



## 5.1 IDENTIFICATION OF HAZARDS OF CONCERN

### 2019 HMP UPDATE CHANGES

- The identification of hazards of concern for the 2019 HMP update incorporates the best available data used to develop the hazard profiles.

To provide a strong foundation for mitigation strategies considered in Section 6, Burlington 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. A summary of the new groupings and changes is provided below.

The "Flood" hazard includes riverine (inland) flooding, ice jams, and 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.

The "Severe Weather" hazard includes tropical cyclones (hurricanes, tropical storms, and tropical depressions), extra-tropical cyclones (Nor'easters), and windstorms that often entail a variety of other influencing weather conditions including thunderstorms, hail, lightning, extreme temperatures, 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.

The "Landslides" hazard includes landslides, land subsidence, and sinkholes. This grouping is consistent with that used in the 2014 NJ HMP "Geological" hazard profile.



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Hazard	Is this a hazard that may occur in Burlington County?	If yes, does this hazard pose a significant threat to Burlington County?	Why was this determination made?	Source(s)
Avalanche	No	No	<ul style="list-style-type: none"> <li>The 2014 NJ HMP does not identify avalanche as a hazard of concern for New Jersey.</li> <li>The topography and climate of Burlington County does not support the occurrence of an avalanche event.</li> <li>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 2018.</li> </ul>	<ul style="list-style-type: none"> <li>2014 NJ HMP</li> <li>Review of NAC-AAA database between 1998 and 2018</li> <li>Steering and Planning Committee Input</li> </ul>
Coastal Erosion	Yes	Yes	<ul style="list-style-type: none"> <li>The NJ HMP identifies coastal erosion as a hazard of concern for NJ. Counties bounded by coastal waters are most affected by coastal erosion.</li> <li>A portion of Burlington County is located within the CAFRA area (Township of Bass River). Coastal erosion may occur because it is tidally influenced. A majority of the County is located along the Delaware River where it is densely populated and in some areas, heavily industrialized.</li> <li>The Planning Committee identified coastal erosion as a significant concern affecting several municipalities within the County</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>Planning Committee Input</li> </ul>
Drought	Yes	Yes	<ul style="list-style-type: none"> <li>The NJ HMP identifies drought as a hazard of concern for New Jersey. The NJHMP indicated that Burlington County experienced drought events during the following time periods:               <ul style="list-style-type: none"> <li>March 1995</li> <li>December 1998</li> <li>January 1999</li> <li>July-September 1999</li> <li>November-December 2001</li> <li>January-July 2002</li> <li>September - October 2002</li> <li>September 2005</li> <li>May-July 2006</li> </ul> </li> <li>Burlington County is located in the Southern Climate Divisions. Periods of severe and/or extreme drought in this division includes:               <ul style="list-style-type: none"> <li>January-February 1931</li> <li>May 1965-August 1966</li> <li>March-June 1985</li> <li>November-December 1998</li> <li>July-September 2002</li> <li>August-September 2010</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>FEMA</li> <li>NRCC</li> <li>Planning Committee Input</li> </ul>





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			<ul style="list-style-type: none"> <li>Burlington County has been included in one FEMA Disaster Declaration for a drought event:               <ul style="list-style-type: none"> <li>FEMA-EM-3083 – Water Shortage – October 1980</li> </ul> </li> </ul>	
Earthquake	Yes	Yes	<ul style="list-style-type: none"> <li>The NJ HMP identifies earthquake as a hazard of concern for NJ. 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 (1500's). Between 1783 and 2012, there have been 179 earthquakes with epicenters in New Jersey. Of those 179 earthquakes, eight had epicenters in Burlington County.</li> <li>According to the USGS seismic hazard maps, the PGA with a 10% probability of exceedance over 50 years for Burlington County is between 2%g and 4%g. FEMA's How-To Guide recommends that earthquakes be considered for further evaluation in the planning process in areas where the PGA is over 2%g.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>FEMA</li> <li>NJGWS</li> <li>USGS</li> <li>NJDEP</li> <li>Planning Committee Input</li> </ul>
Expansive Soils	No	No	<ul style="list-style-type: none"> <li>The NJ HMP does not identify expansive soils as a hazard of concern for NJ.</li> <li>USGS indicated that in Burlington County, 50% or less of the soils consist of clay that has slight to moderate potential of swelling, with some areas underlain by soils with little to no clays with swelling potential.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>Review of USGS 1989 Swelling Clays Map of the Conterminous United States.</li> <li>Planning Committee Input</li> </ul>
Extreme Temperature	Yes	Yes	Please see Severe Weather	
Flood (Riverine, Flash, Coastal and Dam Flooding)	Yes	Yes	<ul style="list-style-type: none"> <li>The NJ HMP stated that flooding is NJ's most common major natural hazard. Between 2010 and 2012, 413 floods were recorded in New Jersey (according to NOAA-NCEI) that resulted in over \$21.8 billion in property damage.</li> <li>Burlington County has been issued five FEMA Disaster Declarations for flooding associated with various storm events (severe storms, snowstorm, severe winter storm). These events include the following:               <ul style="list-style-type: none"> <li>FEMA-DR-1530 – Severe Storms and Flooding – July 2004</li> <li>FEMA-DR-1694 – Severe Storms and Flooding – April 2007</li> <li>FEMA-DR-1873 – Snowstorm – February 2010</li> <li>FEMA-DR-1889 - Severe Winter Storm and Snowstorm – March 2010</li> <li>FEMA-DR-1897 – Severe Storms and Flooding – April 2010</li> <li>FEMA-DR-4086, EM-3354 – Hurricane Sandy – October -2012</li> <li>FEMA DR-4231 – Severe Storm – June 2015</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>FEMA</li> <li>NOAA – NCDC</li> <li>Burlington County GIS</li> <li>Planning Committee Input</li> </ul>



