

5.2 IDENTIFICATION OF HAZARDS OF CONCERN

To provide a strong foundation for mitigation actions considered in Sections 6 (Mitigation Strategy) and 9 (Jurisdictional Annexes), Tompkins County considered a full range of hazards that could impact the area and then identified and ranked those hazards that presented the greatest concern. This work included:

- 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 2019);
- The 2013-14 Tompkins County HMP (Tompkins County HMP 2014); the 2017 Tompkins County CEPA; and
- The review of the research and local, state, and federal information.

Information extracting included the frequency, magnitude, and costs associated with the various hazards that have previously, or could feasibly, impact the region. This further included the qualitative or anecdotal information regarding natural hazards and the perceived vulnerability of the study area's assets to them. Table 5.2-1 documents the process of identifying the natural hazards of concern for further profiling and evaluation. Specific hazards not identified as a hazard of concern for Tompkins County will not be further discussed in detail.

5.2.1 Changes from 2014 Hazard Mitigation Plan

The 2021 Tompkins County Hazard Mitigation plan re-evaluated the hazards that face the County. The 2021 plan addresses a broad range of hazards and has combined several associated hazards to simplify and prioritize actions in the plan. While the 2014 plan included a number of hazards of concern related to man-made, and technological hazards, the DMA 2000 regulations do not require consideration of such hazards in a FEMA-approved hazard mitigation plan, hence the Steering Committee deemed natural hazards to be the focus of the update. Therefore technological (e.g., hazardous material incidents) and man-made hazards (e.g., terrorism, man-made dam breaches/failures) are not addressed in this planning process as stand-alone hazards. These non-natural hazards are addressed by other regional planning efforts including comprehensive emergency management plans, cyber security plans, etc. However, many of the man-made hazards included in the 2014 plan are incorporated as associated or cascading hazards in this update. Details on how these man-made hazards were addressed in the 2021 updated plan are as follows:

- Civil Unrest – Not included in the plan update as this issue is addressed as a separate concern by the Tompkins County Department of Emergency Response and local law enforcement under the Tompkins County Comprehensive Emergency Management Plan.



- Fire (Urban and Wild)- Wildfire is included as a cascading impact of drought and discussed in Section 5.4.2 (Drought). Urban fire is not included in this plan as it is addressed by the County in its Comprehensive Emergency Management Plan as well as municipal fire department planning efforts , (in particular by the City of Ithaca Fire Department).
- Fuel Shortage - While it is acknowledged that a reliable fuel supply supports the health and welfare of communities, this has not been included as a stand-alone hazard, to be addressed by continuity of operations plans separately. However, as relevant, this may be included as a cascading hazard to identified hazards of concern. Stresses to fuel shortages will further be relieved by continued transition away from the reliance on fossil fuels.
- Hazardous Materials in Transit- Fixed hazardous material (Tier II) sites have been included in the risk analysis of this plan and identified as critical facilities; however, hazardous materials in transit are not included, but rather addressed by county in its Comprehensive Emergency Management Plan. Much of the concern in the 2014 plan was the potential adverse impact related to gas drilling. That threat potential no longer exists.
- Terrorism - This has not been included in this plan but rather is addressed by separate emergency management policies.
- Transportation Accident - This has not been included in this plan but rather is addressed by separate emergency management policies and long-range transportation planning. Much of the concern in the 2014 plan was the potential adverse impact related to high-volume hydraulic fracturing (HVHF) gas drilling related truck traffic. That threat potential no longer exists.
- Utility Failure - this is acknowledged as a cascading hazard in the Severe Storm and Flood hazards. Numerous mitigation actions related to utility failure are included in the County and municipal mitigation strategies to address the need for a reliable power supply to support resilient communities.
- Water Supply Contamination-This is partially addressed in the Flood hazard as a cascading hazard of concern and has not been included as a stand-alone hazard.

Regarding additional hazards addressed in the 2021 update, this plan includes disease outbreak and harmful algal bloom, both not included in the 2014 plan. During the update process, members of the Steering Committee identified these as hazards of concern for the 2021 Hazard Mitigation Plan update. In addition, the 2021 plan addresses invasive species as a hazard of concern rather than solely infestation as included in the 2014 plan to address invasive plants, animals, insects, and insect borne diseases that can be a risk to the welfare of the public.

The 2021 Tompkins County Hazard Mitigation Plan Update includes best available data throughout the plan to present an updated understanding Tompkins County's risk.



