

## Chapter 3: Risk Assessment

### Risk Assessment Components

The risk assessment process used for this plan is consistent with the process and steps presented in FEMA 386-2, State and Local Mitigation Planning How-to-Guide, Understanding Your Risks – Identifying Hazards and Estimating Losses (FEMA, 2001). This process identifies and profiles the hazards of concern and assesses the vulnerability of assets (population, structures, critical facilities and the economy) at risk in the community. A risk assessment provides a foundation for the community's decision makers to evaluate mitigation measures that can help reduce the impacts of a hazard when one occurs.

- Step 1: The first step of the risk assessment process is to identify the hazards of concern. FEMA's current regulations only require an evaluation of natural hazards. Natural hazards are natural events that threaten lives, property, and many other assets. Often, natural hazards can be predicted, where they tend to occur repeatedly in the same geographical locations because they are related to weather patterns or physical characteristics of an area.
- Step 2: The next step of the risk assessment is to prepare a profile for each hazard of concern. These profiles assist communities in evaluating and comparing the hazards that can impact their area. Each type of hazard has unique characteristics that vary from event to event. That is, the impacts associated with a specific hazard can vary depending on the magnitude and location of each event (a hazard event is a specific, uninterrupted occurrence of a particular type of hazard). Further, the probability of occurrence of a hazard in a given location impacts the priority assigned to that hazard. Finally, each hazard will impact different communities in different ways, based on geography, local development, population distribution, age of buildings, and mitigation measures already implemented.
- Steps 3 and 4: To understand risk, a community must evaluate what assets it possesses and which assets are exposed or vulnerable to the identified hazards of concern. Hazard profile information combined with data regarding population, demographics, general building stock, and critical facilities at risk, located in Section 4, prepares the community to develop risk scenarios and estimate potential damages and losses for each hazard.

To address the requirements of DMA 2000 and better understand potential vulnerability and losses associated with hazards of concern, Madison County used standardized tools, combined with local, state, and federal data and expertise to conduct the risk assessment.

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

- 1) Approximations and simplifications necessary to conduct such a study
- 2) Incomplete or dated inventory, demographic, or economic parameter data
- 3) The unique nature, geographic extent, and severity of each hazard

## MADISON COUNTY HAZARD MITIGATION PLAN 2016

- 4) Mitigation measures already employed by the Madison County and the amount of advance notice residents have to prepare for a specific hazard event

These factors can result in a range of uncertainty in loss estimates, possibly by a factor of two or more. Therefore, potential exposure and loss estimates are approximate. These results do not predict precise results and should be used to understand relative risk. Over the long term, the Madison County will collect additional data to assist in developing refined estimates of vulnerabilities to natural hazards.

The Committee utilized a number of dissemination techniques to achieve a thorough, responsive, open, and transparent communication process. Planning Committee Meetings were held on a regular basis. Committee Members discussed agenda items and reached consensus on topics such as the community vision statement, critical assets and risks, community needs and opportunities, public event planning and feedback, plan development, strategies, projects, and costs. All committee meetings were open to the public and three public open houses were conducted in different areas of the county, all in an attempt to encourage local stakeholders to submit comments and feedback. While each open house presentation was well attended, however no stakeholder comments were submitted.

### Considerations of Capabilities by Jurisdiction

According to FEMA 386-3, a capability assessment is an inventory of a community's missions, programs and policies; and an analysis of its capacity to carry them out. This assessment is an integral part of the planning process. The assessment process enables identification, review and analysis of local and state programs, policies, regulations, funding and practices currently in place that may either facilitate or hinder mitigation. During the original planning process, the County and all municipalities identified and assessed their capabilities in the areas of planning and regulatory, administrative and technical, and fiscal capabilities. By completing this assessment, the Planning Committee and each jurisdiction learned how or whether they would be able to implement certain mitigation actions by determining the following:

- Limitations that may exist on undertaking actions;
- The range of local and/or state administrative, programmatic, regulatory, financial and technical resources available to assist in implementing their mitigation actions;
- Actions currently outside the scope of capabilities;
- Types of mitigation actions that may be technically, legally (regulatory) administratively, politically or fiscally challenging or infeasible;
- Opportunities to enhance local capabilities to support long term mitigation and risk reduction.

During the plan update process, all participating jurisdictions were tasked with developing or updating their capability assessment, paying particular attention to evaluating the effectiveness of these capabilities in supporting hazard mitigation, and identifying opportunities to enhance local capabilities.

The essential functions that assets and asset systems provide to the community often go unnoticed until they are compromised during a storm event. Assessing the risk posed to these key assets and systems can help communities understand their vulnerabilities, and develop plans and strategies which make more resilient communities in the long term.

In development of this plan each jurisdiction specific capabilities were analyzed, both strengths and weaknesses, including local laws and codes, zoning and land use policies, municipal infrastructure and

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

resources, and a list of needed mitigation actions and the ability of the municipality to deal with the effects of disasters. Details of each jurisdiction's capabilities are described in their specific annex.

## Review of Progress on actions from the 2008 Plan

Part of this plan is a review of the status of past hazards identified in the 2008 hazard mitigation plan. It looked at completed projects to determine if those projects solved the problem or reduced the damages that result from severe storm or disasters. Projects not completed since the 2008 plan will be rolled into the new 2016 plan. Attached to this plan is a summary of mitigation measures planned in the 2008 hazard mitigation plan and the current status of each. See Appendix 2: Status of Previously Proposed Mitigation Measures.

## Reviewed Existing Plans, Jurisdiction by Jurisdiction

Due to the character of Madison County, many towns and villages share similar challenges as well as opportunities relative to the natural environment, physical infrastructure, economic development and other built systems. Of the 15 towns, 10 villages and 1 city that comprise the county, 16 have comprehensive plans. There are numerous plans and studies by the County, State and Federal government that address issues countywide. Below is an overview of plans reviewed to date. To better understand the planning environment and the work accomplished to date within Madison County, and at the regional level, an effort was undertaken to review pertinent plans, studies, and reports to ensure current planning strategies are not in conflict with this planning effort.

The following plans, codes and laws were identified and reviewed:

- Madison County Community Health Assessment (2013)
- Madison County Planning Department Annual Reports (2009-2015)
- Central New York Regional Economic Development Council Strategic Plan (2011) and Updates
- Madison County Water Quality Strategy (2011)
- Madison County Coordinated Public Transit-Human Services Transportation Plan (2010) and Updates
- Madison County Multi-Jurisdictional Hazard Mitigation Plan (2009)
- Madison County Agriculture and Farmland Protection Plan (2005)
- City of Oneida Comprehensive Plan (2005)
- Madison County Comprehensive Emergency Plan (CEMP)
- Emergency Management and Response Plans
- Comprehensive/Master Plans
- NFIP Floodway/floodplain regulations
- Local zoning and land use regulations
- Local subdivision regulations
- Site Plan Regulations
- Storm Water Management Plans
- NYS Building Codes
- Capital Plans
- NYS Multi-Hazard Mitigation Plan, 2014

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

## Identify Hazards of Concern

The Madison County Planning Committee (Committee) expressed concern about a variety of resiliency issues relating both to protecting the life and safety of Community members in the face of storm events and preserving the unique nature of the Community. Some of the most significant and critical issues identified include:

**Natural Environment:** Madison and the surrounding counties contain a complex web of streams, creeks and rivers that comprise a number of watershed basins that drain the region. Flooding in the County typically occurs from peak flows during the springs snow melt or heavy rains, although logjams and debris buildup also cause flooding outside of the 100 year flood corridor. Much of the flooding is attributed to the County's topography: when waters flow down the steep Onondaga Escarpment and reach lowland areas, the grade of the creeks flatten out, velocity slows, water carrying capacity drops, and these creeks overflow their banks. Because watershed boundaries are not contained by county or municipal boundaries, controlling storm water runoff and mitigating future flooding needs to be approached in a comprehensive manner at the regional level.

