

## 5.2 Identification of Hazards of Concern

To provide a strong foundation for mitigation strategies considered in Section 6, Westchester 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 New York State Hazard Mitigation Plan (NYSHMP) 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** are 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 NYSHMP.

The “Flood” hazard includes riverine (inland) flooding, dam failure flooding, coastal, and stormwater. 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. Tropical and extra-tropical cyclones, sometimes grouped together under a coastal storms hazard (FEMA 386-2), are being grouped in this hazard category.

The “Severe Winter Storm” hazard includes heavy snowfall, blizzards, freezing rain/sleet, Nor’Easters and ice storms.

Please note that technological [e.g. hazardous material incidents] and man-made hazards (e.g. terrorism) are being addressed in this planning process. However, the DMA 2000 regulations do not require consideration of such hazards. The County and Planning Committee chose to include these hazards in the 2014 Plan Update.

Table 5.2-1– Identification of Natural Hazards of Concern for Westchester County

Hazard	Is this a hazard that may occur in Westchester County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
Avalanche	No	No	<ul style="list-style-type: none"> <li>The NYSHMP does identify avalanche as a hazard of concern for New York State, with occurrences in the back country of the Adirondack Mountains. There have been no occurrences in Westchester County.</li> <li>The topography and climate of Westchester County does not support the occurrence of an avalanche event.</li> <li>New York State in general has a very low occurrence of avalanche events based on statistics provided by the American Avalanche Association (AAA) between 1950 and 2014.</li> <li>The Planning Committee did not identify Avalanche has a hazard of concern for Westchester County.</li> </ul>	<ul style="list-style-type: none"> <li>NYSHMP</li> <li>Review of NAC-AAA database between 1998 and 2014.</li> <li>Planning Committee Input</li> </ul>
Coastal Erosion	Yes	No	<ul style="list-style-type: none"> <li>The NYSHMP identifies coastal erosion has 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.</li> <li>Westchester County is bordered to the east by the Long Island Sound which is vulnerable to erosion.</li> <li>The NYSHMP indicated that the County was impacted by one to three coastal erosion events.</li> <li>The Planning Committee did not identify Coastal Erosion has a hazard of concern for Westchester County.</li> </ul>	<ul style="list-style-type: none"> <li>NYSHMP</li> <li>Planning Committee Input</li> </ul>
Drought	Yes	No	<ul style="list-style-type: none"> <li>The NYSHMP identifies drought as a hazard of concern for New York State.</li> <li>Between 1990 and 2014, the County has experienced 20 drought events.</li> <li>Westchester County is located in the Hudson Valley Climate Division. According to the NRCC, this climate division has been impacted by the following periods of severe and extreme drought:                             <ul style="list-style-type: none"> <li>November – December 1908</li> <li>May – July 1911</li> <li>October 1930 – April 1931</li> <li>December 1939 – January 1940</li> <li>November 1941 – February 1942</li> <li>November – December 1949</li> <li>September – November 1957</li> <li>June 1964 – August 1966</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>NYSHMP</li> <li>NRCC</li> <li>NOAA-NCDC Storm Database</li> <li>Planning Committee Input</li> </ul>

