



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 Morris County risk assessment presented in Section 4 and outlined as follows:

- Identification of hazards of concern that impact Morris 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

2020 HMP Changes

- The sections in the 2020 HMP have been realigned to increase the readability of the plan. Section 4.1 (formerly Section 5.2 in the 2015 HMP) now comprises the Identification of Hazards of Concern section of the plan.
- Radon was considered as a hazard of concern.
- The flood hazard has been expanded to include urban flooding locations.
- The disease outbreak hazard was organized to include a broader category of mosquito-borne diseases.
- The infestation hazard was organized to include a broader category of insects.
- Harmful algal bloom was added as a new hazard of concern evaluated for the 2020 HMP.

To provide a strong foundation for mitigation strategies considered in Section 6 (Mitigation Strategy), Morris 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), Morris 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 Morris County

Hazard	Is this a hazard that may occur in Morris 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"> The NJ HMP does not identify avalanche as a hazard of concern for New Jersey. The topography and climate of Morris 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 American Avalanche Association (AAA) between 1950 and 2014. 	<ul style="list-style-type: none"> 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 NJ HMP identifies coastal erosion as a hazard of concern for New Jersey. Counties bounded by coastal waters are most affected by coastal erosion. Morris County is not located in the Coastal Erosion Hazard Area (CEHA) and does not border coastal waters. 	<ul style="list-style-type: none"> NJ HMP NOAA Steering and Planning Committee Input
Coastal Storm	Yes	Yes	Please see Severe Storm	
Disease Outbreak	Yes	Yes	<ul style="list-style-type: none"> The NJ HMP identifies pandemic as a hazard of concern for New Jersey. The Planning Committee considers disease outbreak as a hazard of concern for Morris County due to its high population density and proximity to urban areas. In addition, the County has a high risk to mosquito and tick-borne disease. Between 2015 and 2019, Morris County was impacted by numerous cases of Lyme Disease, West Nile Virus, and Zika Virus. Morris County was part of a statewide emergency declaration for West Nile Virus in 2000 (EM-3156). Morris County is part of the COVID-19 pandemic declaration (DR-4488). 	<ul style="list-style-type: none"> NJ HMP NJDOH Steering and Planning Committee Input
Drought	Yes	Yes	<ul style="list-style-type: none"> The NJ HMP identifies drought as a hazard of concern for New Jersey. According to the NJHMP, counties most often affected by a drought are densely populated areas that rely on above-ground reservoirs for water supplies. The drought hazard is a concern for Morris 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. Since 2015, the County has been impacted four periods of drought: <ul style="list-style-type: none"> Moderate drought status from September 1 – December 28, 2015 Moderate drought status from May 12 – June 22, 2016. Moderate drought status from September 1 - December 28, 2016 Moderate drought status from June 14 - October 24, 2016, severe drought status from October 25, 2016 – March 20, 2017, and moderate drought status from March 21 – April 3, 2017. 	<ul style="list-style-type: none"> NJ HMP USGS NRCC NOAA NOAA-NCEI Storm Database Steering and Planning Committee Input



Section 4.1: Risk Assessment - Identification of Hazards

Hazard	Is this a hazard that may occur in Morris County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
Earthquake	Yes	Yes	<ul style="list-style-type: none"> 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). Between 1783 and 2017, there have been 214 documented earthquakes in New Jersey. Roughly a dozen of these events have been epicentered in Morris County. 	<ul style="list-style-type: none"> NJ HMP NJDEP NJGS Steering and Planning Committee Input
Expansive Soils	No	No	<ul style="list-style-type: none"> 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 Morris County. Morris County does not have record of impacts due to expansive soils. 	<ul style="list-style-type: none"> NJ HMP USGS 1989 Swelling Clays Map of the Conterminous U.S. Steering and Planning Committee Input
Extreme Temperature	Yes	Yes	<ul style="list-style-type: none"> The NJ HMP identifies extreme temperature as a hazard of concern for New Jersey as a type of severe weather. The NOAA-NCDC storm event database indicated that between January 2015 and May 2019, Morris County had eight reported extreme temperature events; six cold/wind chill events, one heat event, and one excessive heat event. 	<ul style="list-style-type: none"> NJ HMP NOAA – NCEI Storm Database ONJSC Steering and Planning Committee Input
Flood (Riverine and Urban Flooding)	Yes	Yes	<ul style="list-style-type: none"> The NJ HMP identifies flooding as a hazard of concern in New Jersey. There are 12,578 people in Morris County living in the 1% annual chance flood zone and 20,814 living in the 0.2% annual chance flood zone. Over 5,462 acres of the County is located in the 1% annual chance flood zone and over 8,727 acres in the 0.2% annual chance flood zone. The County has 3,918 NFIP policies with total loss payments equaling over \$191 million. According to NJ DEP, Morris County has a total of 224 dams; 40 of which are identified as high hazard. Dam failure is discussed in a separate hazard of concern. Between 1954 and 2019, Morris County was included in two FEMA declarations related to flooding: <ul style="list-style-type: none"> January 22-24, 2016– FEMA-DR-4264 – Severe Winter Storm and Snowstorm March 6-7, 2018 – FEMA-DR-4368 – Severe Winter Storm and Snowstorm According to NOAA NCEI storm database, Morris County had 12 flood events reported between January 2015 and May 2019. 	<ul style="list-style-type: none"> NJ HMP FEMA FEMA FIS NFIP NOAA-NCEI Storm Database Steering and Planning Committee Input
Geological Hazards	Yes	Yes	<ul style="list-style-type: none"> The NJ HMP identifies geological hazards as a hazard of concern for New Jersey. 	<ul style="list-style-type: none"> NJHMP NJGWS





