financial impacts on individuals, communities, and other involved parties (FEMA, 2021c).

### 8.1 Chautauqua County Floodplain Mapping

The availability of floodplain mapping varies across the County. Most municipalities' floodplains are mapped out in their entirety on FEMA's Flood Insurance Rate Map (FIRM) Panels, which are the official flood maps utilized in the NFIP. However, the following municipalities do not have FIRM Panels:

- Town of Ripley
- Village of Brocton

Moreover, the following municipalities do have FIRM Panels, but do not include complete coverage:

- Town of Sherman
- Town of Portland
- Town of Stockton
- Town of Gerry
- Town of Ellington
- City of Jamestown
- Chautauqua Lake and Chautauqua Lake shoreline (particularly in the south basin and the southeast portion of the north basin)

The Town of Mina/Findley Lake is the only municipality that has official FIRM Panels available in digital form (i.e. GIS data).

Another resource for identifying the location of floodplains is FEMA's Digital Q3 Flood Zone Data, which is generated by scanning existing FIRM Panels and capturing a thematic overlay of flood risks. While the Digital Q3 Flood Zone Data is not a legal document to be used for determining flood hazard on a specific site, it can be used as an advisory tool. The Digital Q3 Flood Zone Data is shown in Figure 5.3 (Appendix A), and

official FIRM Panels can be viewed through the FEMA Flood Map Service Center at <https://msc.fema.gov/portal/home>

## 8.2 Chautauqua County National Flood Insurance Program (NFIP) Participation

All 42 municipalities within Chautauqua County participate in the NFIP. NFIP policies and coverage for each jurisdiction are summarized in Table 8.1 (Appendix A). NFIP claims and losses for each jurisdiction are summarized in Table 8.2 (Appendix A). None of the municipalities in Chautauqua County are Community Rating System eligible communities. The CRS is a voluntary incentive program that recognizes and encourages floodplain management activities at the community level. Flood insurance premiums are discounted in CRS communities to reflect the reduced flood risk that results from community actions to meet the program goals: reduce flood loss, facilitate accurate insurance ratings, and promote flood insurance awareness (FEMA, 2022a).

## 8.3 NFIP Policy Statistics

NFIP policy data as of December 31, 2022 was provided by FEMA to support the development of this Hazard Mitigation Plan. Table 8.1 (Appendix A) summarizes this data, including the number of active flood insurance policies in place, total coverages, and total premium and policy fees. NFIP claims data from 2011 to October 2, 2023 was also provided by FEMA, and is summarized in Table 8.2 (Appendix A). Specific information for each municipality is also summarized in each jurisdictional annex (Appendix B).

The Town of Hanover has the largest number of active policies (120), followed by the Town of Chautauqua (44) and the Town of Ellery (36). The Town of Hanover also has the most total policy coverage (\$18,740,300), followed first by the Town of Chautauqua (\$9,341,600) then the Town of Ellery (\$9,136,700). Since 2011, the Town of Hanover also had the largest number of claims (521), followed by the Town of Chautauqua (145) and the Town of Busti (137).

## 8.4 Repetitive and Severe Repetitive Loss Statistics

According to FEMA, between 1978 and October 2, 2023 there have been a total of 712 repetitive loss claims spread between 224 properties, as show below in Table 8.3. These repetitive loss statistics were obtained from FEMA. Based on the first loss for each property, two hundred and one (201) of these properties were single-family residential homes, eight were 2-4 family residential homes, two were some other type of residential home, four were nonresidential businesses, and nine were some other type of nonresidential use. Collectively, these properties have incurred total payments of \$6,505,545, with an average payment of \$9,137 per loss. The vast majority of repetitive

loss properties, total losses, and total payments have occurred within the Town of Hanover. According to this same data source, there are 14 severe repetitive loss properties in Chautauqua County.