Hazard	Is this a hazard that may occur in Westchester County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
			<ul style="list-style-type: none"> <li>○ April – May 1985</li> <li>○ August – September 1995</li> <li>○ July – August 1999</li> <li>○ November 2001 – April 2002</li> <li>● While the Planning Committee recognizes that drought is a general concern for Westchester County, the County and planning partners have been actively working to address the concern (see Section 9.1) and have not included this as a mitigation HOC for this plan update.</li> </ul>	
Earthquake	Yes	Yes	<ul style="list-style-type: none"> <li>● The NYSHMP identifies earthquake as a hazard of concern for New York State.</li> <li>● Westchester County has a PGA between 3 and 5% based on peak ground acceleration (%g) with 10% probability of exceedance in 50 years.</li> <li>● Westchester County is primarily comprised of NEHRP soil classes B through D. The majority of the County is soil class B.</li> <li>● Between 1973 and 2012, Westchester County has had 13 earthquakes events (according to the NYSHMP).</li> <li>● Numerous fault lines are located in or near Westchester County, including the Ramapo Fault. Indian Point Nuclear Power Plant is located within the vicinity of this fault line.</li> <li>● The Planning Committee identified earthquake has a hazard of concern for Westchester County.</li> </ul>	<ul style="list-style-type: none"> <li>● NYSHMP</li> <li>● USGS</li> <li>● Planning Committee Input</li> </ul>
Expansive Soils	No	No	<ul style="list-style-type: none"> <li>● The NYSHMP identifies expansive soils as a hazard of concern for New York State; however, the Planning Committee did not identify this as a hazard of concern for Westchester County.</li> <li>● USGS indicated that less than 50% of Westchester County is underlain by soils with abundant clays of slight to moderate swelling potential or areas of the County are underlain by soils with little to no clays with swelling potential.</li> </ul>	<ul style="list-style-type: none"> <li>● NYSHMP</li> <li>● USGS 1989 Swelling Clays Map of the Conterminous U.S.</li> <li>● Planning Committee Input</li> </ul>
Extreme Temperature	Yes	Yes	<ul style="list-style-type: none"> <li>● They NYSHMP identifies extreme temperature as a hazard of concern for New York State.</li> <li>● The coldest temperatures recorded in Westchester County included:                             <ul style="list-style-type: none"> <li>○ Westchester County Airport --10°F in 1961 and 1979</li> <li>○ Dobbs Ferry-Ardsley --10°F in 1994</li> <li>○ Yorktown Heights – -15°F in 1994</li> </ul> </li> <li>● The highest temperatures recorded in Westchester County included:                             <ul style="list-style-type: none"> <li>○ Westchester County Airport –102°F in 1966 and 2010</li> <li>○ Dobbs Ferry-Ardsley –104°F in 1980</li> <li>○ Yorktown Heights –100°F in 1995 and 2010</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● NYSHMP</li> <li>● NOAA – NCDC Storm Event Database</li> <li>● Utah Climate Center</li> <li>● Input from Planning Committee</li> </ul>

Hazard	Is this a hazard that may occur in Westchester County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
			<ul style="list-style-type: none"> <li>The NOAA-NCDC storm event database indicated that between 1990 and 2014, Westchester County had 21 extreme temperature events reported. Those events resulted in two fatalities.</li> </ul>	
Flood (Riverine, Coastal, Stormwater and Dam Flooding)	Yes	Yes	<ul style="list-style-type: none"> <li>The NYSHMP identifies flooding as a hazard of concern for New York State.</li> <li>There are numerous floodprone areas throughout the County, especially along the major waterways in the County.</li> <li>Approximately 3.3% of the County’s population lives within the 1% Annual Chance Floodplain and 4.4% live within the 0.2% Annual Chance Floodplain. Over 25,000 acres (8.76%) of the County’s total land area is located in the A-Zone and over 583 acres (0.2%) is located in the V-Zone. Over 30,000 acres (10.42%) is located in the 0.2% flood hazard area.</li> <li>Westchester County is bordered to the west by the Hudson River and prone to flooding events from the River.</li> <li>The County has 7,238 NFIP policies with total loss payments equaling over \$142 million. There 557 repetitive loss policies and 214 severe repetitive loss policies.</li> <li>Between 1954 and 2014, Westchester County was included in 10 FEMA declarations related to flooding:               <ul style="list-style-type: none"> <li>FEMA-DR-311 – September 13, 1971 – Severe Storms &amp; Flooding</li> <li>FEMA-DR-487 – October 2, 1975 – Storms, Rains, Landslides &amp; Flooding</li> <li>FEMA-DR-702 – March 28-April 8, 1984 – Coastal Storms and Flooding</li> <li>FEMA-DR-974 – December 10-14, 1992 – Coastal Storm, High Tides, Heavy Rain &amp; Flooding</li> <li>FEMA-DR-1146 – October 19-20, 1996 – Severe Storms, Flooding, Heavy Rain, High Winds</li> <li>FEMA-DR-1534 – May 13 – June 17, 2004 - Severe Storms and Flooding</li> <li>FEMA-DR-1589 – April 2-4, 2005 – Severe Storms and Flooding</li> <li>FEMA-DR-1650 – June 26-July 10, 2006 – Severe Storms and Flooding</li> <li>FEMA-DR-1692 – April 14-18, 2007 – Severe Storms and Inland and Coastal Flooding</li> <li>FEMA-DR-1899 – March 13-31, 2010 – Severe Storms and Flooding</li> </ul> </li> <li>According to NOAA NCDC storm events database, Westchester County had 145 flood events reported between 1990 and 2014. These events resulted in three deaths, two injuries, and over \$6 million property damage.</li> <li>The Planning Committee identified flooding as a hazard of concern for Westchester County.</li> </ul>	<ul style="list-style-type: none"> <li>NYSHMP</li> <li>FEMA</li> <li>NFIP</li> <li>NOAA-NCDC Storm Events Database</li> <li>Input from Planning Committee</li> </ul>
Hailstorm	Yes	Yes	Please see Severe Storm	
Hurricane	Yes	Yes	Please see Severe Storm	