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Hazard	Is this a hazard that may occur in Burlington County?	If yes, does this hazard pose a significant threat to Burlington County?	Why was this determination made?	Source(s)
			<ul style="list-style-type: none"> <li>o FEMA DR-4264 – Severe Winter Storm and Snowstorm – January 2016</li> <li>• Approximately 16.9% of Burlington County’s total area is located in an A-Zone (88,574 acres); less than 1% in the V-Zone (1,297 acres); and 18.4% in a 500-year flood area (96,372 acres).</li> <li>• According to NOAA NCEI storm database, between 2013 and 2018, Burlington County experienced 23 flood events.</li> </ul>	
Hailstorm	Yes	Yes	Please see Severe Storm	
Hurricane (and other Tropical Cyclones)	Yes	Yes	Please see Severe Storm and Flood	
Ice Jams	Yes	No	Please see Flood	
Ice Storm	Yes	Yes	Please see Severe Winter Storm	
Infestation	Yes	No	<ul style="list-style-type: none"> <li>• The NJ HMP does not identify infestation as a hazard of concern for the State of New Jersey.</li> <li>• Some infestations of ticks, mosquitoes, gypsy moth and/or other types of pest may be present in the County and with the right combination of gypsy moth infestation and forest fire conditions, a potential risk may exist for residential areas. However, no sources indicate that this is a major hazard of concern across the County.</li> </ul>	
Land Subsidence	Yes	Yes	Please see Landslide	
Landslide	Yes	Yes	<ul style="list-style-type: none"> <li>• The NJ HMP identifies landslide as a hazard of concern for NJ.</li> <li>• NJ HMP indicates NJ is vulnerable to land subsidence; the soil collapse sinkhole is the most concerned type of sinkhole for NJ.</li> <li>• USGS indicates within the National Atlas Map Maker program that the County has a moderate susceptibility/low incidence to landslides along the northwestern most edge, and low incidence (or less than 1.5% of the area is susceptible) throughout the remainder of the County.</li> <li>• NJGWS provides four recorded landslides within Burlington County:               <ul style="list-style-type: none"> <li>o May 4, 1893 – Debris flow due to heavy rain in Bordentown Township</li> <li>o Unknown Date – Debris flow due to heavy rain in Bordentown Township</li> <li>o Unknown Date – Debris flow due to quarrying in Burlington Township</li> <li>o Unknown Date – Debris flow due to heavy rain in Southampton Township</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• NJ HMP</li> <li>• NJGWS</li> <li>• NationalAtlas.gov (USGS)</li> <li>• Planning Committee Input</li> </ul>
Nor’Easters	Yes	Yes	Please see Severe Winter Storm and Flood	
Severe Storm (Windstorms, Thunderstorms,	Yes	Yes	<ul style="list-style-type: none"> <li>• NJ HMP identifies thunderstorms, lightning, tornadoes, hurricanes and extreme winds as hazards of concern for NJ.</li> </ul>	<ul style="list-style-type: none"> <li>• NJ HMP</li> <li>• FEMA</li> <li>• SPC</li> </ul>



