



## 5.2 IDENTIFICATION OF HAZARDS OF CONCERN

To provide a strong foundation for mitigation actions considered in Sections 6 and 9, Putnam 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); review of the County HAZNY; 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 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 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.

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

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 occur during the winter, they will remain grouped within this hazard category which is consistent with that used in the NYS HMP.

Please note that technological (e.g. hazardous material incidents) and man-made hazards (e.g. terrorism) are not being addressed in this planning process. The DMA 2000 regulations do not require consideration of such hazards; these were not chosen for inclusion in this plan by the County and planning participants.



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Hazard	Is this a hazard that may occur in Putnam 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 topography and climate of Putnam 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 National Avalanche Center – American Avalanche Association (NAC-AAA) between 1998 and 2013.</li> <li>Avalanche was identified as a hazard in the NYS HMP; however, there have been no occurrences in Putnam County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Planning Committee</li> <li>Review of NAC-AAA database between 1998 and 2013.</li> </ul>
Coastal Erosion	No	No	<ul style="list-style-type: none"> <li>The NYS HMP identifies coastal erosion as a hazard of concern for the State. Counties bounded by coastal waters are most affected by coastal erosion.</li> <li>Putnam County is not bounded by coastal waters; however, the Hudson River is tidally influenced and has impacted several municipalities. Based on input from the Planning Committee, coastal erosion was not identified as a hazard of concern for the County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Planning Committee</li> </ul>
Drought	Yes	No	<ul style="list-style-type: none"> <li>The NYS HMP identifies drought as a hazard of concern for the State. Putnam County has been impacted by several drought events that have occurred in New York State.</li> <li>According to the NOAA-NCDC Storm Events Database, between 1950 and 2014, Putnam County has experienced 10 drought events.</li> <li>New York State has been included in one FEMA drought-related disaster declaration. Putnam County was included in this declaration:               <ul style="list-style-type: none"> <li>FEMA-DR-204 – Water Shortage – August 1965</li> </ul> </li> <li>Putnam County has been included in two drought-related USDA disaster declarations:               <ul style="list-style-type: none"> <li>S3427 – Drought/Excessive Heat – June 2012</li> <li>S3759 – Drought – August 2014</li> </ul> </li> <li>According to the NRCC, Putnam County is located within the Hudson Valley Climate Division, which has been impacted by periods of severe and extreme drought and include the following events:               <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> <li>April – May 1985</li> <li>August – September 1995</li> <li>July – August 1999</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Planning Committee</li> <li>NOAA-NCDC</li> <li>NRCC</li> <li>Putnam County HAZNY</li> </ul>



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			<ul style="list-style-type: none"> <li>o November 2001 – April 2002</li> <li>• The Putnam County HAZNY ranked drought as a low hazard, with a score of 150. Based on the HAZNY ranking and input from the Planning Committee, drought was not identified as a hazard of concern for the County.</li> </ul>	
Earthquake	Yes	Yes	<ul style="list-style-type: none"> <li>• The NYS HMP identified earthquake as a hazard of concern for the State.</li> <li>• USGS indicates that the 2008 PGA for Putnam County is between 3 and 4%. According to FEMA, any jurisdiction that has a PGA of 3% or greater is required to fully profile the earthquake hazard.</li> <li>• According to the NYS HMP, between 1973 and 2012, there have been 189 earthquakes epicentered in the State. Of those 189 events, only four had an epicenter in Putnam County.</li> <li>• According to the NGDC, New York State has only had eight significant earthquakes between 1823 and 2014. None of these events were immediate vicinity of Putnam County.</li> <li>• Since 2008, no earthquakes have been epicentered in Putnam County; however, many earthquakes occurred in surrounding areas and residents of the County reported having felt those events.</li> <li>• The Putnam County HAZNY identified earthquake as a moderately low hazard, with a score of 220.</li> </ul>	<ul style="list-style-type: none"> <li>• NYS DHSES</li> <li>• Input from Planning Committee</li> <li>• NOAA – Review of NGDC Earthquake Database from 1800 to present</li> <li>• USGS – Earthquake Hazards Program, Review of USGS Seismic Maps</li> <li>• Putnam County HAZNY</li> </ul>
Expansive Soils	No	No	<ul style="list-style-type: none"> <li>• The NYS HMP identified expansive soils has a hazard of concern for New York State. However, a majority of Putnam County is underlain by soils with little to no swelling potential and contains areas with less than 50% of the area is underlain by soils with abundant clays of slight to moderate swelling potential.</li> <li>• The Planning Committee did not identify expansive soils as a hazard of concern for Putnam County.</li> </ul>	<ul style="list-style-type: none"> <li>• NYS DHSES</li> <li>• Input from Planning Committee</li> <li>• Review of USGS 1989 Swelling Clays Map of the Conterminous United States.</li> </ul>
Extreme Temperature	Yes	Yes	<ul style="list-style-type: none"> <li>• The NYS HMP identified extreme temperatures as a hazard of concern for New York State.</li> <li>• Between 1950 and 2014, Putnam County experienced the following extreme temperature events:               <ul style="list-style-type: none"> <li>o July 4-6, 1999 – extreme heat</li> <li>o January 17-18, 2000 – extreme cold/wind chill</li> <li>o January 21, 2000 – extreme cold/wind chill</li> <li>o August 8-10, 2001 – heat</li> <li>o July 29-31, 2002 – heat</li> <li>o January 15, 2004 – extreme cold/wind chill</li> <li>o August 1-3, 2006 – heat</li> <li>o July 22-23, 2011 – heat</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• NYS DHSES</li> <li>• Input from Planning Committee</li> <li>• NOAA-NCDC</li> <li>• Putnam County HAZNY</li> </ul>