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Hazard	Is this a hazard that may occur in Westchester County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
(and other Tropical Cyclones)				
Ice Storm	Yes	Yes	Please see Severe Winter Storm	
Land Subsidence	Yes	No	<ul style="list-style-type: none"> <li>The NYSHMP identifies land subsidence as a hazard of concern for New York State; however, the Planning Committee did not identify this as a hazard of concern for Westchester County.</li> <li>A majority of Westchester County is not underlain by carbonate rock; however, there is a small band running northeast to southwest in the County.</li> </ul>	<ul style="list-style-type: none"> <li>NYSHMP</li> <li>Input from Planning Committee</li> </ul>
Landslide	Yes	No	<ul style="list-style-type: none"> <li>The NYSHMP identifies landslide as a hazard of concern for New York State.</li> <li>According to the NYSHMP, over 36,000 people in Westchester County live within a high incidence of landslides; while the remainder of the County is considered to have a low incidence of landslides.</li> <li>Between 1960 and 2012, the County has experienced only one landslide event that caused \$833 in property damage.</li> <li>According to FEMA, between 1954 and 2014, Westchester County was included in one declaration associated with landslide events: <ul style="list-style-type: none"> <li>FEMA-DR-487 – October 2, 1975 – Severe Storms, Heavy Rain, Landslides, Flooding</li> </ul> </li> <li>The Planning Committee did not identify landslide as a hazard of concern for Westchester County.</li> </ul>	<ul style="list-style-type: none"> <li>NYSHMP</li> <li>Input from Planning Committee</li> </ul>
Nor'Easters	Yes	Yes	Please see Severe Winter Storm	
Severe Storm (Windstorms, Thunderstorms, Hail, Hurricanes /Tropical Storms, Lightning, and Tornados)	Yes	Yes	<ul style="list-style-type: none"> <li>The NYSHMP identifies hail, high winds, tornadoes, and hurricane as hazards of concern for New York State.</li> <li>According to FEMA, between 1954 and 2014, Westchester County was included in 13 declarations associated with severe storm events. <ul style="list-style-type: none"> <li>FEMA-DR-311 – September 13, 1971 – Severe Storms and Flooding</li> <li>FEMA-DR-338 – June 23, 1972 – Tropical Storm Agnes</li> <li>FEMA-DR-487 – October 2, 1975 – Storms, Rains, Landslides &amp; Flooding</li> <li>FEMA-DR-974 – December 10-14, 1992 – Coastal Storm, High Tides, Heavy Rain &amp; Flooding</li> <li>FEMA-DR-1146 – October 19-20, 1996 – Severe Storms, Flooding, Heavy Rains, High Winds</li> <li>FEMA-DR-1296 – September 16-19, 1999 – Hurricane Floyd</li> <li>FEMA-DR-1534 – May 13-June 17, 2004 – Severe Storms and Flooding</li> <li>FEMA-DR-1589 – April 2-4, 2005 – Severe Storms and Flooding</li> <li>FEMA-DR-1650 – June 26-July 10, 2006 – Severe Storms and Flooding</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>NYSHMP</li> <li>FEMA</li> <li>NOAA-NCDC Storm Events Database</li> <li>FEMA</li> <li>SPC</li> <li>Input from Planning Committee</li> </ul>

