



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

- Identification of hazards of concern that impact Sussex 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 increased discussion of urban flooding and two new hazards of concern: disease outbreak and infestation and invasive species.

To provide a strong foundation for mitigation strategies considered in Section 6 (Mitigation Strategy) and Section 9 (Jurisdictional Annexes), Sussex County considered a full range of 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), Sussex 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 Sussex County

| Hazard | Is this a hazard that may occur in Sussex 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 Sussex 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 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. Sussex County is not bounded by coastal waters or located in the Coastal Erosion Hazard Area (CEHA). | <ul style="list-style-type: none"> NJ HMP NOAA Steering and Planning Committee Input |
| Coastal Storm | Yes | Yes | See Hurricane and Nor'Easter | |
| Dam Failure | Yes | Yes | <ul style="list-style-type: none"> The NJ HMP identifies dam failure as a hazard of concern for New Jersey. According to NJDEP, Sussex County has 239 dams (40 high hazard, 41 significant hazard, 158 low hazard). | <ul style="list-style-type: none"> NJ HMP NJ DEP Steering and Planning Committee Input |
| Disease Outbreak | Yes | Yes | <ul style="list-style-type: none"> The NJ HMP identifies pandemic as a hazard of concern for New Jersey. 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. Sussex County has been impacted by mosquito and tick-borne diseases, food-borne illness and most recently the COVID-19 pandemic. Sussex 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. | <ul style="list-style-type: none"> NJ HMP FEMA 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. The drought hazard is a concern for Sussex 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. Nearly 10% of the County’s land use is agricultural and agriculture is an important economic sector to plan participants. The USDA declared an agricultural disaster for Sussex County in 2015 (excessive heat and drought). | <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 of Concern

| Hazard | Is this a hazard that may occur in Sussex 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). Sussex County is located in the Highlands and Valley and Ridge Physiographic Provinces and near the Ramapo Fault line. Since 2015, there have been two earthquakes in the region that were felt in Sussex County. | <ul style="list-style-type: none"> NJ HMP NJDEP NJGS Steering and Planning Committee Input |
| Expansive Soils | Yes | No | <ul style="list-style-type: none"> The NJ HMP does not identify expansive soils as a hazard of concern for New Jersey. 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. According to the USGS 1989 Swelling Clays Map of the Conterminous United States, Sussex 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 Sussex County. | <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 | Please see Severe Weather. | |
| Flood (Riverine, Flash Flooding, and Urban Flooding) | Yes | Yes | <ul style="list-style-type: none"> The NJ HMP identifies flooding as a hazard of concern in New Jersey. Sussex County has 28 NFIP policies and 243 Write-Your-Own policies. There has been a total of over \$1.7 million paid claims in Sussex County. There are 16 repetitive and severe repetitive loss properties in the County. A total of 66 facilities identified as lifelines in Sussex County are exposed to the 1-percent annual chance flood hazard event. | <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. There have been historic debris flow, rockfall and rockslide landslide events in Sussex County. Carbonate rock formations are found in the northern portion of the County which are susceptible to natural subsidence. The southeastern areas of Sussex County contain numerous abandoned mines. | <ul style="list-style-type: none"> NJHMP NJGWS NJDEP Steering and Planning Committee Input |