5.2.2 Hazard Categories

For this plan, the Steering Committee categorized hazards based on the similarity of hazard events, typical concurrence or 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; Multi-Hazard Identification and Risk Assessment – The Cornerstone of the National Mitigation Strategy; Local Mitigation Planning Handbook*). Brief descriptions of the hazards are provided below.

Detailed descriptions are provided in each hazard profile in the following sections of the plan.

Disease Outbreak addresses mosquito borne disease (West Nile, Eastern Equine Encephalitis, St. Louis Encephalitis, La Crosse Encephalitis), tick borne disease (Lyme Disease), respiratory viruses (Influenza and Coronavirus), Ebola, Measles, Tuberculosis, and Hepatitis A.

Drought includes drought events that occur and are likely to occur in the future in Tompkins County or had a considerable economic or safety impact on the county. In addition, associated wildfires that occur during drought conditions is included in this hazard.

Extreme Temperature addresses periods of extreme temperature (both extreme hot and cold) that occurred in Tompkins County or had a considerable impact on the county.

Flood includes riverine flooding, flash flooding, shallow flooding, ice jam flooding, and dam failure flooding. Inclusion of the various forms of flooding under a general *Flood* hazard is consistent with that used in FEMA's *Multi-Hazard Identification and Risk Assessment* guidance and the NYS HMP. In addition, flood related ground failure due to instability of saturated soils is included in this hazard.

Invasive Species addresses invasive species that impacts the built environment and public infrastructure in Tompkins County and surrounding region.

Harmful Algal Bloom addresses significant colonies of algae that produce toxins or have harmful health effects. For this HMP, main areas of concern regarding Harmful Algal Bloom are larger waterbodies such as Cayuga Lake, and generally not smaller waterbodies.

Severe Storm includes windstorms that often entail a variety of other influencing weather conditions, including thunderstorms, hail, lightning, windstorms, and tornadoes. Tropical disturbances (hurricanes, tropical storms and tropical depressions) are often identified as a type of severe storm. For this HMP update *Severe Storm* includes thunderstorms, hailstorm, lightning, tornadoes, hurricanes, and tropical storms.

Severe Winter Storm includes heavy snowfall, blizzards, freezing rain/sleet, ice storms, ice jams, and Nor'Easters. This category is consistent with the NYS HMP.



Table 5.2-1. Evaluation of Natural Hazards of Concern for Tompkins County

Hazard	Is this a hazard that may occur in Tompkins County?	If yes, does this hazard pose a significant threat to Tompkins County?	Why was this determination made?	Source(s)
Avalanche	No	No	<ul style="list-style-type: none"> The NYS HMP does not identify avalanche as a hazard of concern in Tompkins County. Avalanches can occur in any situation where snow, slope and weather conditions combine to create proper conditions. About 90 percent of all avalanches start on slopes of 30 to 45 degrees and about 98 percent of all avalanches occur on slopes of 25 to 50 degrees. The topography in Tompkins County is steep with the gorges, however, this does not lead to avalanche conditions. New York State, in general, has a very low occurrence of avalanche events based on statistics provided by National Avalanche Center – American Avalanche Association (NAC-AAA) between 1998 and 2020. 	<ul style="list-style-type: none"> NYS DHSES NAC-AAA
Coastal Erosion	No	No	<ul style="list-style-type: none"> The NYS HMP identifies coastal erosion as a hazard of concern for New York State. Erosion can impact all of the state’s coastal counties along: Lake Erie and the Niagara River, Lake Ontario and the St. Lawrence River, Atlantic Ocean and Long Island Sound, Hudson River south of the federal dam in Troy, the East River, the Harlem River, the Kill van Kull and Arthur Kill, and all connecting waterbodies, bays, harbors, shallows and wetlands. Tompkins County is not surrounded by coastal waters; therefore, based on its inland location and input from the Planning Partnership, coastal erosion is not considered a hazard of concern for the County. 	<ul style="list-style-type: none"> NYS DHSES Input from Planning Partnership
Dam Failure	Yes	Yes	<ul style="list-style-type: none"> The 2019 NYS HMP identifies dam failure as a hazard of concern for New York State and includes it in the Flood hazard profiles. According to the NYS DEC there are 96 dams are within Tompkins County, as shown in Section 4. Of these 96 dams in Tompkins County: 25 low hazard, 4 intermediate hazard, 5 high hazard, and 11 negligible, and 51 with an unknown classification (NYS DEC 2020). Due to the number of dams and input from the Steering Committee, dam failure is identified as a hazard of concern for the County and included in the Flood hazard profile. 	<ul style="list-style-type: none"> NYS DHSES Input from Planning Partnership NYSDEC NYS GIS
Disease Outbreak	Yes	Yes	<ul style="list-style-type: none"> The 2019 NYS HMP does not identify disease outbreak as a hazard of concern for New York State, however due to the large student population 	<ul style="list-style-type: none"> NYS DHSES NYS DEC



