



## SECTION 4. RISK ASSESSMENT

A risk assessment is the process of measuring the potential loss of life, personal injury, economic and property damage resulting from identified hazards. It allows planning personnel to address and reduce hazard impacts and emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. Results of the risk assessment are used to inform mitigation planning processes, including determining and prioritizing mitigation actions that reduce a community’s risk to a specified hazard. Past, present, and future conditions must be evaluated to most accurately assess risk for each jurisdiction. The Mercer County risk assessment presented in Section 4 and outlined as follows:

- Identification of hazards of concern that impact Mercer County
- Methodology and tools used to conduct the risk assessment
- Hazards of concern profiles and vulnerability assessment
- Hazard ranking

### 4.1 IDENTIFICATION OF HAZARDS OF CONCERN

#### 2021 HMP Changes

- The 2016 HMP ‘Hazard Identification’ was presented in subsection 5.2. For the 2021 HMP update, it is presented in subsection 4.1 (Identification of Hazards of Concern).
- The 2021 HMP flood hazard includes additional discussion of urban flooding and a new hazard of concern: infestation and invasive species.

To provide a strong foundation for mitigation strategies considered in Section 6 (Mitigation Strategy) and Section 9 (Jurisdictional Annexes), Mercer 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 State of New Jersey Hazard Mitigation Plan (NJ 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 4.1-1 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 Partnership 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 NJ HMP. With the exception of hazardous substance release (fixed and in-transit), Mercer County chose to focus on natural hazards in this plan as non-natural hazards (technological and intentional hazards) are covered in other local and State plans.



Table 4.1-1. Identification of Natural Hazards of Concern for Mercer County

Hazard	Is this a hazard that may occur in Mercer 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 NJ HMP does not identify avalanche as a hazard of concern for New Jersey.</li> <li>The topography and climate of Mercer 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 American Avalanche Association (AAA) between 1950 and 2014.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>Review of NAC-AAA database</li> <li>Steering and Planning Committee Input</li> </ul>
Coastal Erosion	No	No	<ul style="list-style-type: none"> <li>The NJ HMP identifies coastal erosion as a hazard of concern for New Jersey. Counties bounded by coastal waters are most affected by coastal erosion.</li> <li>Mercer County is not located in the Coastal Erosion Hazard Area (CEHA) however, there are tidal waters that may cause erosion along the Delaware River. However, the likelihood of erosion caused by coastal influences is not high enough for coastal erosion to be considered a hazard of concern.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>NOAA</li> <li>Steering and Planning Committee Input</li> </ul>
Dam Failure	Yes	Yes	<ul style="list-style-type: none"> <li>The NJ HMP identifies dam failure as a hazard of concern for New Jersey.</li> <li>According to NJDEP, Mercer County has 88 dams. Of these dams, 8 are considered high hazard, 8 are considered significant hazard, and 72 are considered low hazard.</li> <li>According to data from March 2021, two dams are considered to be in poor condition and one dam is considered to be in unsatisfactory condition.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>NJ DEP</li> <li>Steering and Planning Committee Input</li> </ul>
Disease Outbreak	Yes	Yes	<ul style="list-style-type: none"> <li>The NJ HMP identifies pandemic as a hazard of concern for New Jersey.</li> <li>According to the NJ HMP, New Jersey’s geographic and demographic characteristics make it particularly vulnerable to importation and spread of infectious diseases. All 21 counties in New Jersey have experienced the effects of a pandemic or disease outbreak.</li> <li>Mercer County has been impacted by mosquito and tick-borne diseases, influenza, and most recently the COVID-19 pandemic.</li> <li>Mercer County was part of a statewide emergency declaration for West Nile Virus in 2000 (EM-3156) and the DR-4488/EM-3451 for COVID-19.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>FEMA</li> <li>Steering and 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.</li> <li>The drought hazard is a concern for Mercer County because the County’s water is supplied by both surface water and groundwater. Surface water supplies are affected more quickly during droughts than groundwater sources.</li> <li>The USDA has declared disasters for Mercer County in 2015 for Excessive Heat and Drought; 2016 for the combined effects of freeze, excessive heat, and drought; and 2016 for drought.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>USGS</li> <li>NRCC</li> <li>NDMC</li> <li>NOAA</li> <li>USDA</li> <li>NOAA-NCEI Storm</li> </ul>