**Economic Development:** The Central New York region has a very diverse economy that is supported by a growing workforce, a well-developed infrastructure base, and strong academic resources. However, the region is economically challenged as indicated by a variety of statistics showing stagnant population base, low per capita income, and areas of high long-term unemployment. To address these challenges, various strategic economic development plans have been developed by the region over the past twenty years which include the CNY Comprehensive Economic Development Strategy (CNY CEDS), Vision 2010: A Regional Economic Development Strategy for Syracuse and Central New York, and the Essential New York Initiative. Together these represent a short-term economic development strategy and a long-term comprehensive approach to economic growth. The Central New York Regional Economic Development Council (CNY REDC) identified the following economic barriers: the high cost of doing business, fragmented government, "brain drain" (loss of younger workers and lack of diversity making it difficult to attract and retain talent), and concentrated areas of poverty.

**Utilities and Infrastructure:** Electricity and the susceptibility of the power grid are both national and regional issues of concern, as well as a County concern. The summer 2013 flooding demonstrated the vulnerability and risk of critical infrastructure systems, such as electricity, gas and water supply, particularly in the City of Oneida. Concern was also expressed over continuous damage to a large quantity of culverts throughout the County. Damage to culverts has often lead to subsequent damages to roadways, impeding traffic flow as well as damage to adjacent land and homes.

**Climate Change:** Climate scientists predict that increasing average global temperatures will have discernible impacts at the local level. According to the New York State Energy Research and Development Authority (NYSERDA) ClimAID Team in a 2011 report, annual average temperatures in New York State have risen by 0.6°F per decade since 1970. Additionally, "intense precipitation events (heavy downpours) have increased in recent decades." It is anticipated that the frequencies of extreme heat events, warm season droughts and heavy precipitation events will continue to increase. These changing climate conditions have local repercussions, such as uncertainty of water resources, ecosystems, and agriculture, susceptibility of energy and telecommunications networks, and exacerbation of public health issues especially for vulnerable populations.

## MADISON COUNTY HAZARD MITIGATION PLAN 2016

Additionally, increased costs for farming could be debilitating to the economy since dairy farming is an important aspect of the local economy.

Specific issues the Community identified include:

- Providing a more natural floodplain for the numerous streams and creeks that run through the County
- Streambank stabilization and repair of severe erosion that has occurred
- Providing regular sediment and debris removal in high risk streams
- Strengthening the regulation of development in the floodplain
- Improving and strengthening communication systems before, during and after disasters
- Providing safer and more resilient housing options for those living in the floodplain
- Increasing public education for homeowners, and potential homeowners, on the risks of living in a floodplain
- Improving emergency evacuation preparedness and procedures
- Implementing innovative technology to strengthen the resiliency of key assets and create redundancy in the electrical power supply
- Managing storm water and water flow through the streams, creeks, and tributaries within the County
- Upgrading aging infrastructure

The Committee also identified several critical issues to be addressed at the regional level, which include:

- Improving coordination with other emergency service providers, municipalities and key institutional entities
- Strengthening the local economy

To provide a strong foundation for mitigation actions, Madison County focused on considering a full range of hazards that could impact the area, and then identified and ranked those hazards that presented the greatest concern. The hazard of concern identification process incorporated input from the County and participating jurisdictions; review of the New York State Hazard Mitigation Plan (NYS HMP); research and local, state, and federal information on the frequency, magnitude, and costs associated with the various hazards that have previously, or could feasibly, impact the region; and qualitative or anecdotal information regarding natural hazards and the perceived vulnerability of the study area's assets to them.

For the purposes of this planning effort, the Planning Committee chose to group some hazards together, based on the similarity of hazard events, their typical concurrence or their impacts, consideration of how hazards have been grouped in Federal Emergency Management Agency (FEMA) guidance documents (FEMA 386-2, "Understanding Your Risks, Identifying Hazards and Estimating Losses; FEMA's "Multi-Hazard Identification and Risk Assessment – The Cornerstone of the National Mitigation Strategy"; FEMA's Local Mitigation Planning Handbook), and consideration of hazard grouping in the NYS HMP.

## MADISON COUNTY HAZARD MITIGATION PLAN 2016

The **“Flood”** hazard includes riverine, flash, ice jam, dam failure flooding (overtopping or breaching from natural causes). Other types of flooding such as coastal or urban drainage do not generally occur within the county; therefore, they were not further considered for inclusion within this HMP. Inclusion of the various forms of flooding under a general “Flood” hazard is consistent with that used in FEMA’s “Multi-Hazard Identification and Risk Assessment” guidance.

The **“Severe Storm”** hazard includes windstorms that often entail a variety of other influencing weather conditions including thunderstorms, hail, lightning and tornadoes. Since tropical disturbances are identified as a type of severe storm event, this hazard also includes tropical cyclone events (hurricanes, tropical storms and tropical depressions). Tropical cyclones were not grouped as a separate hazard, because the County felt that these types of events do not directly impact the County on a frequent basis and that exposure and risk of such events are minimal in comparison to communities along the New York coastline.

The **“Severe Winter Storm”** hazard includes heavy snowfall, blizzards, freezing rain/sleet, ice storms and extra-tropical cyclones (Nor’easters and severe winter low-pressure systems). Extra-tropical events generally occur during winter weather months; therefore, for the purpose of this HMP, all such events are to be grouped within this hazard. Although not all extra-tropical events, such as nor’easters, occur during the winter, they will remain grouped within this hazard category to avoid duplication of events in hazard profiles. Also, since extreme cold temperatures are generated during winter weather months and/or accompany winter storms, extreme cold events have also been grouped with this hazard. This grouping is consistent with that used in the NYS HMP, as well as the “Severe Winter Storm” hazard used in FEMA’s “Multi-Hazard Identification and Risk Assessment” guidance.

These groupings do not change the definition of the included specific events/hazards, as defined within FEMA guidance and other risk assessment documents, and does not affect the hazard analysis conducted through the use of HAZUS-MH, either directly or as a risk assessment support tool.

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

## Profile of each Hazard of Concern

In September of 2008 a vulnerability study was completed as part of Madison County’s Comprehensive Emergency Management Plan. The plan was compiled from information and historical data provided by the National Oceanic and Atmospheric Agency (NOAA), ESRI Hazards Database, the HAZNY program, and the Madison-Oneida American Red Cross. As part of this vulnerability study, types of potential threats and disasters that might occur and focal agencies were listed as follows:

TABLE 5: TYPES OF DISASTERS & FOCAL AGENCIES

Type of Disaster	Focal Agency
Blight	Agriculture & Markets/ DEC
Civil Disturbance/ Terrorism	State Police/ Sheriff/ Local Police
Contamination – Air	Environmental Conservation
Contamination – Water	Environmental Conservation
Drought	Environmental Conservation
Earthquake/ Volcanic Activity	DHSES (SOEM)
Energy Emergency	Energy Office
Epidemic	Health
Explosion	DHSES (OFPC)
Fire	DHSES (OFPC)
Flood/ High Water	Environmental Conservation
Forest Fire	Environmental Conservation
Hazardous Materials	Environmental Conservation
Hurricane/ Tornado/ Windstorm	DSHES (SOEM)
Ice Jams	Environmental Conservation
Ice Storms	Public Service Commission
Infestation	Health
Landslide/ Mudslide	Transportation
Oil Spill	Environmental Conservation
Radiological Accident/ Incident	Health
Snowstorm/ Blizzard	Transportation
Transportation Accident	Transportation
Wave Action	Environmental Conservation

The probability of occurrence of any one, or a combination of these threats varies from area to area, season to season. Some of these threats (Forest Fire) have a low likelihood of occurring. Some threats (Ice Storm, Snow Storm, Epidemic) could occur anywhere in the county with almost equal likelihood and the mitigation of these disasters are addressed in the section on all of Madison County. Some events (Floods) are more likely to occur within a specific Town, Village, or City and will be covered in the individual section for a locality.