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			<p>and migratory nature of the county population, this hazard has been ranked as a hazard of concern for the County.</p> <ul style="list-style-type: none"> • Recent statistics related to this hazard includes: <ul style="list-style-type: none"> ○ As of 10/21 there were 553 positive Covid-19 cases reported; 477 of which had recovered. ○ Known disease outbreaks in the county include Hepatitis A, Lyme Disease, Tuberculosis, West Nile Virus, lab confirmed Influenza, Encephalitis (Non-WNV), Covid-19 (2014-present). 	<ul style="list-style-type: none"> • Input from Planning Partnership
Drought	Yes	Yes	<ul style="list-style-type: none"> • The NYS HMP identifies drought as a hazard of concern for the state. Tompkins County has been impacted by several drought events that have occurred in New York State. • Drought conditions can cause shortages in water for human consumption, impact agricultural production, and lead to reduced local firefighting capabilities. The population of Tompkins County relies on groundwater and surface water for their potable water. Droughts can impact groundwater resources significantly, limiting the availability of drinking water to county residents. • New York State was included in one FEMA drought-related disaster declaration, which did not include Tompkins County. • Tompkins County was included in two recent drought-related USDA disaster declarations: <ul style="list-style-type: none"> ○ S4023 August 2016 ○ S4031 September 2016 • According to the NRCC, Tompkins County is in the Eastern Plateau Climate Division. This division has been impacted by periods of severe and extreme drought 27 times from 1895 to 2002. • Based on previous occurrences, the existence of significant agricultural assets in the county, and input from the Planning Partnership, drought is identified as a hazard of concern for Tompkins County. 	<ul style="list-style-type: none"> • NYS DHSES • FEMA • USDA • Input from Planning Partnership • NOAA-NCEI • NRCC
Earthquake	No	No	<ul style="list-style-type: none"> • The NYS HMP identified earthquake as a hazard of concern for the state. 	<ul style="list-style-type: none"> • NYS DHSES



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			<ul style="list-style-type: none"> • Tompkins County has a PGA below 3%g. According to the FEMA document "Understanding Your Risks: Identifying Hazards and Estimating Losses", areas with 3%g should conduct a risk assessment for earthquakes. • New York State was included in one FEMA earthquake-related disaster declaration (DR-1415); Tompkins County was not included in this declaration. • According to the NYS HMP, between 1973 and 2012, there were 189 earthquakes epicentered in the state. Of those 189 events, none had an epicenter in Tompkins County. • Since earthquakes have historically not been a significant hazard in Tompkins County and New York State, the Steering Committee did not identify earthquakes as a concern and thus will not be including this factor in the assessment. 	<ul style="list-style-type: none"> • Input from Planning Partnership • USGS – Earthquake Hazards Program, Review of USGS Seismic Maps
Expansive Soils	Yes	No	<ul style="list-style-type: none"> • The NYS HMP identified expansive soils as a hazard of concern for New York State but does not identify this as a significant hazard in Tompkins County. In limited areas Ithaca and Tompkins County tend to have geological characteristics that make its communities prone to expansive soils, especially in lower elevation areas near the lake have potential for unstable conditions which can lead to structural damage. However, the Steering Committee did not identify this a significant county-wide hazard of concern. 	<ul style="list-style-type: none"> • NYS DHSES • Input from Steering Committee • Review of USGS 1989 Swelling Clays Map of the Conterminous United States
Extreme Temperature	Yes	Yes	<ul style="list-style-type: none"> • The NYS HMP identified extreme temperatures as a hazard of concern for New York State. • Tompkins County was included in five recent USDA disaster declarations related to extreme temperature events: <ul style="list-style-type: none"> • S3249 – March 2012 – Frosts and freezes • S3427 – June 2012 – Excessive heat (also included drought) • S3746 – February 2014 – Freeze • S4023 – August 2016 – Heat, excessive heat (also included drought) 	<ul style="list-style-type: none"> • NYS DHSES • Input from Steering Committee • NOAA-NCEI • USDA



