

5.2 IDENTIFICATION OF NATURAL HAZARDS OF CONCERN

To provide a strong foundation for mitigation strategies considered in Sections 6 and 9, Delaware County considered a full range of natural hazards that could impact the area, and then identified and ranked those hazards that presented the greatest concern. The natural hazard of concern identification process incorporated input from the County and participating jurisdictions; review of the 2011 New York State Hazard Mitigation Plan (NYS HMP) and previous hazard identification efforts; 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. Table 5.2-1 documents the process of identifying the natural hazards of concern for further profiling and evaluation.

Hazards of Concern is defined as those hazards that are considered most likely to impact a community. These are identified using available data and local knowledge.

For the purposes of this planning effort, the Planning Committee chose to group some natural 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 386-1, “Understanding Your Risks, Identifying Hazards and Estimating Losses; FEMA’s “Multi-Hazard Identification and Risk Assessment – The Cornerstone of the National Mitigation Strategy”), and consideration of hazard grouping in the NYS HMP.

The “Flood” hazard includes riverine, flash, ice jam, and dam break flooding. 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. 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.

Please note that technological (for example, hazardous material incidents) and man-made hazards (for example, terrorism) are not being addressed in this planning process. The DMA 2000 regulations do not require consideration of such hazards, and the Steering Committee has elected to focus full attention on

the natural hazards, particularly flooding, that clearly pose the greatest risk to the County. Further, the risks of man-made and technological hazards are generally mitigated and/or managed through other regulatory programs and plans.

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Table 5.2-1. Identification of Natural Hazards of Concern for Delaware County, New York

Hazard	Step 1	Step 2	Step 3	
	Is this a hazard that may occur in Delaware County?	If yes, does this hazard pose a significant threat to Delaware 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 for New York State. The topography and climate of Delaware County does not readily support the occurrence of an avalanche event. 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 1950 and 2006. 	<ul style="list-style-type: none"> NYSDPC Review of NAC-AAA database between 1950 and 2006
Coastal Erosion / Coastal Storm	No	No	<ul style="list-style-type: none"> Delaware County is not bounded by coastal waters; therefore, not directly impacted by coastal storms that result in coastal erosion. 	<ul style="list-style-type: none"> NYSDPC
Drought	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP identifies drought as a hazard of concern for New York State. Delaware County is located within the Eastern Plateau Climate Division. Between 1895 and 2002, 27 severe or extreme drought events occurred in this climate division. These events include: <ul style="list-style-type: none"> September – November 1895 November – December 1899 August 1900 – February 1901 November 1908 – January 1909 August 1909 – January 1910 July 1910 – September 1911 August – September 1913 October – December 1914 April – June 1915 November – December 1916 September 1921 – February 1922 November – December 1922 May 1923 – January 1924 August 1930 – June 1931 November – December 1931 May 1923 – January 1924 August 1930 – June 1931 November – December 1931 August 1939 – February 1940 May – June 1941 	<ul style="list-style-type: none"> NYSDPC NOAA-NCDC Drought Impact Reporter SHELDUS

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	Is this a hazard that may occur in Delaware County?	If yes, does this hazard pose a significant threat to Delaware County?	Why was this determination made?	Source(s)
			<ul style="list-style-type: none"> o September 1941 – April 1942 o August 1964 – February 1966 o July – August 1966 o October – November 1966 o January – February 1967 o August – September 1995 o November 2001 – January 2002 • Various sources indicated that many drought events or periods impacted large regions of the State, including Delaware County. Such events include: <ul style="list-style-type: none"> o June – September 1993 o May 2005 – March 2006 – County was in moderate to severe drought conditions o September 2005 – Wells going dry; water restrictions mandatory o May 2006 – Dry conditions caused a series of brush fires throughout the County o October – November 2007 – Canal system closed to traffic, recreational use and commercial use 	
Earthquake	Yes	Yes	<ul style="list-style-type: none"> • The NYS HMP identifies earthquake as a hazard of concern for New York State. Areas within the State with a higher seismic risk include; The North and Northeast third (1/3) of the State (The North Country/Adirondack Region including a portion of the Greater Albany-Saratoga region), the Southeast corner (including the greater New York City area and western Long Island), and the Northwest corner (including the City of Buffalo and vicinity) of the State, in that order from higher to lower. • According to the USGS online seismic hazard maps, the peak ground acceleration with a 10% probability of exceedance over 50 years for Delaware County is between 2 and 4% g. FEMA guidance recommends earthquakes are evaluated further if an area has a 3% g peak acceleration or more. 	<ul style="list-style-type: none"> • NYSDPC • USGS
Expansive Soils	No	No	<ul style="list-style-type: none"> • The NYS HMP identifies expansive soils as a hazard of concern for New York State. • USGS indicated that Delaware County’s soils consist of clay having slight to moderate swelling potential • Due to the fact that this hazard has no known historical occurrences, the County decided not to analyze the expansive soils hazard for the purpose of 	<ul style="list-style-type: none"> • NYSDPC • USGS