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

TABLE 6: HAZARDS OF CONCERN BY JURISDICTION

Hazards of Concern by Jurisdiction											
Jurisdiction	Severe Storms	Severe Winter Snow Storms	Ice Storms	Floods	Tornado	Infestation	Extreme High Temperature	Extreme Low Temperature	Drought	Earthquake	Wildfire
C/Oneida	X	X	X	X	X		X	X			
T/Brookfield	X	X	X		X		X	X			X
T/Cazenovia	X	X	X	X	X		X	X			
T/DeRuyter	X	X	X	X	X		X	X			X
T/Eaton	X	X	X	X	X		X	X			
T/Fenner	X	X	X		X		X	X			
T/Georgetown	X	X	X		X		X	X			X
T/Hamilton	X	X	X		X		X	X			
T/Lebanon	X	X	X		X		X	X			X
T/Lenox	X	X	X	X	X		X	X			
T/Lincoln	X	X	X		X		X	X			
T/Madison	X	X	X		X		X	X			
T/Nelson	X	X	X		X		X	X			X
T/Smithfield	X	X	X		X		X	X			
T/Stockbridge	X	X	X	X	X		X	X			
T/Sullivan	X	X	X	X	X		X	X			
V/Canastota	X	X	X	X	X		X	X			
V/Cazenovia	X	X	X	X	X		X	X			
V/Chittenango	X	X	X	X	X		X	X			
V/DeRuyter	X	X	X	X	X		X	X			
V/Earlville	X	X	X	X	X		X	X			
V/Hamilton	X	X	X	X	X		X	X			
V/Madison	X	X	X		X		X	X			
V/Morrisville	X	X	X		X		X	X			
V/Munnsville	X	X	X	X	X		X	X			
V/Wampsville	X	X	X		X		X	X			

## HAZARD ANALYSIS

As part of the Madison County Comprehensive Emergency Management Plan, a Hazard Analysis was conducted in 2008 using the HAZNY program with data supplied by the National Oceanic & Atmospheric Administration, and ESRI Hazards data.

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

TABLE 7: HAZARD RANK SCORING

Hazard Ranking Legend	
321 to 400	High Hazard
214 to 320	Moderately High Hazard
161 to 240	Moderately Low Hazard
44 to 160	Low Hazard

TABLE 8: HAZARDS BY RANKING

Hazard	Classification	Ranking
Severe Storms	Moderately High	312.2
Transportation Accidents	Moderately High	285.2
Winter Storm	Moderately High	272.2
Fires	Moderately High	265.2
HAZMAT (In Transit)	Moderately High	245.2
Ice Storm	Moderately Low	236.2
Terrorism	Moderately Low	231.2
Flood	Moderately Low	222.8
Utility Failure	Moderately Low	218.5
Water Supply Contamination	Moderately Low	207.8
Tornado	Moderately Low	202.5
Oil Spill	Moderately Low	195.2
Ice Jam	Moderately Low	180.5
Infestation	Moderately Low	173.8
HAZMAT (Fixed Site)	Moderately Low	170.8
Extreme Temperatures	Moderately Low	169.8
Epidemic	Moderately Low	164.2
Drought	Moderately Low	164.2
Explosion	Moderately Low	163.8
Wildfire	Low	160.5
Structural Collapse	Low	159.8
Wave Action	Low	159.5
Dam Failure	Low	159.2
Hurricane	Low	158.8
Earthquake	Low	150.5
Radiological (In Transit)	Low	143.2
Air Contamination	Low	123.8
Civil Unrest	Low	111.2
Blight	Low	96.2

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

## Identify locations where vulnerable populations congregated

During the planning process the committee gave special attention to facilities such as hospitals, nursing and assisted living facilities, schools and facilities that provide services to the AFN (Access and Functional Needs) community. Several facilities, such as The Grand Rehabilitation and Nursing Home located in Chittenango, are located in areas prone to flooding events. They create challenges when dealing with evacuations; prolong utility outages, and sustaining critical services to their clients. Each facility is required to produce site-specific emergency plans as a deliverable to NYS DOH.

Below is a list of those facilities within Madison County:

### Hospitals

- Oneida Health Care, 321 Genesee St., Oneida, NY 13421
- Community Memorial Hospital, 150 Broad St., Hamilton, NY 13346

### Nursing Homes

- The Grand at Chittenango, 331 Russell St., Chittenango, NY 13037
- Crouse Community Center, 101 South St., Morrisville, NY 13408
- Oneida Health Care Extended Care Facility, 323 Genesee St., Oneida, NY 13421

### Assisted Living Centers

- Hamilton Manor, 8196 Green Road, Hubbardsville, NY 13355
- Hazel Carpenter Home, 533 Main St., Oneida, NY 13421

### Schools

- n/a

### And/or facilities for the disabled

- Upstate Cerebral Palsy Residential Home, 612 Dyke Rd., Chittenango, NY 13037
- Liberty Resources Residential Home, 812 Tuscarora Rd., Chittenango, NY 13037
- OPWDD Residential Home, Jay Street, Chittenango, NY 13037
- OPWDD Residential Home, Leta Lane, Chittenango, NY 13037
- OPWDD Residential Home, Catherine Street, Chittenango, NY 13037
- Heritage Farm, Inc. Day-Habilitation, 3399 State Route 46, Bouckville, NY 13310

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

## Identify the vulnerability of buildings and infrastructure

A risk assessment was undertaken as part of the mitigation plan update process to identify assets across Madison County that are likely to be the least resilient to future storms. Assets found to be in extreme and high risk areas during the asset inventory (nearly 350 across the County) were advanced to the risk assessment process to better quantify their associated risks in detail. This risk analysis was accomplished using a Risk Assessment Tool developed by NYS DOS. The Risk Assessment Tool is spreadsheet-based and evaluates the flood risks posed to assets based on factors related to hazard, exposure, and vulnerability scores:

- **Hazard Score:** Hazard represents the likelihood and magnitude of future storm event impacts. Typically, an asset located in an Extreme risk area experiences hazards with greater frequency and intensity than assets in a High or Moderate risk area. The Hazard Score directly corresponds to the 100-year and 500-year storm events, and is entered as a 3 or a 4, respectively, in the Risk Assessment Tool.
- **Exposure:** Exposure characterizes the moderating effect of local topographic and protective features. If assets are more exposed (e.g., situated in low-lying floodplains), they are more likely to suffer storm effects than similar assets located at a higher elevation. The landscape attributes captured during the asset inventory are quantified and summed in the Risk Assessment Tool to produce an Exposure Score.
- **Vulnerability:** Vulnerability expresses the level of impairment or consequences that assets may experience from a storm event. If an asset recovers quickly with limited interruption in service it has low vulnerability, while extended service loss or permanently reduced capacity would be synonymous with high vulnerability. Input from Committee members and at public engagements was utilized to rank the Vulnerabilities of assets and systems across the County. In the Risk Assessment Tool, low to high vulnerability was quantified on a 1 to 5 scale, respectively.

Once the hazard, exposure, and vulnerability scores were entered, the Risk Assessment Tool produced a Risk Score for each asset using the follow formula:

$$\text{Hazard Score} \times \text{Exposure Score} \times \text{Vulnerability Score} = \text{Risk Score}$$

The derived risk scores help to quantify the associated risk to each asset in detail, and can be used to illustrate and examine the distribution and types of assets least resilient to flooding.

## Risk Assessment Results

Madison County is primarily vulnerable to flooding from the streams and tributaries of the Oswego River, Mohawk River and the Susquehanna River drainage basins following spring snow melt and during heavy summer rains. The northern half of the County generally drains to Oneida Lake, while the southern portion drains through a network of multiple watercourses. The terrain is gently rolling, with approximately 1800' of relief across the County in a general north to south trend. The gently rolling nature of the land contributes to the presence of the numerous streams and tributaries distributed throughout the County's extent. The Chittenango Creek, Cowaselon Creek, Oneida Creek, Oriskany Creek, Tioughnioga Creek, Beaver Creek, Otselic Creek, Madison River, Unadilla River, and Sangerfield

## MADISON COUNTY HAZARD MITIGATION PLAN 2016

River are main sources of flooding, while smaller tributaries can also contribute when flow volumes are large.