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			<ul style="list-style-type: none"> S4031 – September 2016 – Heat, excessive heat (also included drought) The Planning Partnership identified extreme temperature as a hazard of concern for Tompkins County. 	
Flood (riverine, lake, ice jam, dam failure and flash)	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP identified flooding as a hazard of concern for New York State. Between 1954 and 2020, Tompkins County was included in 5 FEMA flood-related declarations. DR-290 (Heavy Rains and Flooding) - 1970 DR-338 (Tropical Storm Agnes) - 1972 DR-487 (Storm Rain Landslides and Flooding) – 1975 DR-515 (Severe Storms and Flooding) -1976 DR-1095 (Severe Storms and Flooding) - 1996 The Cornell Cooperative Extension Flood Taskforce considers erosion and sediment control to be a specific topic of concern in Tompkins County. Ice Jams have also been a significant problem in Tompkins County. According to the US Army Core of Engineers NYS has the second highest number of ice jams annually, with Tompkins County reporting 27 events since 1937. As these historical occurrences have and continue to be a major issue for the region, Tompkins County steering committee has designated flooding as a potential hazard for the county. 	<ul style="list-style-type: none"> NYS DHSES Input from Steering Committee FEMA NOAA-NCEI USACE CRREL Ice Jam Database Cornell Cooperative Extension
Hailstorm	Yes	Yes	<ul style="list-style-type: none"> Please see Severe Storm 	
Harmful Algal Bloom	Yes	Yes	<ul style="list-style-type: none"> The New York State DEC identified HABs as a critical issue that needs to be addressed for all of the Finger Lakes. Four Harmful Algal Blooms have been recorded in Cayuga Lake just for 2020 (6/25 Stewart Park, 7/6 Ithaca Yacht Club, 7/9 Taughannock Falls State Park, 8/24 Stewart Park Boat Dock) and have been increasing over the years. HABs have been identified and recorded 2 times in Dryden Lake 	<ul style="list-style-type: none"> NYSDEC HABs Mapper Tompkins County Health Department NYS Cayuga Lake Action Plan



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			<ul style="list-style-type: none"> Harmful Algal Blooms have been observed at various locations in Cayuga Lake, including in Tompkins County, during the summers since 2017. Lake nutrient and phosphorous levels have been increasing in Cayuga Lake due to increased contaminated runoff from agricultural, industrial, and commercial/ residential properties. 	
Hurricane	Yes	Yes	<ul style="list-style-type: none"> Please see Severe Storm 	
Ice Jams	Yes	Yes	<ul style="list-style-type: none"> Please see Flood 	
Ice Storm	Yes	Yes	<ul style="list-style-type: none"> Please see Severe Winter Storm 	
Infestation	Yes	No	<ul style="list-style-type: none"> Please see invasive species 	
Invasive Species	Yes	Yes	<ul style="list-style-type: none"> The 2019 NYS HMP does not identify invasive species as a hazard of concern for New York State. New York State has been affected by various instances of invasive ticks and mosquitos. The NYS DEC has identified Tompkins County to be located within the emerald ash borer restricted zone and identified several known locations of the emerald ash borer within the county. In addition to the emerald ash borer, several species of animals, insects, and plants have impacted the county. The Tompkins County Steering Committee and Planning Partnership identified invasive species as a hazard of concern due to previous occurrences of invasive species within Tompkins County. 	<ul style="list-style-type: none"> NYS DEC Input from Planning Partnership
Land Subsidence	Yes	No	<ul style="list-style-type: none"> NYS HMP indicates New York State is vulnerable to land subsidence; however, this hazard is “extremely localized” and poses a “very low risk to population and property”, according to the 2014 NYS HMP. The Planning Partnership did not identify land subsidence as a hazard of concern for Tompkins County. 	<ul style="list-style-type: none"> NYS DHSES Input from Planning Partnership USGS
Landslide	Yes	No	<ul style="list-style-type: none"> Landslides are included and discussed in the flood section. 	<ul style="list-style-type: none"> NYS DHSES Input from Steering Committee



