



5.2 IDENTIFICATION OF HAZARDS OF CONCERN

2016 HMP Update Changes

- The 2011 HMP hazard identification was presented in Section 3. For the 2016 HMP update, the hazard identification is presented in subsection 5.2 (Risk Assessment – Identification of Hazards of Concern).
- The Steering Committee chose to group some natural hazards together based on the similarity of hazard events, their typical occurrence or impacts, and consideration of hazard grouping in the 2014 State of New Jersey Hazard Mitigation Plan (NJ HMP).

To provide a strong foundation for mitigation strategies considered in Section 6, Warren 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 2014 NJ HMP and previous hazard identification efforts; research of 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 Steering 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 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 2014 NJ HMP.

The "Flood" hazard includes riverine (inland) flooding and ice jams. Other types of flooding that can occur in the county include flooding from dam failures which is further discussed under the dam failure hazard in Section 5.4.1 (Dam Failure). 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.

Tropical cyclones (hurricanes, tropical storms, and tropical depressions) and extra-tropical cyclones (Nor'Easters) were grouped under the "Hurricane/Tropical" and "Nor'Easter" hazards, respectively. The "Severe Weather" hazard includes windstorms that often entail a variety of other influencing weather conditions including thunderstorms, hail, lightning, extreme temperatures, and tornadoes.

The "Severe Winter Weather" hazard includes heavy snowfall, blizzards, freezing rain/sleet, and ice storms. This grouping is consistent with that used in the 2014 NJ HMP.



Table 5.2-1. Identification of Hazards of Concern for Warren County

Hazard	Is this a hazard that may occur in Warren County?	If yes, does this hazard pose a significant threat to Warren County?	Why was this determination made?	Source(s)
Avalanche	No	No	<ul style="list-style-type: none"> The 2014 NJ HMP does not identify avalanche as a hazard of concern for New Jersey. The topography and climate of Warren County does not support the occurrence of an avalanche event. New Jersey in general has a very low occurrence of avalanche events based on statistics provided by the National Avalanche Center-American Avalanche Association (NAC-AAA) between 1950 and 2014. 	<ul style="list-style-type: none"> 2014 NJ HMP Review of NAC-AAA database between 1998 and 2014 Steering and Planning Committee Input
Coastal Erosion	No	No	<ul style="list-style-type: none"> The 2014 NJ HMP identifies coastal erosion as a hazard of concern for New Jersey. Counties bounded by coastal waters are most affected by coastal erosion. Warren County is not bounded by coastal waters or contain any tidally influenced bodies of water. Based on the inland location of the County and input from the Steering and Planning Committees, coastal erosion is not a hazard of concern for Warren County. 	<ul style="list-style-type: none"> 2014 NJ HMP Steering and Planning Committee Input
Coastal Storm	Yes	Yes	<ul style="list-style-type: none"> The 2014 NJ HMP identifies coastal storms as a hazard of concern for New Jersey. For the purpose of this HMP Update, hurricanes and tropical storms will be included in 'Hurricanes/Tropical Storms' and Nor'Easters will be included separately in 'Nor'Easters'. Please see those sections for information regarding hurricanes, tropical storms, and Nor'Easters in Warren County. 	<ul style="list-style-type: none"> 2014 NJ HMP FEMA NOAA Steering and Planning Committee Input
Dam Failure	Yes	Yes	<ul style="list-style-type: none"> The 2014 NJ HMP identifies dam/levee failure as a hazard of concern for New Jersey. For the purpose of this HMP Update, only dam failure was identified as a hazard of concern for Warren County. There are 102 dams located in Warren County; 15 of which are identified as high hazard dams. The high hazard dams are located in Blairstown, Harmony, Hardwick, and Oxford Townships. The most recent dam failure incident to occur in the County was during Hurricane Irene (August 2011). The Steering and Planning Committees identified earthquake as a hazard of concern for Warren County. 	<ul style="list-style-type: none"> 2014 NJ HMP FEMA NJDEP
Disease Outbreak	Yes	No	<ul style="list-style-type: none"> The 2014 NJ HMP identifies disease outbreak as a hazard of concern for New Jersey. Infestations of ticks, mosquitoes, and/or other types of pest may be present in Warren County; however, the Steering and Planning Committees did not identify disease outbreak as a hazard of concern. 	<ul style="list-style-type: none"> 2014 NJ HMP Steering and Planning Committee Input
Drought	Yes	Yes	<ul style="list-style-type: none"> The 2014 NJ HMP identifies drought as a hazard of concern for New Jersey. Since 2010, Warren County has been impacted by four drought events. Between 2012 and 2014, the State of New Jersey has been included in seven USDA declarations; of 	<ul style="list-style-type: none"> 2014 NJ HMP USGS USDA