<b>Table 8.3 - NFIP Repetitive Loss Properties in Chautauqua County from 1978 to October 2, 2023 (FEMA, 2023)</b>			
<b>Community Name*</b>	<b>Repetitive Loss Properties</b>	<b>Total Losses</b>	<b>Total Paid</b>
City of Dunkirk	7	17	\$370,502.61
City of Jamestown	1	2	\$61,361.44
Town of Chautauqua	4	11	\$50,465.95
Town of Dunkirk	1	2	\$7,252.43
Town of Ellery	2	4	\$77,363.42
Town of Ellicott	2	4	\$11,603.54
Town of Hanover	169	572	\$4,066,451.55
Town of North Harmony	2	4	\$15,609.20
Town of Poland	1	2	\$4,650.67
Town of Portland	1	2	\$5,417.98
Town of Sheridan	2	4	\$126,024.14
Village of Fredonia	11	27	\$446,062.11
Village of Lakewood	1	2	\$3,164.22
Village of Silver Creek	11	37	\$1,177,271.10
Unspecified	9	22	\$82,344.18
<b>Total</b>	<b>224</b>	<b>712</b>	<b>\$6,505,544.54</b>
*Records were organized based on the NFIP Community Book’s Community ID and Name convention.			

**9.0 PLAN MAINTENANCE**

**9.1 Plan Monitoring and Evaluation**

The County staff on the Mitigation Planning Committee will be responsible for meeting annually to discuss the implementation of the mitigation plan and identify any necessary updates. It is recognized that with increased growth and the passing of time, there may be changes in County and jurisdiction representatives. Any representative changes will be indicated when the plan is revised. This meeting will be planned and facilitated by members of the Chautauqua County Office of Emergency Services. The Committee may also meet to evaluate and revise the County’s mitigation plan following a major disaster event. This would allow committee members to determine if the actions recommended in the plan are appropriate or to see if any changes are necessary based on the pattern

of disaster damages. The Director of the County's Office of Emergency Services is responsible for approving all proposed additions and updates to the plan. The chief elected official of each jurisdiction will be invited to each annual update meeting.

One month prior to the annual HMP review meeting, a reminder will be distributed to the chief elected official of each jurisdiction. This reminder will engage representatives to think of how risks and hazards have changed within their jurisdiction or at the County level, whether the goals and objectives identified in the plan still address the current concerns of their jurisdiction and the County, and whether the status of any proposed mitigation actions have changed or whether additional actions should be included. The implementation of proposed mitigation actions is important to review in order to determine whether the plan is being executed correctly and to the optimal extent. Items that should be reviewed for each mitigation action include the current status of the action, the ultimate cost of the action, the success (if completed action), and the funding sources used for the action.

During the annual plan review meeting, the County and each jurisdiction will provide an update to the group of their review of the plan and the implementation details for the proposed mitigation actions that apply to their jurisdiction. Meeting notes will be documented each year, which will include specific details associated with any proposed changes to the plan. During re-approval years – (every five years), the revised plan will be submitted to FEMA for re-approval in accordance with the five year review schedule dictated in DMA 2000.

## **9.2 Plan Updating**

The proposed HMP 5-year review schedule that will be completed as follows:

- County staff on the Mitigation Planning Committee will meet with jurisdiction representatives on an annual basis to discuss the implementation and specifics of the County mitigation plan. Meeting discussions will be documented, including proposed changes to the plan. An annual update checklist is provided in Appendix G, which will be referenced during these meetings. All discussion and proposed changes will be kept in Appendix G.
- When a 5-year update is required, the Mitigation Planning Committee will meet approximately 18 months prior to the plan's expiration date to update and revise all elements of the plan to produce a final revised document.
- This updated plan will be presented to the boards of each participating jurisdiction in order for each jurisdiction to formally concur with and adopt the proposed changes.

- Once all participating jurisdictions have re-adopted the HMP, the revised plan will be submitted to FEMA for re-approval.