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			<ul style="list-style-type: none"> <li>o July 18, 2012 – heat</li> <li>o September 11, 2013 – heat</li> <li>o January 4, 2014 – extreme cold</li> <li>• Putnam County has not been included in any FEMA disaster declarations for extreme temperature-related events; however, the County has been included in five USDA disaster declarations:               <ul style="list-style-type: none"> <li>o S3249 – Frosts and Freezes – March 2012</li> <li>o S3251 – Frosts, Freezes, High Winds and Hail – March – April 2012</li> <li>o S3427 – Drought/Excessive Heat – June 2012</li> <li>o S3696 – Freeze – December 2013-April 2014</li> <li>o S3759 – Drought – August 2014</li> </ul> </li> <li>• The Planning Committee identified extreme temperatures as a hazard of concern for the County.</li> <li>• The Putnam County HAZNY ranked extreme temperature as a moderately high hazard for the County, with a score of 278.</li> </ul>	
Flood (riverine, flash)	Yes	Yes	<ul style="list-style-type: none"> <li>• The NYS HMP identified flooding as a hazard of concern for New York State.</li> <li>• The County has been included in 11 flood-related FEMA disaster declarations:               <ul style="list-style-type: none"> <li>o FEMA-DR-311 (Severe Storms and Flooding) – September 11-14, 1971</li> <li>o FEMA-DR-487 (Severe Storms, Heavy Rain, Landslides, Flooding) – September 25-27, 1975</li> <li>o FEMA-DR-1095 (Severe Storms and Flooding) – January 19-20, 1996</li> <li>o FEMA-DR-1146 (Severe Storms, Flooding, Heavy Rain, High Winds) – October 19, 1996</li> <li>o FEMA-DR-1296 (Hurricane Floyd) – September 16-18, 1999</li> <li>o FEMA-1534 (Severe Storms and Flooding) – May 13-June 17, 2004</li> <li>o FEMA-DR-1564 (Flash Flood) – September 8, 2004</li> <li>o FEMA-DR-1589 (Severe Storms and Flooding) – April 2-4, 2005</li> <li>o FEMA-DR-1692 (Severe Storms and Inland/Coastal Flooding – April 14-18, 2007</li> <li>o FEMA-DR-4020 (Hurricane Irene) – August 28, 2011</li> <li>o FEMA-DR-4085 (Hurricane Sandy) – October 28, 2012</li> </ul> </li> <li>• According to the NFIP statistics, 224 flood-related claims have been made between 1978 and 2014 by Putnam County, with nearly \$5 million in flood related losses paid to the Towns and Villages of the County. The County has 14 repetitive loss properties and two severe repetitive loss properties.</li> <li>• The Planning Committee identified flooding as a hazard of concern for the County.</li> <li>• The Putnam County HAZY ranked flooding as moderately low hazard, with a score of 229.</li> </ul>	<ul style="list-style-type: none"> <li>• Input from Planning Committee</li> <li>• NYS HMP Update</li> <li>• FEMA</li> <li>• HAZNY</li> </ul>