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			<p>which, Warren County was included in one of the declarations related to drought conditions.</p> <ul style="list-style-type: none"> • Warren County is located in the Northern 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"> ○ August – September 1932 ○ November 1949 – January 1950 ○ September – November 1957 ○ August 1964 – August 1966 ○ December 1980 – January 1981 ○ March – April 1985 ○ August – September 1995 ○ July – August 1999 ○ December 2001 – May 2002 ○ July – September 2002 	<ul style="list-style-type: none"> • NRCC • NOAA • NOAA-NCDC Storm Database • Steering and Planning Committee Input
Earthquake	Yes	No	<ul style="list-style-type: none"> • The 2014 NJ HMP identifies earthquake as a hazard of concern for New Jersey. Although they are known to occur on a regular basis, records indicate that no major earthquakes have struck the state since the establishment of historical record-keeping (1500s). Between 1783 and 2014, there have been 181 documented earthquakes in New Jersey. Three of these events have been epicentered in Warren County. • The Steering and Planning Committees identified earthquake as a hazard of concern for Warren County. 	<ul style="list-style-type: none"> • 2014 NJ HMP • NJDEP • NJGWS • Steering and Planning Committee Input
Expansive Soils	No	No	<ul style="list-style-type: none"> • The 2014 NJ HMP identifies expansive soils as a hazard of concern for New Jersey; however, the Planning Committee did not identify this as a hazard of concern for Warren County. • Soils that expand (swell) as they become wet and contract (shrink) as they dry are called expansive soils. This change can cause the ground to move up and down several inches during a cycle of wetting and drying. Expansive soils that are predominately clay minerals have the ability to absorb water. • In Warren County, most areas are underlain by soils with little to no clays with swelling potential. There are some areas, less than 50%, which are underlain by soils with abundant clays of slight moderate swelling potential. Based on the soil type and no history of expansive soil incidence occurring in the county, expansive soils is not a hazard of concern for Warren County. 	<ul style="list-style-type: none"> • 2014 NJ HMP • USGS • Steering and Planning Committee Input



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Hazard	Is this a hazard that may occur in Warren County?	If yes, does this hazard pose a significant threat to Warren County?	Why was this determination made?	Source(s)
Extreme Temperature	Yes	Yes	Please see “Severe Weather”	
Flood	Yes	Yes	<ul style="list-style-type: none"> The 2014 NJ HMP identifies flooding as a hazard of concern in New Jersey. There are 7,583 (6.9% of total population) people in Warren County living in the 1% and 0.2% annual chance flood zones. Of these people, 3,447 people in the County live in the 1% annual chance flood zone. Over 28,000 acres of Warren County are located in the 1% and 0.2% annual chance flood zones, with 13,382 acres located in the 1% flood zone. The County has 687 NFIP policies with total loss payments equaling over \$31 million. Between 2008 and 2014, Warren County was included in two FEMA declarations related to flooding: <ul style="list-style-type: none"> August 26-September 5, 2011 – FEMA-DR-4021 – Hurricane Irene September 28-October 6, 2011 – FEMA-DR-4039 – Remnants of Tropical Storm Lee The Steering and Planning Committees identified flooding as a hazard of concern for Warren County. 	<ul style="list-style-type: none"> 2014 NJ HMP FEMA FEMA FIS NFIP NOAA-NCDC Storm Database Steering and Planning Committee Input
Geological Hazards	Yes	Yes	<ul style="list-style-type: none"> The 2014 NJ HMP identifies geological hazards as a hazard of concern for New Jersey. For the 2016 HMP update, the Planning Committee identified landslides, sinkholes and land subsidence as hazards of concern for Warren County. Warren County has a low to moderate landslide susceptibility. Most events that have occurred in the County were located in central and northern portions of the County. Warren County has several large bands of carbonate rock running throughout the County, and most of the southern half of the County is underlain by carbonate rock. Approximately 42% of the County has carbonate rock formations and susceptible to sinkholes. The Steering and Planning Committees identified geological hazards as a hazard of concern for Warren County. 	<ul style="list-style-type: none"> 2014 NJ HMP NJGWS NJDEP Steering and Planning Committee Input
Hailstorm	Yes	Yes	Please see “Severe Weather”	
Hazardous Materials	Yes	Yes	<ul style="list-style-type: none"> The 2014 NJ HMP identifies hazardous materials as a hazard of concern for New Jersey. Several major transportation routes are located in Warren County and pose a threat to spills, accidents, and incidents. 	<ul style="list-style-type: none"> 2014 NJ HMP Steering and Planning Committee Input