### 9.3 Incorporation into Existing Planning Mechanisms

Elements of the HMP will be considered as the County and municipalities undertake future development and comprehensive planning efforts. The approved HMP will also serve as an important resource for developing and/or updating emergency operations plans and procedures throughout Chautauqua County. The County’s HMP update will be incorporated into and referenced by future updates of existing plans, policies, ordinances, and programs listed in Table 3.1 (Appendix A). The County and each municipality will integrate the HMP into other available planning mechanisms. This table will be updated as needed each year. Table 9.1 summarizes how the HMP update will be incorporated into the existing and future planning mechanisms and opportunities at the County and jurisdiction level.

<b>Table 9.1 – Planning Mechanism Incorporation</b>	
<b>Mechanism</b>	<b>How Plan Will be Incorporated</b>
Emergency Planning	<ul style="list-style-type: none"> <li>• Hazard risk assessment and vulnerability data included in the mitigation plan will be reviewed during emergency planning.</li> </ul>
Annual Budget	<ul style="list-style-type: none"> <li>• Mitigation actions will be considered when setting the annual budgets for the County, Soil &amp; Water Conservation District, and all participating jurisdictions.</li> </ul>
Plans and Programs	<ul style="list-style-type: none"> <li>• Hazard Mitigation Plan information will be considered by each participating jurisdiction during program and protection updates and revisions.</li> <li>• Programs and plans will be compared to the Hazard Mitigation Plan to ensure that goals and objectives are consistent among all documents.</li> </ul>
Grant Applications and other Funding Opportunities	<ul style="list-style-type: none"> <li>• Data and maps from the HMP will be used as supporting documentation in grant applications.</li> <li>• Mitigation actions included in the Plan will be heavily considered during application submission and fund allocation.</li> </ul>
Economic Development	<ul style="list-style-type: none"> <li>• Hazard vulnerability information will be reviewed and utilized during the siting of local development efforts within participating jurisdictions.</li> </ul>
Capital Improvement Planning	<ul style="list-style-type: none"> <li>• Current and future projects will be reviewed for hazard vulnerability. Hazard resistant construction standards will be incorporated into the design and location of potential projects, as appropriate.</li> </ul>



#### **9.4 Public Involvement**

The Mitigation Planning Committee will keep the public informed about hazard mitigation planning efforts, actions, and projects that occur within the County. To accomplish this goal, and in addition to the public involvement already incorporated into the completion and review of the HMP Update, the following opportunities for public involvement in this ongoing process will be made available:

- A link to the updated HMP will be provided on Chautauqua County's website;
- Public announcements of and invitations to annual Mitigation Planning Committee meetings and 5-year mitigation plan update events; and
- Completion of public outreach and mitigation education events throughout the County, especially in more vulnerable areas.

Public outreach efforts will be documented in future plan updates through the inclusion of samples, copies of notices, flyers, web announcements, and/or meeting minutes. If public response is lacking during subsequent update processes, additional public outreach methods will be considered and implemented. Coordination efforts between the Chautauqua County Office of Emergency Services and jurisdiction representatives will continue to keep the plan current and useful. Public outreach options that may be implemented to increase participation include:

- Distribute targeted questionnaires to local municipal, community, and non-profit groups to solicit public feedback;
- Organize topic-specific meetings with key individuals and experts to discuss particular concerns and brainstorm solutions; and
- Hold educational programs during various community events to disseminate information and engage the public in discussions on mitigation planning and preparedness.

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## **Appendix A**

### **Additional Figures and Tables**

## **Appendix B**

### **Jurisdictional Annexes**



**Appendix C**  
**Meeting Summary**

## **Appendix D**

### **Sample Plan Adoption Resolution**

## **Appendix E**

### **Stakeholder and Public Outreach Documentation**

## **Appendix F**

### **HAZUS Data Reports**

## **Appendix G**

### **Plan Update Checklist**

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