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	Is this a hazard that may occur in Delaware County?	If yes, does this hazard pose a significant threat to Delaware County?	Why was this determination made?	Source(s)
			this Plan.	
Extreme Temperature	No	No	<ul style="list-style-type: none"> • Extreme temperature was not identified as a hazard in the NYS Plan. • NOAA’s NCDC storm events database indicates that Delaware County was impacted by approximately 20 extreme events between 1950 and 2011. However, most events are of a regional extent rather than localized to just one county or community. 	<ul style="list-style-type: none"> • NYSDPC • NOAA-NCDC • National Atlas
Flood (Riverine, Flash, Ice Jam Dam Flooding)	Yes	Yes	<ul style="list-style-type: none"> • The NYS HMP identifies flooding as the main hazard of concern for New York State. • Delaware County has been issued 13 FEMA Disaster Declarations for flood-related events, each event resulting in extensive damages. <ul style="list-style-type: none"> ○ FEMA-DR-290 – 1970 – Severe storm and flooding ○ FEMA-DR-401 – 1973 – Severe storm and flooding ○ FEMA-DR-792 – 1987 – Flooding ○ FEMA-DR-1095 – 1996 – Severe storm and flooding ○ FEMA-DR-1148 – 1996 – Severe storm and flooding ○ FEMA-DR-1233 – 1998 – Severe storm and flooding ○ FEMA-DR-1486 – 2003 – Severe storm, tornadoes and flooding ○ FEMA-DR-1534 – 2004 – Severe storm and flooding ○ FEMA-DR-1565 – 2004 – Flood (remnants of Hurricane Ivan) ○ FEMA-DR-1589 – 2005 – Severe storm and flooding ○ FEMA-DR-1650 – 2006 – Severe storm and flooding ○ FEMA-DR-1670 – 2006 – Severe storm and flooding ○ FEMA-DR-1993 – 2011 – Severe storm, flooding, straight-line wind • NOAA’s NCDC storm events database indicates that Delaware County was impacted by approximately 92 flood events between 1950 and 2011. This includes flash flooding. • The 2011 NYS HMP indicated that Delaware County has been ranked as the 13th most flood vulnerable county in New York State based on potential flood exposure and vulnerability to loss. • Ice Jams are mentioned separately in this Table but are grouped with the Flood hazard in this plan (see below). 	<ul style="list-style-type: none"> • NYSDPC • NYSOEM • FEMA • SHELDUS • NOAA-NCDC • NFIP
Hailstorm	Yes	Yes	Please see Severe Storm	
Hurricane (and other)	Yes	Yes	Please see Severe Storm	



