

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

- Identification of Hazards of Concern that impact Camden 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

2022 HMP Changes

- The 2017 NJ4HMP 'Hazard Identification and Risk Assessment' was presented in section 3. For the 2022 HMP update, it is presented in subsection 4.1 (Identification of Hazards of Concern).
- The 2022 HMP hazard profiles have been updated to include the following: the Flood hazard includes more discussion of urban flooding and storm surge; the Dam and Levee Failure hazard has been combined into one section (Section 4.3.2); two new hazards of concern have been added – Disease Outbreak and Pandemic, and Invasive Species and Harmful Algal Blooms.

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.

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

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. Camden 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.

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

Hazard	Is this a hazard that may occur in Camden 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 Camden 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	Yes	Yes	<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. Camden County is located in the Coastal Erosion Hazard Area (CEHA) due to tidal waters that may cause erosion along the Delaware River. This hazard is discussed in Section 4.3.1 (Coastal Erosion and Sea Level Rise). 	<ul style="list-style-type: none"> NJ HMP NOAA Steering and Planning Committee Input
Coastal Storm	Yes	Yes	<ul style="list-style-type: none"> The NJ HMP identifies hurricanes/tropical storms and nor'easters as hazards of concern for New Jersey. Due to its proximity to the Atlantic Ocean, Camden County is susceptible to hurricanes, tropical storms, and Nor'easters. Between 2015 and 2019, Camden County was included in two FEMA declarations related to coastal storms: <ul style="list-style-type: none"> June 23, 2015 – FEMA DR-4231 – Severe Storm March 6-7, 2018 – FEMA-DR-4368 – Severe Winter Storm and Snowstorm Between 1842 and 2019, 47 tropical cyclones tracked within 65 nautical miles of Camden County. This hazard is discussed in Section 4.3.9 (High Wind). 	<ul style="list-style-type: none"> NJ HMP FEMA NOAA NOAA-NCDC Storm Database Steering and Planning Committee Input
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, Camden County has 1 high hazard dams, 19 significant hazard dams, and 57 low hazard dams. 	<ul style="list-style-type: none"> NJ HMP NJ DEP

Hazard	Is this a hazard that may occur in Camden 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"> This hazard is discussed in Section 4.3.2 (Dam and Levee Failure). 	<ul style="list-style-type: none"> 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. Camden County has been impacted by mosquito and tick-borne diseases, food-borne illness and most recently the COVID-19 pandemic. Camden 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 Camden 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. The USDA has declared disasters for Camden County in 2015 (Excessive Heat and Drought), 2016 (Combined Effects of Freeze, Excessive Heat, and Drought), 2018 (Excessive Heat and Drought) and 2019 (Drought). This hazard is discussed in Section 4.3.4 (Drought). 	<ul style="list-style-type: none"> NJ HMP USGS NRCC NOAA NOAA-NCEI Storm Database Steering and Planning Committee Input
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). Soil types in Camden County include NHERP Class C, D, and E, which exacerbate ground shaking. Since 1991, there have been 5 earthquakes with epi-centers in Camden County. The February 1993 event had the greatest magnitude of 2.5 with the epi-center located in Cherry Hill Township This hazard is discussed in Section 4.3.5 (Earthquake). 	<ul style="list-style-type: none"> NJ HMP NJDEP NJGS Steering and Planning Committee Input

Hazard	Is this a hazard that may occur in Camden County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
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 Camden 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. 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 Camden 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	<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. Camden County has experienced excessive heat and extreme cold temperature events. Camden County was included in 6 USDA declared disasters for excessive heat between 2015 and 2020. Camden County was included in a FEMA declaration DR-4264 in January 2016 for a severe winter storm and snowstorm that was accompanied by freezing temperatures. This hazard is discussed in Section 4.3.6 (Extreme Temperatures). 	<ul style="list-style-type: none"> NJ HMP NOAA – NCEI Storm Database ONJSC Steering and Planning Committee Input
Flood (Riverine, Flash Flooding, Urban Flooding and Sea Level Rise)	Yes	Yes	<ul style="list-style-type: none"> The NJ HMP identifies flooding as a hazard of concern in New Jersey. The County has 1,638 active NFIP policies. There has been a total of nearly \$6.5 million paid claims in Camden County. There are 83 repetitive and 12 severe repetitive loss properties in the County. This hazard is discussed in Section 4.3.7 (Flood). 	<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