Floodwaters in Madison County were described by Community members to often “come fast, but go fast,” meaning that floodwaters typically behave in a flash-flooding manner. Across the County, a pattern of flooding emerges when recounting past events that is characterized by streams unable to handle increased volumes from heavy rains, logjams and silt deposition obstructing watercourses and reducing channel depths, and blockages of culverts with debris. This rural County is dominated by agricultural land uses and open space, which may help explain some of the behaviors floodwaters typically exhibit. An analysis of land cover data reveals that Madison County is approximately 16% cropland, 19% pasture, 43% forest, 9% shrubland, and 8% wetland – totaling nearly 95% of largely permeable surfaces that can help to absorb floodwaters introduced by acute rain events. Understanding the flooding patterns within Madison County can help provide perspective when reviewing the results of the Risk Assessment Tool. Out of the 348 assets analyzed, 1 had a Severe Risk Score, 95 had High Risk Scores, and 252 had Moderate Risk Scores, and none had a Residual Risk Score. Risk Scoring is categorized as follows:

- **Severe Risk:** Could represent that the asset is in a dangerous situation. Both exposure and vulnerability should be reduced if possible, and relocation considered a priority option.
- **High Risk:** Conditions could lead to significant negative outcomes from a storm. Actions should be taken to reduce vulnerability and exposure, and if ineffective then relocation may be necessary.
- **Moderate Risk:** Conditions could lead to moderate to serious consequences from a storm. A combination of measures to reduce vulnerability and exposure may reduce risk to more acceptable levels.
- **Residual Risk:** Conditions indicate that floods would pose minor or infrequent consequences.

Settlement patterns and landscape conditions are similar across Madison County, explaining the homogeneity of the risk scores. Those assets most at risk are typically concentrated near the floodplains identified as extreme risk areas in the Oneida Flats, Hamlet of Poolville, and Villages of Chittenango, DeRuyter, and Morrisville. These highest-risk assets typically have very few protective landscape attributes, compounding the issues inherent to being located in extreme risk areas. Some key assets most at risk include the Oneida Armory (a primary shelter during storm events), Oneida DPW, Morrisville Fire Station, numerous residential areas and neighborhoods, multiple downtown business centers, and various assets that serve socially vulnerable populations such as the Grand Rehabilitation Center in Chittenango.

Out of the economic assets analyzed, 31 received high risk scores and 40 received moderate risk scores. About half of these were businesses across the County concentrated in villages and downtowns. Major employers at moderate risk include Queensboro Farm Products and DMC Technical Products in the Village of Canastota, and Johnson Brothers Lumber in the Town of Cazenovia. Another major employer at high risk is the Canastota Concrete Plant in the City of Oneida. Multiple commercial properties along Wilson Street in the City of Oneida are at high risk; further corroborated by flooding from the 2013 storm which caused vacancies after flooded tenants failed to return. Multiple marinas along Oneida Lake in the Towns of Lenox and Sullivan offer recreational and tourism opportunities, but are subject to an inherent moderate risk due to their location.

## MADISON COUNTY HAZARD MITIGATION PLAN 2016

Thirteen health and social services assets were found to be at high risk and 16 at moderate risk. Facilities key to emergency response efforts found to be at high risk include the Morrisville Fire Station and the Oneida Armory which serves as a shelter during times of need. Moderate risk assets related to emergency response are the Erieville and Georgetown Fire Stations and Hamilton Police Department. Additionally, the City of Oneida DPW and Madison County Highway Garage located in the Village of Morrisville are at high risk, and the Towns of Sullivan and Georgetown Highway Garages at moderate risk. Multiple assets that provide services for socially vulnerable populations are at risk, as well. The Chittenango Child Care Center, Chittenango OPWDD, and Fiver Children's Foundation in the Town of Hamilton were found to be at high risk. At moderate risk were a day care center, elementary school, high school, and Madison County Jail in Oneida, preschool and central school in Hamilton, and a preschool in Lenox. Two animal hospitals are also at risk – the Georgetown Veterinary Clinic is at moderate risk and the Oneida Animal Hospital at high risk.

Numerous housing assets including neighborhoods and homes were found to be at risk. The majority of at-risk housing consists of single-family residences and neighborhoods, with the remainder including various multi-family apartments and two mobile home parks. Overall, moderate risk housing is found distributed throughout the County. High risk housing is concentrated in the Hamlet of Poolville and Villages of Chittenango, DeRuyter, and Morrisville. Assets serving socially vulnerable populations such as the Chittenango Center for Rehabilitation and Healthcare as well as senior housing in the Village of Morrisville were found to be at high risk. The Flats neighborhood in the City of Oneida was found to be at severe risk. The 2013 storm devastated the Flats with flooding and inundation that took days to recede and left a significant deposition of debris. Numerous homes were damaged beyond repair in this predominantly low-to-moderate income neighborhood. The need for assistance to residences through a buyout program was identified, and the planning stages of the program are currently underway to help residences relocate out of flood-risk areas.

Components of infrastructure systems were found to be at risk across the County. Since categorizing the risk to an overall system can be difficult to quantify, the approach was taken to analyze the risk faced by principal points of those systems to identify vulnerabilities. Of the 123 infrastructure assets examined, 99 were bridges that crossed watercourses and represented particular points of the transportation system that were likely to be vulnerable across the County. Eighteen bridges received high risk scores, and the remaining 81 received moderate risk scores. Higher risk bridges generally were situated near the confluence of merging streams or in an extreme risk area known to flood frequently. Components of the electric transmission and telecommunications systems including four electrical substations and three telecommunications towers were found to be at moderate risk. The Oneida Sewage Treatment Plant received a high risk score and marks a key vulnerability of Oneida's wastewater system. Following the 2013 storm, the plant was incapacitated for days and running at reduced capacity for weeks after until repairs could be completed. Multiple water wells and treatment facilities were found to be at risk across eight municipalities, which could jeopardize both municipal and private water supply networks.

Fifteen natural and cultural resource assets received high risk scores and six received moderate risk scores. The majority include parks, ball fields, and campgrounds at moderate risk that provide recreational opportunities and open space for Community members to enjoy. While parks can provide a vital area for floodwaters to recharge back to the water table, the downtime and damage they can experience from flooding can remain an issue. Assets in the built environment found to be at high risk were the Chittenango Landing Museum, Morrisville Library, and Chittenango United Methodist Church.

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

## Public Input

The planning process provided a number of occasions for public involvement, including the six planning committee meetings held at the county office building and the three public open house events held across the county. Each event was advertised in the local media and official notice locations. While the public and other interested parties and organizations attended each of the events, little comment or feedback came from public interaction and is not included in this report.

## Identification of Hazards

### 1. Severe Storms (Wind, Hail, and Lightning Only)

**Definition:** Severe Storms include hail storms, wind storms, and severe thunderstorms. A thunderstorm is a local storm accompanied by lightning and thunder and is often accompanied by gusty winds, heavy rain, and sometimes hail. The National Weather Service classifies a thunderstorm as severe if it produces winds greater than 57mph or hail  $\frac{3}{4}$  inch or more in diameter. Hurricanes are not included in this section because historically their main effect in Madison County has been flooding.

**Probability of future occurrence:** Based on recent history in Madison County, we have experienced two severe storms during the past 13 years. With the perceived increasing severity of weather events, it can be expected that severe storms will occur once within a 5 year period.

**Location:** All Regions of Madison County

**Seasonal Pattern:** Spring - Summer

**Warning Availability:** Hours to several days

**Duration:** 1 Day

**Impacts:** The greatest expected impacts from a Severe Storm are associated either with damage from flooding, hail, or wind. Flooding is covered as a separate category and will be addressed in another section of this document. As of this writing, little information is available on hail damage in Madison County.

**Historical Severe Storm Damage:** During the past twenty years, there have been three notable severe storms that caused extensive damage in Madison County and fatalities within the Central New York area: these storms occurred on July 15, 1995, September 7, 1998 and July 3, 2014, an EF-2 tornado that resulted in four fatalities in the Town of Smithfield.

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

## 2. Severe Winter Snow Storms

**Definition:** Winter Storms occur anytime between October and May in Madison County and produce frozen precipitation. These storms can become disasters when they produce large quantities of precipitation, or have severe winds and low temperatures. According to Madison County Highway Department personnel, storms that produce more than 12 inches of snow in 12 hours severely tax the resources of the county. Ice Storms are a separate category.