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Tropical Cyclones)				
Ice Jams (categorized as a Flood hazard in this HMP)	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP identifies ice jam flooding as a hazard of concern for New York State (grouped as a type of flood). New York State ranks 2nd in the Nation for total number of ice jam events, with over 1,500 incidents documented between 1857 and 2010. The USACE CRREL Ice Jam Database, NYS HMP and various other sources, indicates that 36 reported ice jam events have occurred within Delaware County between 1857 and 2011. 	<ul style="list-style-type: none"> NYSDPC Review of USACE CRREL Ice Jam Database
Ice Storm	Yes	Yes	Please see Severe Winter Storm	
Infestation	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP does not identify infestation as a hazard of concern for New York State. The following have infected Delaware County over the last several years: <ul style="list-style-type: none"> Lyme disease Forest Tent Caterpillar Gypsy Moth West Nile Virus Hemlock Woolly Adelgid The County identified infestation as a hazard of concern due to the following: <ul style="list-style-type: none"> Infestation has led to industry sector (farming, agriculture, timber) and economic losses in the County Infestation has resulted in large-scale tree die-offs, increasing fuel loading and wildfire risk Infestation complicates vegetation management (mitigation) programs, and debris management post-disaster 	<ul style="list-style-type: none"> NYSDPC USGS NYSDEC
Land Subsidence	Yes	No	<ul style="list-style-type: none"> The NYS HMP identifies land subsidence as a hazard of concern for New York State. The NYS HMP indicates that New York State is vulnerable to land subsidence; however, this hazard is “extremely localized” and poses a “very low risk to population and property.” The NYS HMP does not identify Delaware County as a County that has experienced land subsidence in the past. According to USGS, Delaware County is not made up of unconsolidated aquifer systems, hence it is unlikely that there will be permanent subsidence 	<ul style="list-style-type: none"> NYSDPC USGS



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			<p>and related ground failures.</p> <ul style="list-style-type: none"> • Due to the fact that this hazard has a low occurrence of incidents and that the County could not quantify significant losses to the County and/or municipalities from historic events, the land subsidence hazard will not be analyzed for the purposes of this Plan. 	
Landslide	Yes	Yes	<ul style="list-style-type: none"> • The NYS HMP identifies landslide as a hazard of concern for New York State, with Delaware County located in a low landslide incidence area. The NYS HMP indicates that Delaware County has had six landslide occurrences from 1837 to 2007. The NYS HMP listed Delaware County as the 24th County in the State most threatened by and vulnerable to landslides and landslide losses. • According to National Atlas, a majority of Delaware County has a low landslide incidence. However, the eastern border of the County has a high susceptibility/moderate incidence and the southwestern portion has a moderate susceptibility to landslide/low incidence. 	<ul style="list-style-type: none"> • NYSDPC • USGS • National Atlas
Nor'Easters	Yes	Yes	Please see Severe Winter Storm	
Severe Storm (Windstorms, Thunderstorms, Hail, Lightning, Tornadoes and Hurricanes)	Yes	Yes	<ul style="list-style-type: none"> • The NYS HMP identifies all types of severe storms as hazards of concern for New York State. Delaware County has experienced three tornado events. NYS HMP listed Delaware County as the 38th County in the State most threatened by and vulnerable to extreme wind and wind losses. • The NYS HMP, NYSEMO, FEMA indicate that Delaware County has been issued 18 FEMA Disaster Declarations for severe storm events (some also identified as flooding events). <ul style="list-style-type: none"> ○ FEMA-DR-290 – 1970 – Severe storm and flooding ○ FEMA-DR-401 – 1973 – Severe storm and flooding ○ FEMA-DR-1095 – 1996 – Severe storm and flooding ○ FEMA-DR-1148 – 1996 – Severe storm and flooding ○ FEMA-DR-1233 – 1998 – Severe storm and flooding ○ FEMA-DR-1486 – 2003 – Severe storm, tornadoes and flooding ○ FEMA-DR-1534 – 2004 – Severe storm and flooding ○ FEMA-DR-1565 – 2004 – Severe Storm (remnants of Hurricane Ivan) ○ FEMA-DR-1589 – 2005 – Severe storm and flooding ○ FEMA-DR-1650 – 2006 – Severe storm and flooding ○ FEMA-DR-1670 – 2006 – Severe storm and flooding 	<ul style="list-style-type: none"> • NYSDPC • FEMA • National Atlas • SHELDUS • NOAA-NCDC