Section 4.1: Risk Assessment – Identification of Hazards of Concern

Hazard	Is this a hazard that may occur in Mercer County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
				Database • Steering and Planning Committee Input
Earthquake	Yes	Yes	<ul style="list-style-type: none"> <li>The 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 (1500's).</li> <li>Mercer County is located near the Ramapo Fault line.</li> <li>Since 2014, there have been three earthquakes with that were epicentered outside of the County but were felt within Mercer County.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>NJDEP</li> <li>NJGS</li> <li>USGS</li> <li>Steering and Planning Committee Input</li> </ul>
Expansive Soils	No	No	<ul style="list-style-type: none"> <li>The NJ HMP does identify expansive soils as a hazard of concern for New Jersey; however, the Planning Committee did not identify this as a hazard of concern for Mercer County.</li> <li>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.</li> <li>Mercer County soils have slight to moderate swelling potential and in some areas, contain little or no swelling clay. Based on the soil type and no history of expansive soil incidence occurring in the county, expansive soils are not a hazard of concern for Mercer County.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>USGS 1989 Swelling Clays Map of the Conterminous U.S.</li> <li>Steering and Planning Committee Input</li> </ul>
Extreme Temperature	Yes	Yes	<ul style="list-style-type: none"> <li>The NJ HMP identifies extreme temperature as a hazard of concern for New Jersey as a type of severe weather.</li> <li>Mercer County has experienced excessive heat and extreme cold temperature events.</li> <li>The USDA declared disasters for excessive heat and drought in 2015 and the combined effects of freeze, excessive heat, and drought in 2016.</li> <li>Extreme temperature is included as part of the Severe Weather hazard profile.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>NOAA – NCEI Storm Database</li> <li>ONJSC</li> <li>USDA</li> <li>Steering and Planning Committee Input</li> </ul>
Flood (Coastal, Riverine, Flash Flooding, Urban Flooding)	Yes	Yes	<ul style="list-style-type: none"> <li>The NJ HMP identifies flooding as a hazard of concern in New Jersey.</li> <li>Mercer County is exposed to coastal flooding (including storm surge and sea level rise), riverine flooding, flash flooding, and urban flooding.</li> <li>The County has 1,761 NFIP policies.</li> <li>There has been a total of over \$36 million paid claims in Mercer County.</li> <li>There are 275 repetitive loss and 33 severe repetitive loss properties in the County.</li> <li>The 2020 FEMA DFIRMs indicate over 9% of the County is located in the 1-</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>FEMA</li> <li>FEMA FIS</li> <li>NFIP</li> <li>NOAA-NCEI Storm Database</li> <li>Steering and Planning Committee Input</li> </ul>



Section 4.1: Risk Assessment – Identification of Hazards of Concern

Hazard	Is this a hazard that may occur in Mercer County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
			percent annual chance floodplain.	
Geological Hazards	Yes	Yes	<ul style="list-style-type: none"> <li>The NJ HMP identifies geological hazards as a hazard of concern for New Jersey.</li> <li>There have been minor historic debris flow, rockfall and rockslide landslide events in Mercer County.</li> <li>Carbonate rock formations are found in several portions of the County which are susceptible to natural subsidence.</li> <li>Between April 2016 and April 2021, there have been no identified geological hazard events in Mercer County.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>NJGWS</li> <li>NJ DEP</li> <li>Steering and Planning Committee Input</li> </ul>
Hailstorm	Yes	Yes	Please see Severe Weather	
Hurricane (and other Tropical Cyclones)	Yes	Yes	<ul style="list-style-type: none"> <li>The NJ HMP identifies hurricanes/tropical storms as a hazard of concern for New Jersey.</li> <li>Due to its proximity to the Atlantic Ocean, Mercer County is susceptible to hurricanes and tropical storms.</li> <li>Between 1856 and 2021, 39 tropical cyclones tracked within 65 nautical miles of Mercer County.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>FEMA</li> <li>NOAA</li> <li>NHC</li> <li>NOAA-NCDC Storm Database</li> <li>Steering and Planning Committee Input</li> </ul>
Ice Storm	Yes	Yes	Please see Severe Winter Weather	
Infestation and Invasive Species	Yes	Yes	<ul style="list-style-type: none"> <li>Mercer County has a diverse landscape with development woven through natural areas.</li> <li>Pests in Mercer County that compete for natural resources or transmit diseases to humans, livestock and the environment include insects and invasive plants.</li> <li>Due to the presence of forested area in the County and the abundance of parkland throughout, Emerald Ash Borer (EAB) and other pests that damage trees have become an increased focus.</li> <li>Mercer County has experienced harmful algal blooms in the past causing impacts to natural systems and the local economy.</li> <li>Infestation and invasive species have been added as a new hazard of concern to the 2021 HMP update.</li> </ul>	<ul style="list-style-type: none"> <li>NJ DEP</li> <li>Steering and Planning Committee Input</li> </ul>
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"> <li>The NJ HMP identifies Nor'easter as a hazard of concern for New Jersey.</li> <li>Due to its proximity to the Atlantic Ocean, Mercer County is susceptible to Nor'Easters.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>FEMA</li> <li>NOAA</li> </ul>