Hazard	Is this a hazard that may occur in Westchester County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
			<ul style="list-style-type: none"> <li>○ FEMA-DR-1692 – April 14-18, 2007 – Severe Storms and Inland and Coastal Flooding</li> <li>○ FEMA-DR-1899 – March 13-31, 2010 – Severe Storms and Flooding</li> <li>○ FEMA-DR-4020 – August 26-September 5, 2011 – Hurricane Irene</li> <li>○ FEMA-DR-4085 – October 27-November 8, 2012 – Hurricane Sandy</li> <li>● NOAA-NCDC storm events database indicates that Westchester County was impacted by approximately 326 severe storm events between 1990 and 2014 causing a total of 24 injuries, 13 fatalities, approximately \$14.3 million in property damages, and \$250 in crop damages.</li> <li>● Between 1950 and 2013, Westchester County has been impacted by eight tornadoes.</li> <li>● The Planning Committee identified severe storms as a hazard of concern for Westchester County.</li> </ul>	
Severe Winter Storm (Heavy Snow, Blizzards, Nor'Easters, Freezing Rain/Sleet, Ice Storms)	Yes	Yes	<ul style="list-style-type: none"> <li>● The NYSHMP identifies severe winter storm as a hazard of concern for New York State.</li> <li>● Annual average snowfall in Westchester County is less than 60 inches.</li> <li>● According to FEMA, between 1954 and 2014, Westchester County was included in five declarations associated with severe winter storm events. <ul style="list-style-type: none"> <li>○ FEMA-DR-702 – March 28-April 8, 1984 – Coastal Storms and Flooding</li> <li>○ FEMA-DR-974 – December 10-14, 1992 – Coastal Storm, High Tides, Heavy Rain and Flooding</li> <li>○ FEMA-EM-3107 – January 6-12, 1996 – Severe Snowstorm (Blizzard of '96)</li> <li>○ FEMA-EM-3184 – February 17-18, 2003 – Snow</li> </ul> </li> <li>● NOAA-NCDC has indicated that Westchester County has experienced the impacts of 45 winter storm events between 1990 and 2014.</li> <li>● The Planning Committee identified severe winter storm as a hazard of concern for Westchester County.</li> </ul>	<ul style="list-style-type: none"> <li>● NYSHMP</li> <li>● FEMA</li> <li>● NOAA – NCDC Storm Event Database</li> <li>● Input from Planning Committee</li> </ul>
Tornado	Yes	Yes	Please see Severe Storm	
Tsunami	No	No	<ul style="list-style-type: none"> <li>● The NYSHMP does identify tsunami as a hazard of concern for the State of New York. All low-lying coastal areas in the State have the potential to be struck by a tsunami.</li> <li>● There is no recent history of tsunamis impacting the State.</li> <li>● The Long Island Sound makes up the eastern border of Westchester County. Even though there are coastal areas in the County, there is no history of tsunami occurrences. Therefore, the Planning Committee does not identify tsunami as a hazard of concern for Westchester County.</li> </ul>	<ul style="list-style-type: none"> <li>● NYSHMP</li> <li>● Input from Planning Committee</li> </ul>

Hazard	Is this a hazard that may occur in Westchester County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
Volcano	No	No	<ul style="list-style-type: none"> <li>The NYSHMP does not identify volcano as a hazard of concern for New York State.</li> <li>The Planning Committee did not identify volcanoes as a hazard of concern for Westchester County.</li> </ul>	<ul style="list-style-type: none"> <li>NYSHMP</li> <li>Input from Planning Committee</li> </ul>
Wildfire	Yes	Yes	<ul style="list-style-type: none"> <li>The NYSHMP identifies wildfire as a hazard of concern for the State of New York.</li> <li>In Westchester County, approximately 240 square miles (53.3%) of the County is located in the WUI. A majority of the WUI is located in the northern half of the County.</li> <li>Approximately 21.9% of the County’s population is exposed to the WUI.</li> <li>Numerous brush fires have impacted the County; however, the County has never been included in a FEMA declaration due to a wildfire event.</li> <li>The Planning Committee identified wildfire as a hazard of concern for Westchester County.</li> </ul>	<ul style="list-style-type: none"> <li>NYSHMP</li> <li>NOAA-NCDC Storm Events Database</li> <li>FEMA</li> <li>Input from Planning Committee</li> </ul>
Windstorm	Yes	Yes	Please see Severe Storm	

- DR Presidential Disaster Declaration Number
- EM Presidential Disaster Emergency Number
- FEMA Federal Emergency Management Agency
- HMP Hazard Mitigation Plan
- K Thousands (\$)
- M Millions (\$)
- NCDC National Oceanic and Atmospheric Administration National Climatic Data Center
- NOAA National Oceanic and Atmospheric Administration
- NRCC Northeast Regional Climate Center
- NWS National Weather Service
- NYSHMP New York State Hazard Mitigation Plan
- SPC Storm Prediction Center
- USGS U.S. Geologic Survey
- WUI Wildland-Urban Interface