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				<ul style="list-style-type: none"> FEMA
Nor'Easters	Yes	Yes	<ul style="list-style-type: none"> Please see Severe Winter Storm 	
Severe Storm (windstorms, thunderstorms, lightning, hurricanes / tropical storms, hail and tornadoes)	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP identified severe storm as a hazard of concern for New York State; however, for the state HMP, the hazards were profiled in individual sections thunderstorms, lightning, hail, tornadoes, high winds, and hurricanes/tropical storms. For the Tompkins County HMP, the hazards were combined into one profile. Between 1954 and 2018, Tompkins County was included in 11 FEMA severe storm-related declarations. <ul style="list-style-type: none"> DR-290 (Heavy Rains and Flooding) - 1970 DR-338 (Tropical Storm Agnes) - 1972 DR-487 (Storm Rain Landslides and Flooding) – 1975 DR-515 (Severe Storms and Flooding) -1976 DR-1095 (Severe Storms and Flooding) - 1996 DR-1148 (Severe Storms, High Winds, Rain, and Flooding) -1996 DR-1233 (Severe Storms and Flooding) -1998 DR-1335 (Severe Storms and Flooding) -2000 DR-1534 (Severe Storms and Flooding) -2004 DR-1650 (Severe Storms and Flooding) -2006 DR -4031 (Remnants of Tropical Storm Lee) 2011 DR-3262 (Hurricane Katrina Evacuation) – 2005 DR -3351 (Hurricane Sandy) - 2012 Based on previous occurrences and input from the Planning Partnership, severe storms are identified as a hazard of concern for Tompkins County. 	<ul style="list-style-type: none"> NYS DHSES FEMA NOAA-NCEI SPC Input from the Planning Partnership
Severe Winter Storm (heavy snow, blizzards, ice)	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP identified severe winter storm as a hazard of concern for New York State. According to the National Oceanic and Atmospheric Administration, Tompkins County's annual average snowfall ranges between 50 to 100 inches with an average of 64.4 inches and their total historic county-wide property damage is \$670,000 	<ul style="list-style-type: none"> NYS DHSES FEMA NOAA-NCEI



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storms, ice jams, and Nor'easters)			<ul style="list-style-type: none"> FEMA included Tompkins County in two winter storm-related disaster declarations: <ul style="list-style-type: none"> FEMA-EM-3107 (Severe Blizzard) – March 1993 FEMA-DR-4322 (Severe Winter Storm and Snowstorm) – March 2017 Based on previous occurrences and input from the Planning Partnership, severe winter storms are identified as a hazard of concern for Tompkins County. 	<ul style="list-style-type: none"> Input from the Planning Partnership
Tornado	Yes	Yes	Please see Severe Storm	
Tsunami	No	No	<ul style="list-style-type: none"> Tsunami is not identified as a hazard of concern in the NYS HMP. Due to its inland location, Tompkins County does not experience tsunamis. Therefore, the Planning Partnership did not identify tsunami as a hazard of concern for Tompkins County. 	<ul style="list-style-type: none"> NYS DHSES Input from the Planning Partnership
Volcano	No	No	<ul style="list-style-type: none"> The NYS HMP did not identify volcano as a hazard of concern for New York State. There are no active volcanos located in Tompkins County; therefore, the Planning Partnership does not identify volcano as a hazard of concern for Tompkins County. 	<ul style="list-style-type: none"> NYS DHSES Input from the Planning Partnership
Wildfire	Yes	No	<ul style="list-style-type: none"> The NYS HMP identified wildfire as a hazard of concern for New York State. Tompkins County was not included in any FEMA wildfire-related disaster declarations. <p>The Planning Partnership identified wildfire as a hazard of concern associated with drought conditions; therefore, wildfire is discussed in the drought hazard profile.</p>	<ul style="list-style-type: none"> NYS DHSES Input from Planning Partnership FEMA
Windstorm	Yes	Yes	<ul style="list-style-type: none"> Please see Severe Storm 	

CRREL Cold Regions Research and Engineering Laboratory
 DR Presidential Disaster Declaration Number
 EM Presidential Disaster Emergency Number
 FEMA Federal Emergency Management Agency
 NCEI National Centers for Environmental Information
 NRCC Northeast Regional Climate Center
 NYS DEC New York State Department of Environmental Conservation
 NYS DHSES New York State Division of Homeland Security and Emergency Services



NYS HMP New York State Hazard Mitigation Plan

PGA Peak ground acceleration

SPC Storm Prediction Center

USDA U.S. Department of Agriculture

USGS United States Geologic Survey



5.2.3 Summary of Hazards of Concern

In summary, a total of eight natural hazards of concern were identified as significant hazards affecting the entire planning area, to be addressed at the county level in this plan (shown here in alphabetical order):

- Disease Outbreak
- Drought (including wildfire)
- Extreme Temperature
- Flood (riverine, flash, stormwater, lakeshore, landslide, dam failure, and ice jam)
- Infestation and Invasive Species
- Harmful Algal Bloom (HAB)
- Severe Storm (thunderstorm, lightning, hail, wind, tornado, and hurricane/tropical storm)
- Severe Winter Storm