Section 4.1: Risk Assessment – Identification of Hazards of Concern

Hazard	Is this a hazard that may occur in Mercer 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>Between 2016 and 2021, Mercer County was included in one FEMA declarations related to Nor’Easter: January 22-24, 2016 – FEMA-DR-4264 – Severe Winter Storm and Snowstorm.</li> </ul>	<ul style="list-style-type: none"> <li>NOAA-NCEI Storm Database</li> <li>Steering and Planning Committee Input</li> </ul>
Radon	Yes	No	<ul style="list-style-type: none"> <li>Radon is a naturally occurring radioactive gas, which has always been a part of our environment. It’s a natural decay product of uranium and is found in soil everywhere in varying concentrations and is a serious health risk.</li> <li>There are several reasons why radon was not profiled in the HMP.               <ul style="list-style-type: none"> <li>The NJ HMP does not identify radon as a hazard of concern for New Jersey.</li> <li>The revised building code requires radon control measures be installed for new construction; therefore, this hazard is mitigated at this time.</li> <li>Testing is required at time of real estate transactions; therefore, this hazard is tested and mitigated as appropriate at this time.</li> <li>Hazard requires mitigation at the individual property level (approximately \$1300/structure) with municipal and County support to test. Princeton’s Environmental Health website includes information for residents regarding the radon hazard and testing: <a href="https://www.princetonnj.gov/287/Environmental-Health">https://www.princetonnj.gov/287/Environmental-Health</a></li> <li>The Boroughs of Hopewell, Pennington and Rocky Hill are served by the Montgomery Township Health Department. The Health Department has a webpage dedicated to radon health risks, testing, and links to NJDEP resources. <a href="https://health.montgomery.nj.us/services/environmental-health/radon/">https://health.montgomery.nj.us/services/environmental-health/radon/</a></li> </ul> </li> <li>This hazard was not evaluated further in the 2021 HMP.</li> </ul>	<ul style="list-style-type: none"> <li>NJDEP: <a href="https://www.njradon.org/radonin.htm">https://www.njradon.org/radonin.htm</a></li> </ul>
Severe Weather (Windstorms, Thunderstorms, Hail, Lightning, Extreme Temperatures, and Tornados)	Yes	Yes	<ul style="list-style-type: none"> <li>The NJ HMP identifies severe weather as a hazard of concern for New Jersey.</li> <li>Severe weather events occur annually in Mercer County causing a range of impacts from property damage, flooding, and loss of power.</li> <li>NOAA’s NCEI storm events database indicates that Mercer County was impacted by approximately 46 severe weather events between April 2015 and December 2020.</li> <li>The strongest tornado on record in Mercer County was an F-2.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>NOAA – NCEI</li> <li>FEMA</li> <li>NJ OEM</li> <li>Steering and Planning Committee Input</li> </ul>
Severe Winter Weather (Heavy Snow, Blizzards, Freezing)	Yes	Yes	<ul style="list-style-type: none"> <li>The NJ HMP identifies severe winter weather as a hazard of concern for New Jersey.</li> <li>Normal seasonal snowfall in Mercer County averages 22.7 inches.</li> <li>Between 2015 and 2021, Mercer County was included in one FEMA declaration</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>FEMA</li> <li>NOAA – NCEI Storm Database</li> </ul>