Section 4.1: Risk Assessment - Identification of Hazards

Hazard	Is this a hazard that may occur in Morris 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"> There are abandoned mines throughout Morris County with a concentration in the western portion. There is carbonate rock present in Morris County that is susceptible to natural subsidence/sinkholes. There are areas susceptible to landslide events (Class AI, AII, AIV, AVI, BIII, and BIV) with documented historic landslide events throughout the County. Between January 2015 and May 2019, there have been no identified geological hazard events in Morris County. 	<ul style="list-style-type: none"> NJDEP Steering and Planning Committee Input
Hailstorm	Yes	Yes	Please see Severe Storm	
Hurricane (and other Tropical Cyclones)	Yes	Yes	Please see Severe Storm	
Ice Storm	Yes	Yes	Please see Severe Winter Storm	
Infestation	Yes	Yes	<ul style="list-style-type: none"> Morris County has a diverse landscape with development woven through natural areas. Pests in Morris County that compete for natural resources or transmit diseases to humans, livestock and the environment include insects, white-tailed deer, rodents and invasive plants. 	<ul style="list-style-type: none"> Steering and Planning Committee Input
Land Subsidence	Yes	No	Please see Geological Hazards	
Landslide	Yes	No	Please see Geological Hazards	
Nor'Easters	Yes	Yes	Please see Severe Winter Storm	
Radon	Yes	No	<ul style="list-style-type: none"> Morris County and municipalities are in Tiers 1 and 2 with high and moderate to potential of having radon concentrations greater than or equal to 4 pCi/L, respectively. Morris County has the following in place to mitigate the radon hazard: <ul style="list-style-type: none"> Revised building code requires radon control measures be installed for new construction Testing is required at time of real estate transaction; County already conducts education and outreach on this hazard: <ul style="list-style-type: none"> Morris County Office of Health Management has education and awareness materials available for residents such as January is Radon Month: Website: https://morriscountynj.gov/2017/01/morris-residents-january-is-radon-action-month-check-your-home-for-radon/ 	<ul style="list-style-type: none"> NJDEP: https://www.njradon.org/radonin.htm



Hazard	Is this a hazard that may occur in Morris 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"> Newsletter featuring radon: https://health.morriscountynj.gov/wp-content/uploads/2015/10/MCOHM-Newsletter-January-2016-Issue-1.pdf Education and awareness materials posted on the County website: DEP podcast on radon: https://njdep.podbean.com/e/episode-38-radon-action-month-with-anita-kopera/ News release: https://morriscountynj.gov/2016/01/radon-testing-of-homes-and-schools-urged-by-morris-county-office-of-health-management/ This hazard was not evaluated further in the 2020 HMP. 	
Severe Storm (Windstorms, Thunderstorms, Hail, Lightning, and Tornadoes)	Yes	Yes	<ul style="list-style-type: none"> The NJ HMP identifies severe weather as a hazard of concern for New Jersey. NOAA's NCEI storm events database indicates that Morris County was impacted by approximately 27 severe storm events between January 2015 and May 2019 causing one injury and one fatality and resulting in approximately \$10.51 thousand in property damages. New Jersey has experienced 91 tornadoes between 1986 and 2016, with one of those occurring in Morris County. Between 1842 and 2019, 26 tropical cyclones tracked within 65 nautical miles of Morris County, with none occurring between 2015 and 2019. The hazard, Severe Weather, was evaluated for the 2020 HMP to include hurricanes, tropical storms, windstorms, thunderstorms, hail, lightning and tornadoes). 	<ul style="list-style-type: none"> NJ HMP NOAA – NCEI FEMA NJ OEM SPC Steering and Planning Committee Input
Severe Winter Storm (Heavy Snow, Blizzards, Freezing Rain/Sleet, Ice Storms)	Yes	Yes	<ul style="list-style-type: none"> The NJHMP identifies severe winter weather as a hazard of concern for New Jersey. Normal seasonal snowfall in Morris County ranges between 26-35 inches. Between 2015 and 2019, Morris County was included in two FEMA declarations related to flooding: <ul style="list-style-type: none"> January 22-24, 2016– FEMA-DR-4264 – Severe Winter Storm and Snowstorm March 6-7, 2018 – FEMA-DR-4368 – Severe Winter Storm and Snowstorm NOAA-NCDC has indicated that Morris County has experienced the impacts of 11 winter storm events between January 2015 and May 2019. 	<ul style="list-style-type: none"> NJ HMP FEMA NOAA – NCEI Storm Database ONJSC Steering and Planning Committee Input
Tornado	Yes	Yes	Please see Severe Storm	
Tsunami	No	No	<ul style="list-style-type: none"> The NJ HMP does identify tsunami as a hazard of concern for New Jersey. 	<ul style="list-style-type: none"> NJ HMP