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			<ul style="list-style-type: none"> There are been numerous hazardous material incidents in Warren County. Based on the history of occurrences and input from the Steering and Planning Committees, hazardous materials was identified as a hazard of concern for Warren County. 	
Hurricane (and other Tropical Cyclones)	Yes	Yes	<ul style="list-style-type: none"> The 2014 NJ HMP identifies hurricanes and tropical storms as hazards of concern for New Jersey. According to FEMA, between 2010 and 2015, Warren County was included in three declarations associated with hurricanes and tropical storms. <ul style="list-style-type: none"> August 26-September 5, 2011 – FEMA-DR-4021 – Hurricane Irene September 5-14, 2011 – FEMA-DR-4039 – Remnants of Tropical Storm Lee October 26-November 8, 2011 – FEMA-DR-4048 – Hurricane Sandy The Steering and Planning Committees identified hurricanes and tropical storms as a hazard of concern for Warren County. 	<ul style="list-style-type: none"> 2014 NJ HMP NOAA – NCDC FEMA Steering and Planning Committee Input
Ice Storm	Yes	Yes	Please see “Severe Winter Weather”	
Infestation	Yes	No	Please see “Disease Outbreak”	
Land Subsidence	Yes	No	Please see “Geological Hazards”	
Landslide	Yes	No	Please see “Geological Hazards”	
Nor’Easters	Yes	Yes	<ul style="list-style-type: none"> The 2014 NJ HMP identifies Nor’Easters as hazards of concern for New Jersey. According to FEMA, between 2010 and 2015, Warren County was included in one declaration associated with Nor’Easters. <ul style="list-style-type: none"> October 29, 2011 – FEMA-DR-4048 – Severe Weather (snowstorm/Nor’Easter) The Steering and Planning Committees identified Nor’Easter events as a hazard of concern for Warren County. 	<ul style="list-style-type: none"> 2014 NJ HMP NOAA – NCDC FEMA Steering and Planning Committee Input
Severe Weather (Windstorms, Thunderstorms, Hail, Lightning, Extreme Temperature, and Tornadoes)	Yes	Yes	<ul style="list-style-type: none"> The 2014 NJ HMP identifies thunderstorms, lightning, tornadoes, extreme winds and extreme temperature as hazards of concern for New Jersey. According to FEMA, between 2010 and 2015, Warren County was included in four declarations associated with severe weather events. <ul style="list-style-type: none"> August 26-September 5, 2011 – FEMA-DR-4021 – Hurricane Irene September 28-October 6, 2011 – FEMA-DR-4039 – Remnants of Tropical Storm Lee October 29, 2011 – FEMA-DR-4048 – Severe Weather October 26 – November 8, 2012 – FEMA-DR-4086 – Hurricane Sandy 	<ul style="list-style-type: none"> 2014 NJ HMP NOAA – NCDC FEMA SPC Steering and Planning Committee Input