Section 4.1: Risk Assessment – Identification of Hazards of Concern

Hazard	Is this a hazard that may occur in Mercer County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
Rain/Sleet, Ice Storms)			related to severe winter weather: January 22-24, 2016, FEMA-DR-4264 – Severe Blizzard <ul style="list-style-type: none"> <li>NOAA-NCEI has indicated that Mercer County has experienced the impacts of several winter storm events between January 2015 and May 2019.</li> </ul>	<ul style="list-style-type: none"> <li>ONJSC</li> <li>Steering and Planning Committee Input</li> </ul>
Tornado	Yes	Yes	Please see Severe Weather	
Tsunami	No	No	<ul style="list-style-type: none"> <li>The NJ HMP does identify tsunami as a hazard of concern for New Jersey.</li> <li>Only a small area of southwest Mercer County is bounded by coastal waters. As such, tsunami is not identified as a hazard of concern by Mercer County.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> <li>NJ DEP</li> <li>Steering and Planning Committee Input</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 New Jersey.</li> </ul>	<ul style="list-style-type: none"> <li>NJ HMP</li> </ul>
Wildfire	Yes	Yes	<ul style="list-style-type: none"> <li>The NJHMP identifies as wildfire as a hazard of concern for New Jersey.</li> <li>In Mercer County 1,099 people and 428 building are located in the high, very high, and extreme wildfire fuel zones according to the New Jersey Forest Fires Service.</li> <li>Between January 2015 and May 2019, there have no reports of wildfires in Mercer County that could not be controlled by State and local fire services. However, based on input from the Planning Committee, wildfire is considered a hazard of concern for Mercer County due to the large areas of State forests and development proximate to these areas.</li> </ul>	<ul style="list-style-type: none"> <li>NOAA – NCEI Storm Events</li> <li>USGS</li> <li>NJ HMP</li> <li>NJFFS</li> <li>Steering and Planning Committee Input</li> </ul>
Windstorm	Yes	Yes	Please see Severe Weather	

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|-------------|--|--------------|--|
| <i>DIR</i>  | <i>Drought Impact Reporter</i>   | <i>NJDEP</i> | <i>New Jersey Department of Environmental Protection</i>   |
| <i>DR</i>   | <i>Presidential Disaster Declaration Number</i>                                      | <i>NJDOH</i> | <i>New Jersey Department of Health</i>                     |
| <i>EM</i>   | <i>Presidential Disaster Emergency Number</i>  | <i>NJFFS</i> | <i>New Jersey Forest Fire Service</i>                      |
| <i>FEMA</i> | <i>Federal Emergency Management Agency</i>   | <i>NJGS</i>  | <i>New Jersey Geological Survey (as part of the NJDEP)</i> |
| <i>HMP</i>  | <i>Hazard Mitigation Plan</i>  | <i>NOAA</i>  | <i>National Oceanic and Atmospheric Administration</i>     |
| <i>K</i>    | <i>Thousands (\$)</i>  | <i>NRCC</i>  | <i>Northeast Regional Climate Center</i>                   |
| <i>M</i>    | <i>Millions (\$)</i>   | <i>NWS</i>   | <i>National Weather Service</i>                            |
| <i>NCDC</i> | <i>National Oceanic and Atmospheric Administration National Climatic Data Center</i> | <i>OEM</i>   | <i>Office of Emergency Management</i>                      |
| <i>NDMC</i> | <i>National Drought Mitigation Center</i>  | <i>ONJSC</i> | <i>Office of New Jersey State Climatologist</i>            |
| <i>NHC</i>  | <i>NOAA NWS National Hurricane Center</i>  | <i>SPC</i>   | <i>Storm Prediction Center</i>                             |
| <i>NJ</i>   | <i>New Jersey</i>  | <i>USDA</i>  | <i>United States Department of Agriculture</i>             |
|             |  | <i>USGS</i>  | <i>U.S. Geologic Survey</i>                                |