Section 4.1: Risk Assessment – Identification of Hazards of Concern

| Hazard | Is this a hazard that may occur in Sussex 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"> Between 2015 and 2020, there have been no identified geological hazard events in Sussex County. | |
| Hailstorm | Yes | Yes | Please see Severe Weather. | |
| Hurricane (and other Tropical Cyclones) | Yes | Yes | <ul style="list-style-type: none"> The NJ HMP identifies hurricanes/tropical storms as hazards of concern for New Jersey. Due to its proximity to the Atlantic Ocean, Sussex County is susceptible to hurricanes and tropical storms. In 2020, two tropical storms came within 65 nautical miles of Sussex County. | <ul style="list-style-type: none"> NJ HMP FEMA NOAA-NHC NOAA-NCEI Storm Database Steering and Planning Committee Input |
| Ice Storm | Yes | Yes | Please see Severe Winter Weather. | |
| Infestation and Invasive Species | Yes | Yes | <ul style="list-style-type: none"> Sussex County has a diverse landscape with development woven through natural areas. Pests in Sussex County that compete for natural resources or transmit diseases to humans, livestock and the environment include insects and invasive plants. Due to large forested areas and the abundance of parkland throughout the County, pests that damage trees have become an increased focus. Sussex County has experienced harmful algal blooms in the past causing impacts to natural systems and the local economy. Infestation and invasive species is added as a new hazard of concern to the 2021 HMP update. | <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 | <ul style="list-style-type: none"> The NJ HMP identifies Nor'Easters as a hazard of concern for New Jersey. Due to its proximity to the Atlantic Ocean and location geographically, Sussex County is susceptible to Nor'Easters. Between 2015 and 2020, Sussex County experienced several impactful Nor'Easter events. | <ul style="list-style-type: none"> NJ HMP FEMA NOAA NOAA-NCEI Storm Database Steering and Planning Committee Input |
| Radon | Yes | No | <ul style="list-style-type: none"> 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. The NJ HMP does not identify radon as a hazard of concern for New Jersey. | <ul style="list-style-type: none"> NJ HMP |



Section 4.1: Risk Assessment – Identification of Hazards of Concern

| Hazard | Is this a hazard that may occur in Sussex 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"> The revised building code requires radon control measures be installed for new construction. Testing is required at time of real estate transactions. The Sussex County Division of Health has information regarding this hazard posted on their website. https://www.sussex.nj.us/cn/webpage.cfm?tpid=9641 The Borough of Franklin has information on their municipal website with the radon map and the Radon Awareness Program: http://www.franklinborough.org/. The Mayor of Franklin declared February Radon Awareness Month as noted in their Press Release. Hampton Township advertises on their website that residents can obtain free radon testing kits at municipal offices: http://www.hamptontownshipnj.info/. In addition, the Township’s proclamation identifies January as Radon Awareness Month. This hazard was not evaluated further in the 2021 HMP. | |
| Severe Weather (Extreme Temperatures, 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. Severe weather events occur annually in Sussex County causing a range of impacts from property damage, flooding and loss of power. NOAA’s NCEI storm events database indicates that Sussex County was impacted by approximately 45 severe weather events between 2015 and 2020. The largest hailstone on record for Sussex County was 1.75 inches. The strongest tornado on record in Sussex County was an EF-2. The NJ HMP identifies extreme temperature as a hazard of concern for New Jersey as a type of severe weather. Sussex County has experienced excessive heat and extreme cold temperature events. | <ul style="list-style-type: none"> NJ HMP NOAA – NCEI FEMA NJ OEM ONJSC Steering and Planning Committee Input |
| Severe Winter Weather (Heavy Snow, Blizzards, Freezing Rain/Sleet, Ice Storms) | Yes | Yes | <ul style="list-style-type: none"> The NJ HMP identifies severe winter weather as a hazard of concern for New Jersey. Normal seasonal snowfall in Sussex County ranges between 40 to 50 inches. NOAA-NCEI has indicated that Sussex County has experienced the impacts of 16 severe winter weather events between 2015 and 2020. | <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 Weather. | |
| Tsunami | No | No | <ul style="list-style-type: none"> The NJ HMP does identify tsunami as a hazard of concern for New Jersey. Sussex County is not bounded by coastal waters; therefore, tsunami is not identified as a hazard of concern. | <ul style="list-style-type: none"> NJ HMP Steering and Planning Committee Input |