**HAZNY Definitions:**

- *Heavy Snow* – Six inches in 12 hours or less
- *Blizzard* – Characterized by low temperatures, winds 35 mph or greater, and significant falling and/ or blowing snow in the air to frequently reduce visibility to ¼ mile or less for a duration of at least three hours.
- *Severe Blizzard* – Characterized by temperatures near or below 10 degrees F, winds exceeding 45 mph, and visibility reduced by snow to near zero for a duration of at least three hours.

**Probability of future occurrence:** Heavy Snow can be expected to occur at least six times during a winter season in Madison County. Blizzards are more infrequent. Based on past history and a perceived increase in severe weather, blizzards can be expected to occur once every ten years.

**Location:** All regions of Madison County

**Seasonal Pattern:** October – May

**Warning Availability:** Days, to a week or more

**Duration:** 1-2 Days

**Frequency:** Annually

**Impacts:** For the Madison County Highway Department, a 12 inch storm requires 3 trips of standard routes by 21 plows taking 9 hours. According to Joe Wisninski, County Highway Superintendent, the average cost per mile for snow removal is \$30. This figure includes the cost of equipment, labor, and materials. The County is responsible for 545 miles of snow removal on County and State roads. A 12 inch storm would cost approximately \$30 x 545 miles x 3 trips = \$49,050.

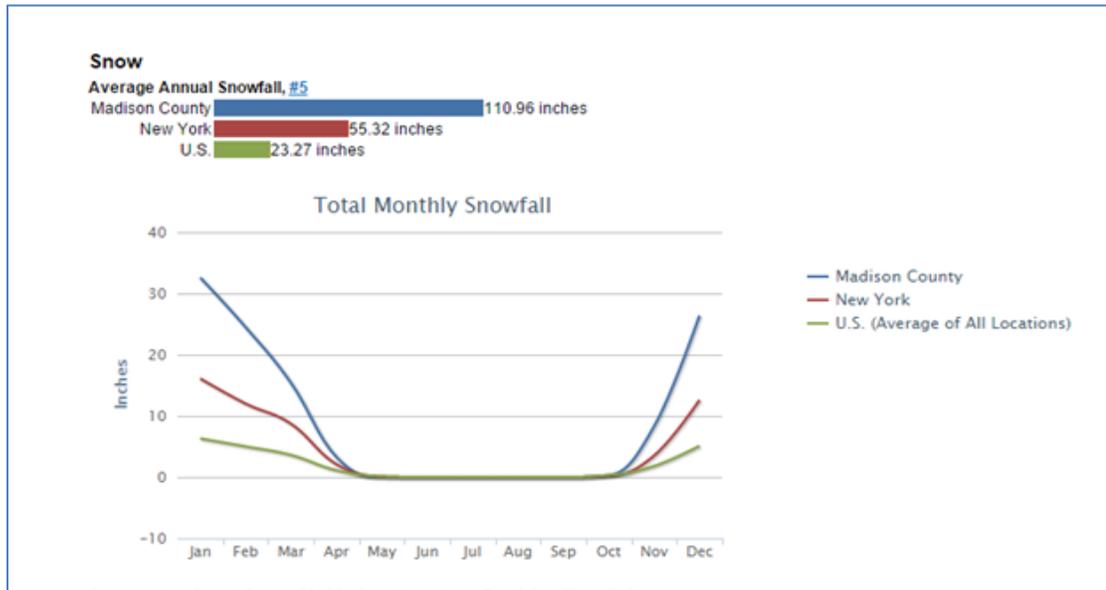
**Historical Severe Winter Storm Damages:**

- December 25 & 26, 2002 Snowstorm – This was presidential emergency FEMA 3173 EM-NY. During a 48 hour period, a record snowfall occurred in parts of Madison County. Snowfall amounts ranged from 18 inches in the Town of Eaton to 39 inches in the Town of Brookfield. At 100% reimbursement, the Madison County received \$44,685 from the federal government.
- March 1993 Blizzard – This storm dumped 43 inches of snow in Syracuse during a 36 hour period. Because of its higher elevation (up to 1700 feet vs. 300 feet), portions of Madison County probably sustained greater amounts of snowfall.

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

- Blizzard of '66 – This was a three day storm during the month of January that was characterized by steady snow and continuous winds.

Figure 2: Average Annual Snowfall by Month



Source: <http://www.usa.com/madison-county-ny-weather.htm>

DRAFT

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

## 3. Ice Storms

**Definition:** Ice storms occur when rain freezes on contact with surfaces at ground level. Substantial accumulations can cause power outages and disruption in transportation.

**Probability of future occurrence:** Moderately Probable

**Location:** All of Madison County has the potential for ice storm damage. Because elevation varies from 371 feet above sea level at Oneida Lake to 2140 feet above sea level on Fire Tower Hill, the location and extent of ice storm damage can vary. Generally, icing will be worst at higher elevations but under severe conditions all of the county could suffer damage from icing.

**Seasonal Pattern:** Late fall through spring

**Duration:** Days, to weeks

**Warning Availability:** several days, or more

**Frequency:** Infrequent

**Impacts:** Senior housing facilities, apart from nursing homes, have been cited as being particularly susceptible to power failures caused by ice storms. These facilities include:

- Stoneleigh Apartments, Canastota
- Hazel Carpenter Home, Oneida
- Oneida Towers, Oneida
- Bolivar Landing, Chittenango
- Emerald Court Apartments, Chittenango
- Cazenovia Village Apartments, Cazenovia
- Carriage Lane Apartments, Cazenovia
- Madison Lane Apartments, Hamilton
- DeRuyter Senior Apartments, DeRuyter

**Historical Ice Storm Damages:** April 4, 2003 – Madison County declared Disaster No. 1467 for this ice storm. From U.S. Department of Commerce, National Climatic Data Center – Steady widespread freezing rain started during the day of April 4 and continued through the night. Ice accumulations were mostly a quarter of an inch with a few locations up to an inch. Tens of thousands of electricity customers in a ten county area were without power, some for up to a week. April 4, 2003 - From U.S. Department of Commerce, National Climatic Data Center – Economic losses for a ten county area were listed as 28.5 million.

January, 1998 – Six counties in North Country and four other New York Counties were declared Disaster No. 1196. The North Country Counties of Clinton, Essex, Franklin, Jefferson, Lewis, and St. Lawrence were hit hardest. 2 to 6 inches of rain fell during freezing temperatures and caused 3 to 4 inches of ice accumulation. Almost all utility customers lost power for part of the event, some up to 23 days.

## MADISON COUNTY HAZARD MITIGATION PLAN 2016

**Potential Losses:** The worst case scenario for Madison County would be an ice storm similar to the disaster that occurred in northern New York in January, 1998. Madison County is similar to these counties in terms of population and industry. Damage in this sort of event can include dairy farm damages, damage to housing, and lost wages.

**Dairy** – Madison County is one of the top 100 dairy counties in the United States with approximately 300 commercial dairy farms. According to the FEMA Ice Storm Overview of the January, 1998 disaster, 1,400 of 1,800 North Country dairies (78%) were damaged because of a power outage. Average damages according to their calculations were \$22,075 per farm. If 78% of the dairies in Madison County were to sustain damages of \$22,075 per farm, economic losses would equal 234 dairies x \$22,075/ dairy = \$5,165,550

**Lost Wages** – As a result of the January, 1998 Disaster, most businesses were closed for three days and almost the entire labor force was out of work for those three days. The cost to Madison County for a similar disaster would be in the millions of dollars.

DRAFT

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

## 4. Floods

**Definition:** Flooding usually is a natural cyclic occurrence in existing water bodies. When a waterbody overflows its “normal” banks, a potentially violent and/ or destructive waterway can form. A flash flood is a sudden transformation of a small stream into a violent waterway after heavy rain and/ or rapid snowmelt.