Hazard	Is this a hazard that may occur in Morris 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"> Morris County is not bounded by coastal waters; therefore, tsunami is not identified as a hazard of concern by Morris County. 	<ul style="list-style-type: none"> Steering and Planning Committee Input
Volcano	No	No	<ul style="list-style-type: none"> The NJ HMP does not identify volcano as a hazard of concern for New Jersey. 	<ul style="list-style-type: none"> NJ HMP
Wildfire	Yes	Yes	<ul style="list-style-type: none"> The NJHMP identifies as wildfire as a hazard of concern for New Jersey. In Morris County, approximately 17.7 square miles are located in the high to extreme wildfire fuel hazard risk area. With the exception of controlled brush fires, between January 2015 and May 2019, there have no reports of wildfires in Morris County. This hazard was determined to be included by the Planning Partnership. 	<ul style="list-style-type: none"> NJ HMP NJFFS Steering and Planning Committee Input
Windstorm	Yes	Yes	Please see Severe Storm	

DIR Drought Impact Reporter
 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
 NJ New Jersey
 NJDEP New Jersey Department of Environmental Protection

NJDOH New Jersey Department of Health
 NJFFS New Jersey Forest Fire Service
 NJGS New Jersey Geological Survey (as part of the NJDEP)
 NOAA National Oceanic and Atmospheric Administration
 NRCC Northeast Regional Climate Center
 NWS National Weather Service
 OEM Office of Emergency Management
 ONJSC Office of New Jersey State Climatologist
 SPC Storm Prediction Center
 USGS U.S. Geologic Survey





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

Hazard	Is this a hazard that may occur in Morris 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"> • The NJ HMP identifies hazardous substances as a hazard of concern for New Jersey. • Morris County contains numerous roadways and railways that transport hazardous substances. Between 2015 and 2016, there have been 56 highway accidents involving hazardous material in the County. Between 2015 and 2018, the County had a total of over 165,000 gallons of chemical released on-site and 100,000 gallons released off-site. • The Planning Committee identified hazardous substances as a hazard of concern for Morris County due to its extensive transportation network and vulnerability. 	<ul style="list-style-type: none"> • NJ HMP • NJ.com • USEPA • PHMSA • Steering and Planning Committee Input

FEMA Federal Emergency Management Agency
 HMP Hazard Mitigation Plan
 NJ New Jersey
 PHMSA Pipeline and Hazardous Materials Safety Administration
 USEPA U.S. 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 at the county level in this plan:

Natural Hazards of Concern

- Dam Failure
- Disease Outbreak (Mosquito-Borne Diseases, Tick-Borne Diseases, Campylobacteriosis, Influenza, Mumps, Ebola, Coronavirus)
- Drought
- Earthquake
- Extreme Temperature (heat and cold)
- Flood (including urban flooding)
- Geological Hazards (landslide, subsidence, and sinkholes)
- Harmful Algal Bloom
- Infestation (Insects [e.g. Gypsy Moth, Mosquitoes, Spotted Lanternfly, Emerald Ash Borer], White-Tailed Deer, Rodents)
- Severe Weather (Hurricanes, Tropical Storms, High Winds, Tornadoes, Thunderstorms, Hail, Lightning)
- Severe Winter Storm (Heavy Snow, Blizzards, Ice Storms)
- Wildfire

Human-Caused Hazards of Concern

- Hazardous Materials (Fixed Sites and In Transit)

Other natural hazards of concern have occurred within Morris 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 HMP.