Section 4.1: Risk Assessment – Identification of Hazards of Concern

| Hazard | Is this a hazard that may occur in Sussex County? | If yes, does this hazard pose a significant threat to the County? | Why was this determination made? | Source(s) |
|-----------|---|---|--|--|
| 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 NJ HMP identifies as wildfire as a hazard of concern for New Jersey. In Sussex County, nearly 70 square miles are located in the extreme and very high wildfire fuel zones according to the New Jersey Forest Fires Service. Between 2015 and 2020, there was one wildfire in Sussex County that damaged a home. Based on input from the Planning Committee, wildfire is considered a hazard of concern for Sussex County due to the large areas of State forests and development proximate to these areas. | <ul style="list-style-type: none"> NOAA – NCEI Storm Events Query USGS NJ HMP NJFFS Steering and Planning Committee Input |
| Windstorm | Yes | Yes | Please see Severe Weather. | |

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

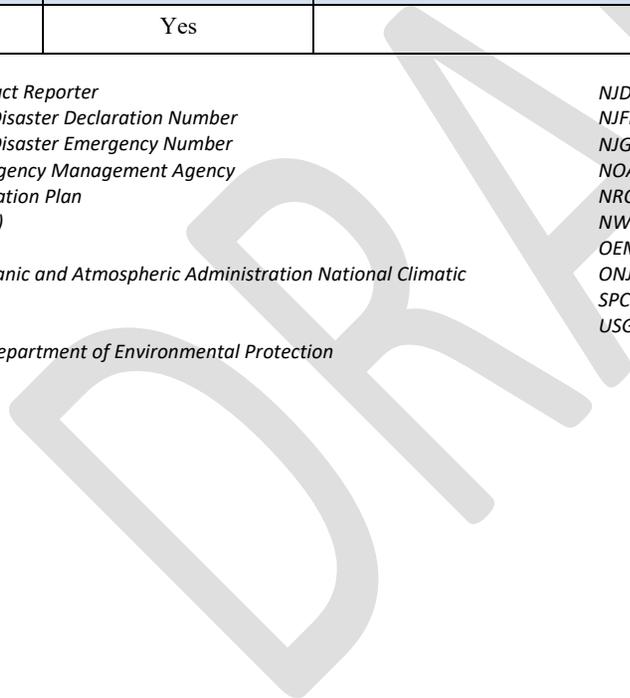




Table 4.1-2. Identification of Non-Natural Hazards of Concern for Sussex County

| Hazard | Is this a hazard that may occur in Sussex 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. • Major highways in the County over which hazardous materials are transported daily include U.S. Route 206 and State Highway 15. • Hazardous substances may also be transported via rail or pipeline in the County. • Between 2015 and 2018, Sussex County had a total of 36,960 pounds of chemicals released on-site (USEPA 2020). • In 2015, a rail accident occurred involving hazardous materials. • The Planning Committee identified hazardous substances as a hazard of concern for Sussex County due to its extensive transportation network and vulnerability to surrounding communities if there is a release. | <ul style="list-style-type: none"> • NJ HMP • NJ.com • USEPA • PHMSA • Steering and Planning Committee Input |

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 hazard of concern were identified as significant hazards affecting the entire planning area, to be addressed in this plan.

Natural Hazards of Concern:

- Dam Failure
- Disease Outbreak
- Drought
- Earthquake
- Flood (including riverine, flash, urban flooding)
- Geologic (landslide, subsidence, and sinkholes)
- Hurricane and Tropical Storm
- Infestation and Invasive Species
- Nor'Easter
- Severe Weather (High Winds, Tornadoes, Thunderstorms, Hail)
- Severe Winter Weather (Heavy Snow, Blizzards, Ice Storms)
- Wildfire

Human-Caused Hazards of Concern:

- Hazardous Materials (Fixed Sites and Transportation)

There are other natural and human-caused hazard events that have occurred in Sussex County; however, they have a low potential to occur or are covered in other plans that specifically address technological and intentional hazards. Therefore, these hazards will not be further addressed in the 2021 HMP. However, if deemed necessary by the County, these hazards may be considered in future versions of this plan.