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Hail, Lightning, Tornadoes and Hurricanes)			<ul style="list-style-type: none"> <li>• Burlington County has been issued eight FEMA Disaster Declarations for severe storm-related events (flooding and hurricane). These events include the following:               <ul style="list-style-type: none"> <li>○ FEMA-EM-3148 – Hurricane Floyd – September 1999</li> <li>○ FEMA-DR-1530 – Severe Storms and Flooding – July 2004</li> <li>○ FEMA-DR-1694 – Severe Storms and Inland/Coastal Flooding – April 2007</li> <li>○ FEMA-DR-1897 – Severe Storms and Flooding – March-April 2010</li> <li>○ FEMA-DR-4021 – Hurricane Irene – August-September 2011</li> <li>○ FEMA-DR-4086 – Hurricane Sandy – October 2012</li> <li>○ FEMA-DR-4231 – Severe Storm – June 2015</li> </ul> </li> <li>• The NOAA-NCEI Storm Events Database indicated that between 1950 and 2018, Burlington County experienced 15 tornadoes.</li> <li>• The NJ HMP identifies extreme heat as a hazard of concern for NJ citing 61 extreme heat events between 1950 and 2009. The NJ HMP also identifies extreme cold as a hazard of concern for NJ.</li> </ul>	<ul style="list-style-type: none"> <li>• ONJSC</li> <li>• Planning Committee Input</li> </ul>
Severe Winter Storm (Heavy Snow, Blizzards, Freezing Rain/Sleet, Nor’Easters, Ice Storms)	Yes	Yes	<ul style="list-style-type: none"> <li>• NJ HMP indicates winter storms are significant hazards that impact NJ.</li> <li>• ONJSC indicated that normal seasonal snowfall for Burlington County ranges from 14.4 inches to 21.8 inches.</li> <li>• Burlington County has been issued five FEMA Disaster Declarations for winter storm-related events (severe blizzard, snow, snowstorm, and severe winter storm). These events include the following:               <ul style="list-style-type: none"> <li>○ FEMA-EM-3106 – Severe Blizzard – March 1993</li> <li>○ FEMA-EM-3181 – Snow – February 2003</li> <li>○ FEMA-DR-1873 – Snowstorm – December 2009</li> <li>○ FEMA-DR-1889 – Severe Winter Storm and Snowstorm – February 2010</li> <li>○ FEMA-DR-1954 – Severe Winter Storm and Snowstorm – December 2010</li> <li>○ FEMA-DR-4262 – Severe Winter Storm – January 2016</li> </ul> </li> <li>• The NOAA-NCEI Storm Events Database indicated that between 2013 and 2018, Burlington County experienced 58 winter storm events (heavy snow, winter weather, and winter storm).</li> </ul>	<ul style="list-style-type: none"> <li>• NJ HMP</li> <li>• ONJSC</li> <li>• NWS</li> <li>• FEMA</li> <li>• NOAA-NCEI</li> <li>• Planning Committee Input</li> </ul>
Tornado	Yes	Yes	Please see Severe Storm	
Tsunami	Yes	No	<ul style="list-style-type: none"> <li>• The NJ HMP does not identify tsunami as a hazard of concern for NJ; however, tsunamis are discussed and it is indicated that there is no record of the generation of a catastrophic Atlantic Basin tsunami that has impacted the mid-Atlantic coastline.</li> <li>• Over the past 200 years, the Atlantic and Gulf Coasts have experienced very few tsunamis. The probability of a large tsunami impacting the coastal areas of New Jersey is believed to be small; however, earthquake activity along the Mid-Atlantic Ridge is</li> </ul>	<ul style="list-style-type: none"> <li>• NJ HMP</li> <li>• NOAA / WDS</li> <li>• Planning Committee Input</li> </ul>



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			<p>recognized as having the potential to pose some level of tsunami risk to the Atlantic seaboard.</p> <ul style="list-style-type: none"> <li>• NOAA/WDS Tsunami Event Database did not indicate any tsunami or tsunami-like events that impacted Burlington County.</li> <li>• Burlington County is bounded by coastal waters in the southeastern portion of the County. Although the County is mostly shielded by barrier islands, the impacts from a tsunami could flow in through one of the inlets and up the Mullica River. However, the probability of a large tsunami impacting the coast of New Jersey and Burlington County is very small.</li> </ul>	
Volcano	No	No	<ul style="list-style-type: none"> <li>• The NJ HMP does not identify volcano as a hazard of concern for the State of New Jersey or its counties and jurisdictions.</li> </ul>	<ul style="list-style-type: none"> <li>• NJ HMP</li> <li>• Planning Committee Input</li> </ul>
Wildfire	Yes	Yes	<ul style="list-style-type: none"> <li>• Wildfires are not an uncommon occurrence in NJ, especially in the Pine Barrens. Fires which burn more than 1,000 acres occur, on average, once every 10 years in the Pine Barrens. In May 2007, a wildfire along the border of Ocean and Burlington Counties burned more than 12,000 acres (~19 square miles).</li> <li>• Between 1929 and 2006, there were 2,233 wildfire incidents in Burlington County. They burned over 42,000 acres and destroyed 831 acres.</li> <li>• In Burlington County, over 195 square miles are located within the extreme wildfire fuel hazard area; over 11 square miles in the very high area; over 106 square miles in the high area; over 86 square miles in the moderate area; and over 165 square miles in the low.</li> <li>• According to the NOAA-NCEI, a total of seven wildfires have occurred in Burlington County between 20013 and 2018.</li> </ul>	<ul style="list-style-type: none"> <li>• NJ HMP</li> <li>• NJFFS</li> <li>• NOAA-NCEI</li> </ul>
Windstorm	Yes	Yes	Please see Severe Storm	

DR Presidential Disaster Declaration Number  
 FEMA Federal Emergency Management Agency  
 HMP Hazard Mitigation Plan  
 NAC-AAA National Avalanche Center-American Avalanche Association  
 NCEI National Centers for Environmental Information  
 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 8 hazards of concern were identified as significant hazards affecting the entire planning area, to be addressed at the county level in this plan:

- Coastal Erosion
- Drought
- Earthquake
- Flooding (including dam failure and ice jams)
- Landslide (including subsidence/sinkholes)
- Severe Weather (Tropical Cyclones, Nor'easters, 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 Burlington 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.