**Probability of future occurrence:** Probable

**Location:** Many of Madison County’s flooding problems are closely related to its topography. The worst flooding problems can be found in the northern municipalities: Town of Sullivan, Town of Lenox, City of Oneida, Village of Chittenango, and the Village of Canastota. These municipalities are located on relatively flat land north of the steep north facing Onondaga Escarpment. Water flows down the face of the escarpment in waterways such as Chittenango Creek, Oneida Creek, Cowaselon Creek, Canaseraga Creek, and Canastota Creek.

**Seasonal Pattern:** Peak flows commonly occur due to spring snow melt or heavy rain storms.

**Duration:** Hours to days

**Warning Availability:** from minutes to several days

**Frequency:** Moderately frequent

**Impacts:** Loss of public infrastructure facilities, such as bridges, culverts, dams and levees can result in damages to public and private properties. Loss of critical systems like roadways can prevent movement in the affected areas, including the public’s ability to commute to and from work, school, etc. or the ability of public safety agencies and other services reaching victims of the storm.

**Historical Damages:** The following flooding events, many of which received disaster declarations, have occurred within Madison County in the recent past:

- June, 1972 – Disaster No. 0338 declared for effects of Tropical Storm Agnes.
- October 2, 1975 – Disaster No. 0487 declared for heavy rains, landslides, and flooding.
- January 23, 1996 – Disaster No. 1095 declared for severe storms and flooding.
- December 13, 1996 - From U.S. Department of Commerce, National Climatic Data Center – A combination of heavy rain and snowmelt produced small stream flooding along Chittenango Creek near Juddville.
- May 13 & 14, 2000 – Widespread flooding was reported with many roads closed following heavy thunderstorm rains.
- July, 2000 – Disaster No. 1335 declared for severe storms and flooding
- June 23, 2001 – Emergency management officials reported numerous roads closed and basements flooded due to flash flooding from heavy thunderstorm rains.
- Summer, 2003 – Disaster No. 1486 declared for severe storms and flooding
- August, 2004 – Disaster declared for severe storms and flooding

## MADISON COUNTY HAZARD MITIGATION PLAN 2016

- November 28, 2004 – 1.5 to 3 inches of rain fell across Madison County on ground already saturated from recurrent storms including the last one on the 25<sup>th</sup>. Most of the rain fell on the morning of the 28<sup>th</sup>. Road flooding happened in many locations, including Madison, Cazenovia, and Hamilton. Property damage according to NOAA was \$10,000.
- **Late June – Early July 2013 – FEMA DR 4129 – Heavy rains across the county caused flash flooding in multiple locations. The worst hit was the City of Oneida which received damage to an estimated 200 homes and businesses as well as the City DPW facilities, sewage treatment plant and Shelter located in the Oneida Armory.**

Photo 1: Aerial Photo of Oneida Flooding 2013



*Source: Syracuse.com, June 28, 2013, Governor Andrew Cuomo surveys the flooding in the City of Oneida.*

## 5. Tornado

**Definition:** A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. Because wind is invisible, it is hard to see a tornado unless it forms a condensation funnel made up of water droplets, dust and debris. Tornadoes are the most violent of all atmospheric storms. (source: NOAA)

**Probability of future occurrence:** New York State historically has an average of five tornadoes a year which can occur in any region, Madison County averages one tornado every 10 years. A tornado is a great threat to life and usually causes catastrophic damage to property within its path. Due to the great amount of damage that tornadoes cause in a relatively short amount of time, they are considered one of the most destructive natural hazards

**Location:** Historically tornadoes have occurred in the southern escarpment, however could occur in any area of the county.

**Seasonal Pattern:** Early spring through late fall

**Duration:** Minutes

**Frequency:** Infrequent

**Warning Availability:** from minutes to several hours

**Impacts:** Extreme threat to life and property

**Historical Damages:** According to web sources, the following tornadoes have occurred in Madison County (source: NOAA):

- September 18, 1977, 2pm, Town of Nelson, 1 injured, damages: \$250K, Scale: F2
- Nov. 16, 1989, 9:15am, Town of Georgetown, 0 injured, damages: \$250K, Scale: F0
- May 16, 2009, 03:34pm, Town of Lebanon, 1 injured, damages: \$50K, Scale: EF2
- **July 8, 2014, 7:02 pm, a tornado touched down in the Town of Smithfield just 2 miles northeast of the Hamlet of Peterboro. This EF2 tornado with a path length of 2.5 miles and a path width of 235 yards resulted in 4 fatalities. Three homes were destroyed and 5 additional homes sustained significant damages totaling \$600K.**

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

Photo 2: Aerial Photo of Smithfield Tornado Damage 2014



*Source: Syracuse.com, Aerial photo of Madison County storm damage, July 9, 2014*

DRAFT

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

## 6. Infestation

**Definition:** An excessive population of insects, rodents, or other animals requiring control measures due to their potential to carry diseases, destroys crops, or harms the environment.

**Probability of future occurrence:** Very Likely

**Location:** All of Madison County

**Seasonal Pattern:** Spring through fall

**Duration:** Varies. In some cases, infestations are resolved in one to two years if the pest species can be eradicated, as was the case in the Chicago area where an Asian Long-horned Beetle infestation was eradicated through the use of an intensive tree culling operation. In other cases, the infestation can become permanent such as the beetle that is the vector for Dutch Elm disease. Mosquito-borne infestations treatments are almost immediately effective, however success is based on a number of factors, including wind, amount of standing water, and application coverage.

**Frequency:** Frequent (Madison County conducts aerial spraying for mosquitoes and an almost annual basis)

**Impacts:** New York State has been impacted by various past and present infestations including: high population of mosquitoes (West Nile Virus), deer ticks (Lyme disease), Asian longhorned beetles, and hemlock woolly adelgid. Other infestations that have impacted the State include: Eastern Equine Encephalitis (EEE), La Cross Encephalitis, Powassan Virus, St. Louis Encephalitis, Western Equine Encephalitis, Emerald Ash Borer, and Sirex Wood wasp. Not all of these infestations have occurred in Madison County; therefore, the following infestations listed below, will be discussed further in this section.

- *West Nile Disease (WNV)* – is a mosquito-borne virus that can cause encephalitis (inflammation of the brain) or meningitis (inflammation of the lining of the brain and spinal cord). WNV is spread to humans by the bite of an infected mosquito. A mosquito becomes infected by biting a bird that carries the virus.
- *Eastern Equine Encephalitis (EEE)* – is a rare but serious viral disease spread by mosquitoes that can affect people and horses. It is transmitted by the bite of an infected mosquito. Mosquitoes become infected by feeding on infected birds. Infected mosquitoes will then occasionally feed on horses, humans and other mammals. The virus that causes EEE is spread only by mosquitoes. People and horses do not directly spread the disease to horses of people. (Source: NYSDOH 2012)
- *Lyme Disease* – is the most commonly reported vector-borne illness in the United States. In 2009, it was the fifth most common nationally notifiable disease. In 2010, 94 percent of Lyme disease cases were reported in 12 states – Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Jersey, New Hampshire, New York, Pennsylvania, Virginia and Wisconsin (Source: CDC, 2011). According to data provided TickChek.com, the number of reported cases of Lyme disease is growing in Madison

## MADISON COUNTY HAZARD MITIGATION PLAN 2016

County, from a low of 4 cases reported between 1992 to 1996, increasing to 30 between 2007 and 2011.

- *Gypsy Moth* – A severe outbreak in 2006 denuded many hillsides in Madison County.
- *Sirex Woodwasp* – an Eurasian pest, was first discovered in New York in 2004, in the City of Fulton, Oswego County. Larvae are woodborers that tunnel deep into the trunks of all species of pine (*Pinus*) trees. As the female *Sirex* wood wasp, *Sirex noctilio*, prepares to lay her eggs, she secretes a toxic mucus and symbiotic fungus into the tree which work synergistically to weaken, and in some cases kill the attacked tree(s).
- *Asian Long-horned Beetle* (ALB) is an exotic pest, native to parts of Asia, threatening a wide variety of hardwood trees in North America, particularly in New York State, New Jersey and Chicago. The beetle is believed to have arrived in New York City in the 1980's, in wooden packing material used in cargo shipments from China. The ALB has the ability to infest certain hardwood trees, eventually destroying them. They are a threat to public, private and commercial hardwood trees. The US Department of Agriculture (USDA) believes this beetle can probably survive and reproduce in most sections of the country where suitable host trees exist. The preferred host for this pest is the sugar maple. It has the potential to kill all of the maple trees in Madison County.
- *Emerald Ashborer* – The ashborer has been identified in Madison County and is causing issues with the ash trees already. The Village of Chittenango, under the direction of a local arborist, has begun an active treatment and harvest program to treat infected trees and remove those trees that have deteriorated beyond treatment from public property.