Table 5.2-2. Identification of Non-Natural Hazards of Concern for Westchester County

Hazard	Is this a hazard that may occur in Westchester County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
Chemical, Biological, Radiological, or Nuclear (CBRN) Incidents	Yes	Yes	<ul style="list-style-type: none"> <li>The NYSHMP does not identify CBRN incidents as a hazard of concern for New York State. However, the Steering and Planning Committees felt it was important to include as a hazard of concern for Westchester County.</li> <li>Any area of Westchester County can experience a CBRN incident; however, the most vulnerable areas are the major roadways, facilities that contain hazardous materials, and facilities that have or transport radioactive materials.</li> <li>While there have been no major CBRN incidents in the County, there is the potential. Therefore, the Planning and Steering Committees identified CBRN as a hazard of concern for Westchester County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Westchester County</li> <li>Steering and Planning Committee Input</li> </ul>
Critical Infrastructure Failure	Yes	Yes	<ul style="list-style-type: none"> <li>The NYSHMP does not identify critical infrastructure failure as a hazard of concern for New York State. However, based on recent events that led to power outages and fuel shortages, the Planning and Steering Committees felt it was important to include as a hazard of concern for Westchester County.</li> <li>Power outages and fuel shortages can occur anywhere in the County and can impact those that live, work or visit the County.</li> <li>There are have been numerous events that led to critical infrastructure failure. See Table 5.2-1 for details regarding those events.</li> <li>Based on previous events, critical infrastructure failure will continue to impact Westchester County. Therefore, the Planning and Steering Committees identified this as a hazard of concern for the County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Westchester County</li> <li>Steering and Planning Committee Input</li> </ul>
Cyber Attack	Yes	Yes	<ul style="list-style-type: none"> <li>The NYSHMP does not identify cyber attack as a hazard of concern for New York State. However, the Steering and Planning Committees felt this hazard could have adverse impacts on the County and should be identified as a hazard of concern for Westchester County.</li> <li>Although there are have been no major direct attacks impacted Westchester County, the Steering and Planning Committees identified cyber attack as a hazard of concern for the County due to its vulnerability and impact on the County and the previous occurrences.</li> <li>Westchester County is a vulnerable target to cyber attacks due to its location, critical information infrastructures, and home to several Fortune 500 companies. Any disruption to these businesses could have an impact on the County's economy.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Westchester County</li> <li>Steering and Planning Committee Input</li> </ul>
Disease Outbreak	Yes	Yes	<ul style="list-style-type: none"> <li>The NYSHMP does not identify disease outbreak as a hazard of concern for New York State; however, there have been numerous incidents in the State and in Westchester County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Westchester County</li> <li>USGS</li> <li>NYS DOH</li> </ul>



Hazard	Is this a hazard that may occur in Westchester County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
			<ul style="list-style-type: none"> <li>• Infestations of ticks, mosquitoes, and/or other types of pest may be present in the county. Therefore, the Steering and Planning Committees identified disease outbreak as a hazard of concern.</li> <li>• In addition to tick- and mosquito-borne illnesses, the county has been impacted by influenza and has participated in Ebola awareness/preparedness programs due to recent incidents.</li> </ul>	<ul style="list-style-type: none"> <li>• Steering and Planning Committee Input</li> </ul>

According to input from the County, and review of all available resources, a total of six natural hazards of concern were identified as significant hazards affecting the entire planning area, to be addressed at the county level in this plan:

- Earthquake
- Extreme Temperatures
- Flooding (coastal, dam failure, stormwater, riverine/flash)
- Severe Storm (High Winds, Tornadoes, Thunderstorms, Hail, Hurricane/Tropical Storm)
- Severe Winter Storm (Heavy Snow, Blizzards, Ice Storms, Nor'Easter)
- Wildfire

Additionally, a total of three non-natural hazards of concern were identified as significant hazards affecting the entire planning area, to be addressed at the county level in this plan:

- Chemical, Biological, Radiological, or Nuclear (CBRN) Incidents
- Cyber Attack Incidents
- Critical Infrastructure Failure
- Disease Outbreak

Other natural and human-caused hazards of concern have occurred within Westchester County, but have a low potential to occur and/or result in significant impacts within the County. Therefore, these 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.