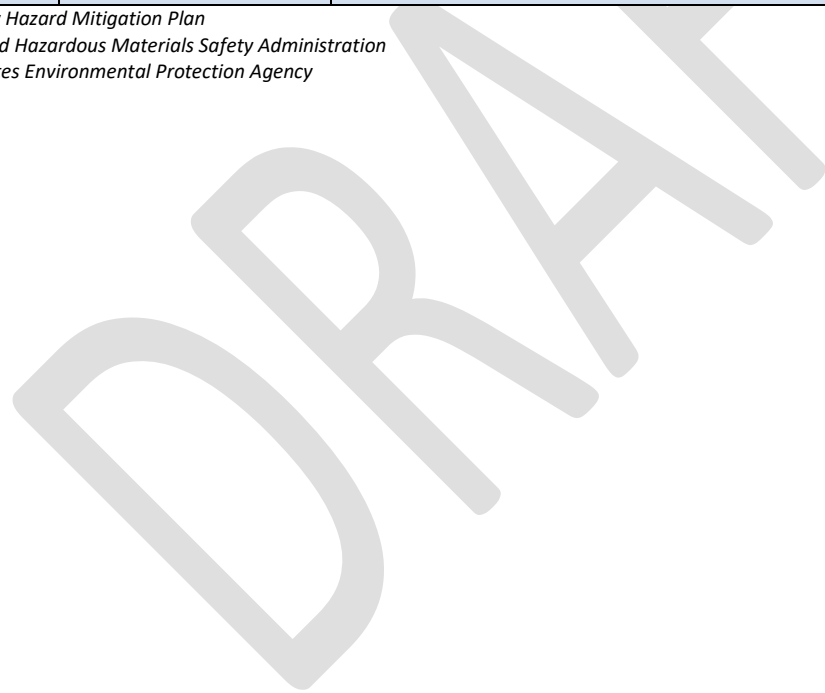


Table 4.1-2. Identification of Non-Natural Hazards of Concern for Mercer County

Hazard	Is this a hazard that may occur in Mercer County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
Hazardous Substances	Yes	Yes	<ul style="list-style-type: none"> <li>• The NJ HMP identifies hazardous substances as a hazard of concern for New Jersey.</li> <li>• Major highways, railways, and pipelines cross Mercer County.</li> <li>• Hazardous substances may also be transported via rail or pipeline in the County.</li> <li>• According to USEPA, between 2015 and 2019, Mercer County had a total of 43,329 pounds of chemicals released on-site and a total of 646 pounds of chemicals released off-site.</li> <li>• The Planning Committee identified hazardous substances as a hazard of concern for Mercer County due to its extensive transportation network and vulnerability to surrounding communities if there is a release.</li> </ul>	<ul style="list-style-type: none"> <li>• NJ HMP</li> <li>• NJ.com</li> <li>• US EPA</li> <li>• PHMSA</li> <li>• Steering and Planning Committee Input</li> </ul>

NJ HMP  
PHMSA  
USEPA

New Jersey Hazard Mitigation Plan  
Pipeline and Hazardous Materials Safety Administration  
United States Environmental Protection Agency





According to input from the County, and review of all available resources, a total of 12 natural hazards and one human-caused hazards of concern were identified as significant hazards affecting the entire planning area, to be addressed in this plan.

### **Natural Hazards of Concern**

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- Dam Failure
- Disease Outbreak
- Drought
- Earthquake
- Flood (including riverine, flash, sea level rise, urban flooding)
- Geological Hazards (landslide, subsidence, and sinkholes)
- Hurricane and Tropical Storm
- Infestation and Invasive Species (inclusive of harmful algal bloom)
- Nor'Easter
- Severe Weather (high winds, tornadoes, thunderstorms, hail, extreme temperatures)
- Severe Winter Weather (heavy snow, blizzards, ice storms)
- Wildfire

### **Human-Caused Hazards of Concern**

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- Hazardous Materials (Fixed Sites and Transportation)

There are other natural and human-caused hazard events that have occurred within Mercer County; however, they have a low probability of occurrence with significant impacts or are covered in other plans that specifically address technological and intentional hazards. 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 HMP.