### Historical Damages:

- *September 2015*, humans infected with EEE infection have been hospitalized in nearby Onondaga and Oswego Counties.
- *August 2015*, Madison County declares a local State of Emergency following the discovery of both Eastern Equine Encephalitis and West Nile Virus in mosquito traps, especially in the north section of the Town of Sullivan. Aerial spraying was conducted just before dusk.
- *September 2014* – a horse stabled in the town of Lenox died of EEE.
- *2013 - Emerald Ash Borer* – First found in the county in 2013, it is still here with no known method for control.
- *2006* – Gypsy Moth, the most serious gypsy moth outbreak to date occurred in Madison County in 2006.
- *1996* – Asian Long-horned Beetle was discovered in New York City and parts of Long Island. This insect probably arrived in New York in packing crates or pallets from China. This outbreak is believed to be under control but it is possible that infected firewood may have been exported to the Upstate New York area.

## 7. Extreme High Temperature

**Definition:** Extreme heat is defined as temperatures which hover 10 degrees or more above the average high temperature for a region and last for several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility. Droughts occur when a long period passes without substantial rainfall. A heat wave combined with a drought is a very dangerous situation. Extended periods of excessive cold weather with a serious impact on human and/ or animal populations particularly elderly and/ or persons with respiratory ailments.

**Probability of future occurrence:** Moderate

**Location:** All areas of Madison County

**Seasonal Pattern:** Late spring through early fall

**Duration:** Several days to weeks

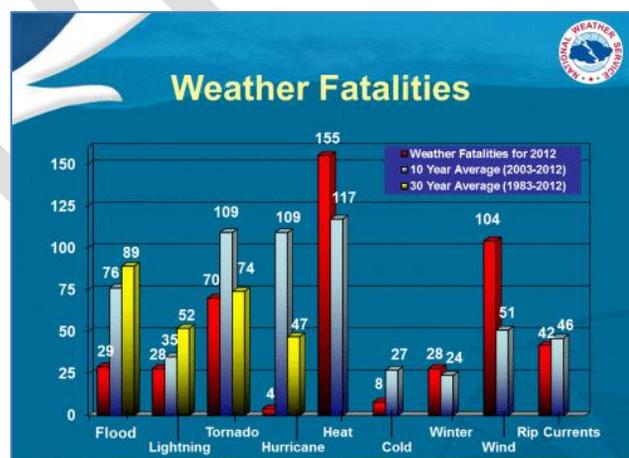
**Warning Availability:** 72+ hours

**Frequency:** Annually

**Impacts:** Senior citizens, infants & children, as well as those with medical conditions are particularly susceptible to periods of extremely high temperature, especially when coupled with brown-out or power failures and high heat indexes.

**Historical High Temperature Events:** The highest recorded temperature for the Central New York area was 96.8°F recorded on July 21, 2011. The heat index associated with the record high event was 114.8°F. 1960-2012 there have been 140 fatalities as a result of extreme heat; 31 of the 140 fatalities took place in a period of 2 years, ranging from 2010 - 2012.

Figure 3: National Weather Fatalities



Source: National Weather Service

## 8. Extreme Low Temperature

**Definition:** Although no specific definition exists for Extreme Cold, the following are characteristics of an Extreme Cold event in New York State: temperatures at or below zero degrees for an extended period of time. Note that Extreme Cold events are usually part of Winter Storm events but can occur during anytime of the year and have devastating effects on New York State agricultural production.

**Probability of future occurrence:** Moderate

**Location:** All of Madison County

**Seasonal Pattern:** Winter

**Duration:** Days to weeks

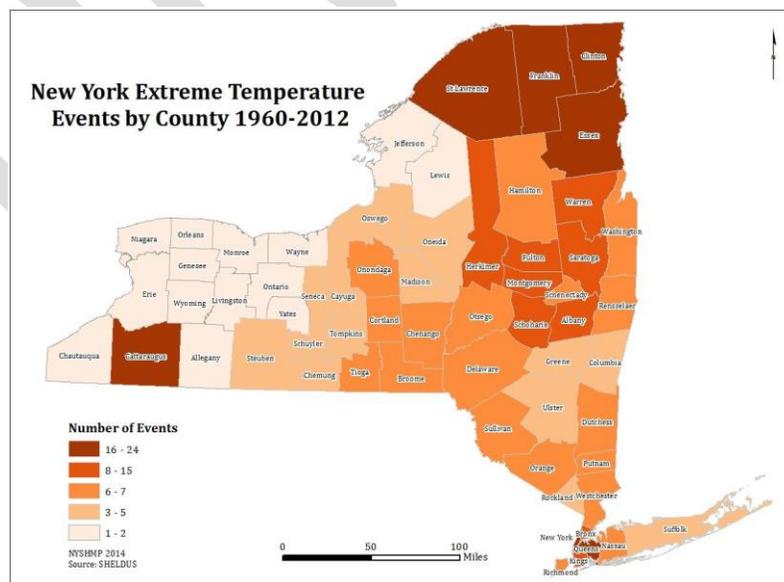
**Warning Availability:** 72+ hours

**Frequency:** Annually

**Impacts:** Senior citizens, infants & children, as well as those with medical conditions are particularly susceptible to periods of extremely low temperature, especially when coupled with wind-chill effects.

**Historical Low Temperature Events:** February 2015 was the coldest month on record in Syracuse. Temperatures never went above freezing, and the average was nearly 17 degrees below normal. On February 13<sup>th</sup> the high temperature was 6°F.

Figure 4: Extreme Temperature Events by County



Source: 2014 New York State Hazard Mitigation Plan

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

## 9. Drought

**Definition:** Drought is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. It is a normal, recurrent feature of climate that occurs in virtually all climate zones, from very wet to very dry. Drought is a temporary aberration from normal climatic conditions, thus it can vary significantly from one region to another. Drought is different than aridity, which is a permanent feature of climate in regions where low precipitation is the norm, as in a desert. Human factors, such as water demand and water management, can exacerbate the impact that drought has on a region. Because of the interplay between a natural drought event and various human factors, drought means different things to different people. In practice, drought is defined in a number of ways that reflect various perspectives and interests.

**Probability of future occurrence:** Possible

**Location:** All areas of Madison County

**Seasonal Pattern:** Primarily late spring through late fall

**Duration:** varies

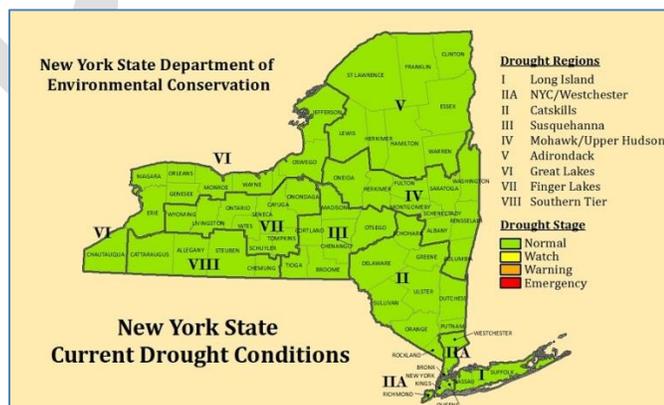
**Warning Availability:** from minutes to several days

**Frequency:** Infrequent

**Impacts:** Agriculture, dairy and crop production. Increase probability of wildland fires.

**Historical Damages:** New York is rich with water resources. Our celebrated streams, lakes, and coasts are fed by an average annual precipitation that ranges from 60 inches in the Catskills to 28 inches in the Lake Champlain Valley. But even here, in our "temperate moist" climate, normal fluctuations in regional weather patterns can lead to periods of dry weather. Occasional drought is a normal, recurrent feature of virtually every climate in the United States. The last severe droughts in New York occurred in the mid-1960s, and again in the early and mid-1980s.