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Hailstorm	Yes	Yes	Please see Severe Storm	
Hurricane (tropical cyclones, including tropical storms and tropical depressions)	Yes	Yes	Please see Severe Storm	
Ice Jams	Yes	No	<ul style="list-style-type: none"> <li>The NYS HMP includes ice jams in the flood hazard profile and identifies it as a hazard of concern for the State. However, the NYS HMP does not document any ice jam events in Putnam County.</li> <li>Historically, between 1780 and 2014, there have been three reported ice jams along the Horse Pound Brook in Lake Carmel and the Croton River in Carmel.</li> <li>The Planning Committee does not consider ice jams as a significant hazard affecting the County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Planning Committee</li> <li>USACE CRREL Ice Jam Database</li> </ul>
Ice Storm	Yes	Yes	Please see Severe Winter Storm	
Land Subsidence	Yes	No	<ul style="list-style-type: none"> <li>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.”</li> <li>NYS HMP does not identify Putnam County as a community that has experienced land subsidence in the past. In general, moderate to low land subsidence susceptibility exists for New York State, however, it was identified that this hazard has a very low risk to population or property.</li> <li>According to USGS, Putnam County is not made up of unconsolidated aquifer systems. Land subsidence incidences have been reported within Putnam County.</li> <li>The Planning Committee identified land subsidence as a hazard of concern for Putnam County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Planning Committee</li> <li>USGS Fact Sheet 165-00</li> </ul>
Landslide	Yes	No	<ul style="list-style-type: none"> <li>The NYS HMP includes landslide as a hazard of concern for New York State. According to the NYS HMP, 18,391 people in Putnam County live within a high incidence of landslide area. The remainder of the population lives within a low incidence area.</li> <li>Karst landscapes exist from carbonate rock in Putnam County. Having this increases the County’s risk of land subsidence and sinkholes.</li> <li>Between 1954 and 2014, New York State was included in one landslide-related disaster declaration. Putnam County was included in this declaration.               <ul style="list-style-type: none"> <li>FEMA-DR-487 (Severe Storms, Heavy Rain, Landslides, Flooding) – September 25-27, 1975</li> </ul> </li> <li>Other landslide incidents in Putnam County include:               <ul style="list-style-type: none"> <li>August 7, 1990</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Planning Committee</li> <li>FEMA</li> <li>Putnam County HAZNY</li> </ul>



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			<ul style="list-style-type: none"> <li>o August 28-30, 2011 – Hurricane Irene – rains caused a mudslide in Philipstown</li> <li>• The Putnam County HAZY ranked landslide as low hazard, with a score of 156; however, the Planning Committee identified landslide as a hazard of concern for Putnam County.</li> </ul>	
Nor'Easters (extra-tropical cyclones, including severe winter low-pressure systems)	Yes	Yes	Please see Severe Winter Storm	
Severe Storm (windstorms, thunderstorms, hail, hurricanes, tropical storms and tornados)	Yes	Yes	<ul style="list-style-type: none"> <li>• 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: hailstorm, high wind, and hurricane. For the purpose of this County HMP, the hazards were combined into one profile.</li> <li>• The NOAA-NCDC Storm Events Database indicated that Putnam County was impacted by 170 severe storm-related events between 1950 and 2014, resulting in 12 injuries and over \$26 million in property damage.</li> <li>• According to the SPC, four tornadoes have impacted Putnam County between 1950 and 2013.</li> <li>• FEMA included Putnam County in eight severe storm-related disaster declarations:               <ul style="list-style-type: none"> <li>o FEMA-DR-311 (Severe Storms and Flooding) – September 11-14, 1971</li> <li>o FEMA-DR-487 (Severe Storms, Heavy Rain, Landslides and Flooding) – September 25-27, 1975</li> <li>o FEMA-DR-1095 (Severe Storms and Flooding) – January 19-20, 1996</li> <li>o FEMA-DR-1146 (Severe Storms, Flooding, Heavy Rains, High Winds) – October 19, 1996</li> <li>o FEMA-DR-1296 (Hurricane Floyd) – September 16-18, 1999</li> <li>o FEMA-DR-1692 (Severe Storms and Inland/Coastal Flooding) – April 14-18, 2007</li> <li>o FEMA-DR-4020 (Hurricane Irene) – August 28, 2011</li> <li>o FEMA-DR-4085 (Hurricane Sandy) – October 28, 2012</li> </ul> </li> <li>• The Planning Committee identified severe storms as a hazard of concern for Putnam County.</li> <li>• The Putnam County HAZNY ranked hurricane as a moderately low hazard, with a score of 274; severe storm as a moderately high hazard, with a score of 248; and tornado as a moderately low hazard with a score of 222.</li> </ul>	<ul style="list-style-type: none"> <li>• NYS HMP Update</li> <li>• FEMA</li> <li>• NOAA-NCDC</li> <li>• Input from Planning Committee</li> <li>• Putnam County HAZY</li> </ul>
Severe Winter Storm (heavy snow, blizzards, ice storms)	Yes	Yes	<ul style="list-style-type: none"> <li>• The NYS HMP identified severe winter storm as a hazard of concern for New York State.</li> <li>• The NOAA-NCDC Storm Events Database indicated that Putnam County was impacted by 66 winter storm events between 1950 and 2014.</li> <li>• FEMA included Putnam County in five winter storm-related disaster declarations:               <ul style="list-style-type: none"> <li>o FEMA-DR-801 (Severe Winter Storm) – October 4, 1987</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• NYS HMP Update</li> <li>• FEMA</li> <li>• NOAA-NCDC</li> <li>• Input from Planning Committee</li> </ul>