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			<ul style="list-style-type: none"> New Jersey has experienced 147 tornadoes between 1950 and 2013, with five of those occurring in Warren County. However, there have been no tornadoes between 2010 and 2015 in the County. NOAA’s NCDC storm events database indicates that Warren County was impacted by approximately 88 severe weather events between 2010 and 2015 causing a total of over \$10.1 million in property damages. The Steering and Planning Committees identified severe weather (windstorms, thunderstorms, hail, lightning, extreme temperatures, and tornadoes) as a hazard of concern for Warren County. 	
Severe Winter Weather (Heavy Snow, Blizzards, Freezing Rain/Sleet, Ice Storms)	Yes	Yes	<ul style="list-style-type: none"> The 2014 NJ HMP identifies severe winter weather as a hazard of concern for New Jersey and includes snow, blizzards, and ice storms. For the purpose of this HMP update, Warren County is including blizzards, heavy snow, and ice storms in the severe winter weather hazard profile. Normal seasonal snowfall in Warren County is approximately 22.1 inches. According to FEMA, between 2010 and 2015, Warren County was included in one declaration associated with severe winter weather events. <ul style="list-style-type: none"> October 29, 2011 – FEMA-DR-4048 – Severe Weather NOAA-NCDC has indicated that Warren County has experienced the impacts of 85 winter storm events between 2010 and 2015. Based on the history of occurrences and losses, and based on input from the Planning and Steering Committees, Warren County identified severe winter weather as a hazard of concern for the County. 	<ul style="list-style-type: none"> 2014 NJ HMP FEMA NOAA – NCDC Storm Database ONJSC Steering and Planning Committee Input
Tornado	Yes	Yes	Please see “Severe Weather”	
Tsunami	No	No	<ul style="list-style-type: none"> The 2014 NJ HMP does identify tsunami as a hazard of concern for New Jersey. Warren County is not bounded by coastal waters; therefore, based on input from the Steering and Planning Committees and the location of the county, tsunami is not a hazard of concern for Warren County. 	<ul style="list-style-type: none"> 2014 NJ HMP Steering and Planning Committee Input
Volcano	No	No	<ul style="list-style-type: none"> The 2014 NJ HMP does not identify volcano as a hazard of concern for New Jersey. The Steering and Planning Committees did not identify volcano as a hazard of concern for Warren County. 	<ul style="list-style-type: none"> 2014 NJ HMP Steering and Planning Committee Input
Wildfire	Yes	Yes	<ul style="list-style-type: none"> The 2014 NJ HMP identifies wildfire as a hazard of concern for New Jersey. In Warren County, approximately 359.6 square miles of the County are located in the low to moderate NJFFS Risk Area and 32.7 square miles is located in the high to 	<ul style="list-style-type: none"> 2014 NJ HMP NOAA – NCDC Storm Events Query USGS



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Windstorm	Yes	Yes	<p>extreme risk area. The northern area of the County has the highest risk to wildfire events.</p> <ul style="list-style-type: none"> Between 2010 and 2015, there have several reports of wildfires and brush fires in Warren County. Approximately 34.4% of the County’s population is exposed to a moderate/low risk area and 4.1% of the population is exposed to an extreme/very high/high risk area. Based on input from the Steering and Planning Committees and the amount of land vulnerable to wildfires, wildfire is considered a hazard of concern for Warren County. 	<ul style="list-style-type: none"> NJFFS Steering and Planning Committee Input
			Please see “Severe Weather”	

- DR Presidential Disaster Declaration Number
- FEMA Federal Emergency Management Agency
- HMP Hazard Mitigation Plan
- NAC-AAA National Avalanche Center-American Avalanche Association
- NCDC National Climatic Data Center
- NFIP National Flood Insurance Program
- NJ New Jersey
- NJDEP New Jersey Department of Environmental Protection
- NJDOH New Jersey Department of Health
- NJFFS New Jersey Forest Fire Service
- NJGWS New Jersey Geological and Water Survey
- NJ HMP State of New Jersey Hazard Mitigation Plan
- NJOEM New Jersey Office of Emergency Management
- NRCC Northeast Regional Climate Center
- NOAA National Oceanic and Atmospheric Administration
- ONJSC Office of the New Jersey State Climatologist
- SPC Storm Prediction Center
- USDA U.S. Department of Agriculture
- USGS U.S. Geological Survey



According to input from the county, and review of all available resources, a total of 11 hazards of concern were identified as significant hazards affecting the entire planning area, to be addressed at the county level in this plan:

- Dam Failure
- Drought
- Earthquake
- Flooding (including ice jams)
- Geological Hazards (landslide and subsidence/sinkholes)
- Hazardous Materials (fixed site and in-transit)
- Hurricanes/Tropical Storms
- Nor'Easter
- Severe Weather (High Winds, Tornadoes, Thunderstorms, Hail, Extreme Temperatures)
- Severe Winter Weather (Heavy Snow, Blizzards, Ice Storms)
- Wildfire

Other natural and human-caused hazards of concern have occurred within Warren 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 HMP. However, if deemed necessary by the county, these hazards may be considered in future HMP updates.