Figure 5: Current Drought Conditions



Source: New York State Department of Environmental Conservation

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

## 10. Earthquake

**Definition:** A sudden and violent shaking of the ground, sometimes causing great destruction, as a result of movements within the earth's crust or volcanic action.

**Probability of future occurrence:** Likely

**Location:** All areas of New York State, including Madison County

**Seasonal Pattern:** N/A, earthquakes occur during any season.

**Duration:** From seconds to as much as a minute or more.

**Warning Availability:** from minutes to several days

**Frequency:** Earthquakes occur in or near New York State about once a month.

**Impacts:** From no physical damages to catastrophic losses.

**Historical Damages:** See table below.

Table 9: Significant Earthquakes in New York State

Significant Earthquakes in New York State				
From 1737 to 2002				
Date	County	Community	Maximum Modified Mercalli Intensity	General Magnitude
1737 - Dec. 18	New York	New York City	VI	5.0 est.
1853 - Mar. 12	Lewis	Lowville	VI	4.8 est.
1857 - Oct. 23	Erie	Buffalo	V	4.6 est.
1867 - Dec. 18	St. Lawrence	Canton	VI	4.8 est.
1874 - Dec. 11	Westchester	Tarrytown	VI	4.8 est.
1884 - Aug. 10	New York	Rockaway Beach	VI	5.3 est.
1897 - May 28	Clinton	Plattsburgh	VI	Not Stated
1928 - Mar. 18	Franklin	Saranac Lake	VI	4.5 est.
1929 - Aug. 12	Wyoming	Attica	VII	5.2
1931 - Apr. 20	Warren	Warrensburg	VII	4.5
1934 - Apr. 15	Clinton	Dannemora	VI	4.5
1944 - Sep. 5	St. Lawrence	Massena	VIII	6.0
1944 - Sep. 5	St. Lawrence	Massena	V	4.5
1966 - Jan. 1	Wyoming	Attica	VI	4.6
1967 - Jun. 13	Wyoming	Attica	V	4.4
1983 - Oct. 7	Essex	Newcomb	VI	5.1
1985 - Oct. 19	Westchester	White Plains	V	4.0
1991 - Jun. 17	Schoharie	Summit	V	4.1
1994 - Mar. 22	Livingston	Cuylerville	VI	3.6

Source: USGS

# MADISON COUNTY HAZARD MITIGATION PLAN 2016

## 11. Wildfire

**Definition:** A wildfire is a fire that rages out of control in the wilderness, like a forest or countryside. Wildfires often begin unnoticed. These fires are usually triggered by lightning or accidents, such as campers or hikers that did not take care of their campfire properly. They spread quickly, igniting brush, trees, and homes.

**Probability of future occurrence:** Likely, wildfires occur regularly in Madison County

**Location:** All areas of Madison County, occurring more often in the unincorporated areas of towns than village or city.

**Seasonal Pattern:** Late winter through early summer presents the most risk. This is typical of all areas on New York State, so much that the NYS Department of Environmental Conservation of issued Regulation Part 215 which describes legal types of outdoor burning as well as an annual burn ban from March 15<sup>th</sup> through May 14<sup>th</sup> each year.

**Duration:** Hours, but could be days or longer.

**Warning Availability:** Current wildfire risk map is provided by the NYS DEC to county emergency management office on a daily basis. Other than forecasting fire risk conditions, actual wildfire warnings are most times not available.

**Frequency:** During the peak, high fire risk period of March through May it is not uncommon to have multiple incidents per week.

**Impacts:** Wildfires in populated areas have the risk of significant property loss such as homes, agricultural and commercial buildings, resulting in displaced persons and loss of commerce. When there is a large loss of ground cover there is also an increased risk of erosion and flooding, which can result in damage to infrastructure, restricting travel and commerce.

**Historical Wildfire Damages:** In the last exceptionally dry fire season of 2002, forest rangers responded to 324 wildfires throughout the state, burning a total of 2,062 acres. In historical contrast, the similarly dry weather of 1903 spawned over 643 fires which burned 464,000 acres in the Adirondack and Catskill Parks alone. The difference from 1903 to 2012 is a direct result of 125 years of Forest Ranger efforts, working to prevent wildfires and improve fire control response.

Table 10: Past Wildfire Events in New York

Past Wildfire Events in New York		
Date	Location	Damages
1903	Adirondacks	Economic loss to lumber industry.
1908	Adirondacks	Economic loss to lumber industry.
1911	Adirondacks	Economic loss to lumber industry.

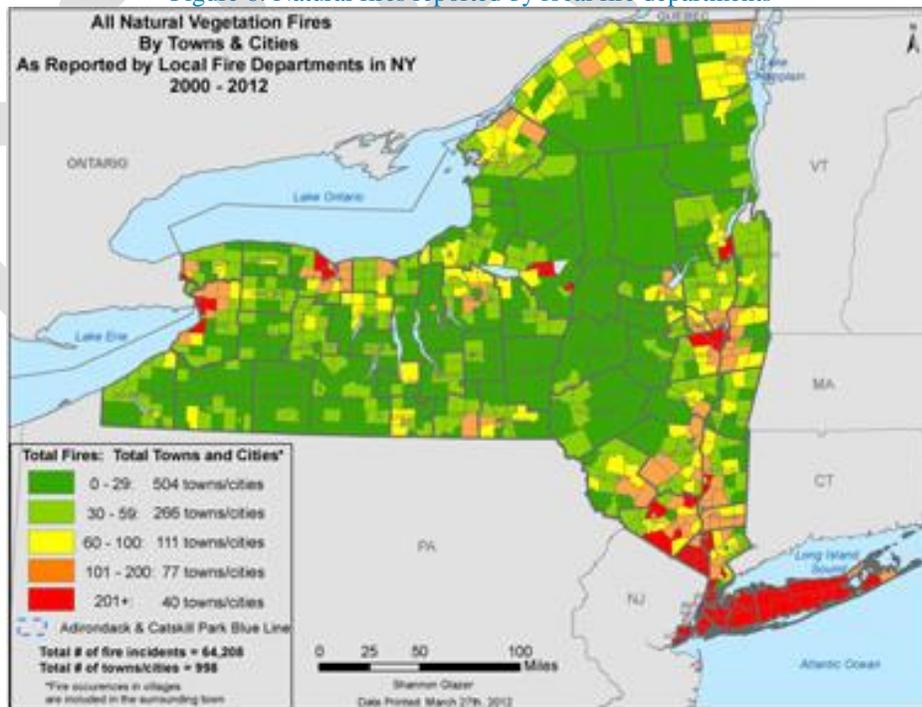
## MADISON COUNTY HAZARD MITIGATION PLAN 2016

1913	Adirondacks	Economic loss to lumber industry.
1915	Adirondacks	Economic loss to lumber industry.
1950	Adirondacks	Economic loss to lumber industry.
1995	Suffolk County	Sunrise Fires, 7,000 acres burned, \$5 million in damage.
2001	Washington County	\$95k in property damage, 34 acres of land burned.
2001	Schenectady County	\$5k, 6 acres burned, threatened several homes west of the Glendale Nursing Home. Some residents of the nursing home were evacuated.
2001	Rensselaer County	\$2k, 3 acres of a corn field destroyed.
2001	Suffolk County	2injuries, dollar amount damage unknown.
2002	Adirondacks	340 acres burned, dollar amount damage unknown.

Source: SEMO archives, NCDC and Jonathan Meade

Note: Forest rangers respond to approximately 4% of all wildfires in the state. More than 1,700 fire departments respond to an average of 5,500 wildfires each year.

Figure 6: Natural fires reported by local fire departments



Source: NYS Department of Environmental Conservation