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			<ul style="list-style-type: none"> o FEMA-DR-1993 – 2011 – Severe storm, flooding, straight-line wind o FEMA-DR-4020 (EM-3328) – 2011 – Hurricane Irene o FEMA-DR-4031 (EM-3341) – 2011 – Remnants of Tropical Storm Lee • NOAA’s NCDC storm events database indicates that Delaware County was impacted by approximately 299 severe storm events between 1950 and 2011. 	
Severe Winter Storm (Heavy Snow, Blizzards, Freezing Rain/Sleet, Ice Storms, and Nor’Easters)	Yes	Yes	<ul style="list-style-type: none"> • The NYS HMP identifies all types of severe winter storms as hazards of concern for New York State. The NYS HMP listed Delaware County as the 44th County in the State most threatened by and vulnerable to snow and snow loss, with an annual average snowfall 72.2 inches. Delaware County is also listed as the 50th County in New York State most threatened by and vulnerable to ice storms and ice storm loss. • The NYS HMP, NYSOEM, FEMA indicate that Delaware County has been issued five FEMA Disaster Declarations for winter storm events (some also identified as flooding events). <ul style="list-style-type: none"> o FEMA-DR-1083 – 1996 - Blizzard o FEMA-EM-3173 – 2003 - Snowstorm o FEMA-EM-3184 – 2003 – Snowstorm o FEMA-DR-1827 (EM-3299) – 2008 – Severe Winter Storm • NOAA’s NCDC storm events database indicates that Delaware County was impacted by approximately 98 winter storm events between 1950 and 2011. However, most events are of a regional extent rather than localized to just one county or community. 	<ul style="list-style-type: none"> • NYSDPC • NYSOEM • FEMA • NOAA-NCDC • SHELDUS
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 	<ul style="list-style-type: none"> • NYSDPC
Volcano	No	No	<ul style="list-style-type: none"> • Volcanoes are not identified as a hazard of concern in the NYS HMP, because there are no known volcanoes located in the state. 	<ul style="list-style-type: none"> • NYSDPC
Wildfire	Yes	Yes	<ul style="list-style-type: none"> • The NYS HMP identifies wildfires as hazards of concern for New York State. • GeoMac indicates that portions of Delaware County are located within the Wildland-Urban Interface. • USGS indicates that no wildfires greater than 250 acres were experienced in Delaware County between 1980 and 2003. • GeoMAC indicates that no wildfires were experienced in Delaware County 	<ul style="list-style-type: none"> • NYSDPC • USGS • GeoMAC



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			between 2001 and 2011. <ul style="list-style-type: none"> Delaware County is located in the Catskills and the NYSDEC identified this area as a fire-prone area. The County is located in the NYS Forest Ranger Division of Wildfire Protection Area. A large of portion of Delaware County is part of NYCDEP watershed lands, where it is believed that fuel loading has been increasing without adequate management plans in place. Climate change data also suggests that wildfire risk will increase over time in the region. 	
Windstorm	Yes	Yes	Please see Severe Storm	

- CRREL Cold Regions Research and Engineering Laboratory
- DPC Disaster Preparedness Commission
- DR Presidential Disaster Declaration Number
- EM Presidential Emergency Declaration
- FEMA Federal Emergency Management Agency
- HMP Hazard Mitigation Plan
- NCDC National Climatic Data Center
- NOAA National Oceanic and Atmospheric Administration
- NYCDEP New York City Department of Environmental Protection
- NYS New York State
- NYSDPC New York State Disaster Preparedness Commission
- NYSOEM New York State Office of Emergency Management
- SHELDUS Spatial Hazard Events and Losses Database for the United States
- USACE U.S. Army Corp of Engineers
- USGS U.S. Geologic Survey



According to input from Delaware County, and review of all available resources, a total of eight natural hazards of concern were identified as significant hazards affecting the County, to be addressed within this plan:

- Drought
- Earthquake
- Flooding (riverine, flash, ice jam, and dam)
- Infestation
- Landslide
- Severe Storm (windstorms, thunderstorms, hail, tornadoes and hurricanes/tropical storms)
- Severe Winter Storm (heavy snow, blizzards, ice storms, Nor'Easters)
- Wildfire

Other natural hazards of concern have occurred within the County, but typically have a low potential to result in significant impacts. The County deemed other natural hazards as minor in comparison to those bulleted above; therefore, additional natural hazards will not be further addressed within this version of the Plan. However, if deemed necessary by the County, these hazards may be considered in future versions of the Plan.