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			<ul style="list-style-type: none"> <li>o FEMA-EM-3107 (Severe Blizzard) – March 14-17, 1993</li> <li>o FEMA-DR-1083 (Blizzard of 1996) – January 6-12, 1996</li> <li>o FEMA-EM-3184 (Snow) – February 17-18, 2003</li> <li>o FEMA-EM-3299 (Severe Winter Storm) – December 11-31, 2008</li> <li>• The Planning Committee identified severe winter storm as a hazard of concern for Putnam County. The County HAZNY ranked winter storm as a moderately high hazard with a score of 272. Ice storm was ranked as a moderately low hazard with a score of 203.</li> </ul>	<ul style="list-style-type: none"> <li>• Putnam County HAZNY</li> </ul>
Tornado	Yes	Yes	Please see Severe Storm	
Tsunami	No	No	<ul style="list-style-type: none"> <li>• Tsunami is not identified as a hazard of concern in the NYS HMP.</li> <li>• The Planning Committee does not consider tsunami to be a significant concern to the planning area.</li> </ul>	<ul style="list-style-type: none"> <li>• NYS HMP Update</li> <li>• Input from Planning Committee</li> </ul>
Volcano	No	No	There are no volcanoes located in New York State.	<ul style="list-style-type: none"> <li>• NYS HMP Update</li> <li>• Input from Planning Committee</li> </ul>
Wildfire	Yes	Yes	<ul style="list-style-type: none"> <li>• The NYS HMP identified wildfire as a hazard of concern for New York State.</li> <li>• Approximately 170 square miles (69%) of Putnam County is located in the wildland urban interface.</li> <li>• Between 2000 and 2012, Putnam County has had between 60 and 200 natural vegetation fires.</li> <li>• The County HAZNY ranked wildfire as a moderately high hazard with a score of 251. The Planning Committee identified wildfire as a hazard of concern for Putnam County.</li> </ul>	<ul style="list-style-type: none"> <li>• NYS HMP Update</li> <li>• Input from Planning Committee</li> <li>• FEMA</li> <li>• Putnam County HAZNY</li> </ul>
Windstorm	Yes	Yes	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  
 HAZNY Hazards New York  
 NOAA National Oceanic and Atmospheric Administration  
 NRCC Northeast Regional Climate Center  
 NYSDEC 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  
 USGS United States Geologic Survey





In summary, a total of seven 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):

- Earthquake
- Extreme Temperatures
- Flood (riverine and flash flooding)
- Land Failure (landslide, sinkhole)
- Severe Storms (hurricane, tropical storm, windstorms, thunderstorms, hail, lightning and tornados)
- Severe Winter Storm (heavy snow, blizzards, ice storms, Nor'Easters)
- Wildfire

Other natural hazards of concern that have occurred within Putnam County, but have a low potential to occur and/or result in significant impacts, may be considered in future versions of the Plan.