Hazard	Is this a hazard that may occur in Camden 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"> Carbonate rock formations are found in the northern portion of the County which are susceptible to natural subsidence. Between January 2015 and May 2021, there have been no identified geological hazard events in Camden County. This hazard is discussed in Section 4.3.8 (Geological Hazards). 	<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 Coastal Storm	
Ice Storm	Yes	Yes	Please see Severe Winter Storm	
Infestation and Invasive Species	Yes	Yes	<ul style="list-style-type: none"> Camden County has a diverse landscape with development woven through natural areas. Pests in Camden County that compete for natural resources or transmit diseases to humans, livestock and the environment include insects and invasive plants. Due to the large forested area in the southern portion of the County and the abundance of parkland throughout, Emerald Ash Borer (EAB) and other pests that damage trees have become an increased focus. Camden County has experienced harmful algal blooms in the past causing impacts to natural systems and the local economy. Infestation and invasive species has been added as a new hazard of concern to the 2020 HMP update. This hazard is discussed in Section 4.3.10 (Invasive Species and Harmful Algal Bloom). 	<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 Storm	
Radon	No	No	<ul style="list-style-type: none"> The NJ HMP does identify Radon Exposure as a hazard of concern for New Jersey. 	<ul style="list-style-type: none"> NJDEP: https://www.njradon.org/radonin.htm

Hazard	Is this a hazard that may occur in Camden 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 majority of Camden County classified as Tier 2 for Moderate Radon exposure; however, this has not been identified as a hazard of concern by Camden County. 	
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. Severe weather events occur annually in Camden County causing a range of impacts from property damage, flooding and loss of power. NOAA's NCEI storm events database indicates that Camden County was impacted by approximately 193 severe storm events between 1950 and 2020. The strongest tornado on record in Camden County was an F-2. This hazard is discussed in Section 4.3.9 (High Wind). 	<ul style="list-style-type: none"> NJ HMP NOAA – NCEI FEMA NJ OEM 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 NJ HMP identifies severe winter weather as a hazard of concern for New Jersey. Normal seasonal snowfall in Camden County is 13-15 inches. Between 1950 to 2020, Camden County was included in six FEMA declarations related to severe winter weather. NOAA-NCDC has indicated that Camden County has experienced the impacts of several winter storm events between January 2015 and 2020. This hazard is discussed in Section 4.3.12 (Severe Winter Weather). 	<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 not identify tsunami as a hazard of concern for New Jersey. None of Camden County is bounded by coastal waters; therefore, tsunami is not identified as a hazard of concern by Camden County. 	<ul style="list-style-type: none"> NJ HMP 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 Camden County, greater than 10 square miles are located in the extreme and very high wildfire fuel zones according to the New Jersey Forest Fires Service. 	<ul style="list-style-type: none"> NOAA – NCEI Storm Events Query USGS NJ HMP NJFFS

Hazard	Is this a hazard that may occur in Camden County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
Windstorm	Yes	Yes	<ul style="list-style-type: none"> Between January 2015 and May 2019, there have no reports of wildfires in Camden 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 Camden County due to the large areas of State forests and development proximate to these areas. This hazard is discussed in Section 4.3.13 (Wildfire). 	<ul style="list-style-type: none"> Steering and Planning Committee Input

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 Camden County

Hazard	Is this a hazard that may occur in Camden County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
Hazardous Substances	Yes	No	<ul style="list-style-type: none"> The NJ HMP identifies hazardous substances as a hazard of concern for New Jersey. Major highways and transportation systems that traverse Camden County may transport hazardous materials. Hazardous substances may also be transported via rail or pipeline in the County. The Planning Committee does not identify Hazardous Substances as a hazard of concern for Camden County. 	<ul style="list-style-type: none"> NJ HMP NJ.com US EPA 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

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According to input from the County, and review of all available resources, a total of 13 natural hazards 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

- Coastal Erosion and Sea Level Rise
- Dam and Levee Failure
- Disease Outbreak and Pandemic
- Drought
- Earthquake
- Extreme Temperature
- Flood (including riverine, flash, urban and stormwater flooding, and storm surge)
- Geological Hazards (landslide, subsidence, and sinkholes)
- High Wind (Straight-Line Winds, High-Speed Winds associated with Thunderstorms, Coastal Storms [i.e., Hurricanes, Tropical Storms, Nor'easters] and Tornadoes)
- Invasive Species and Harmful Algal Blooms
- Severe Summer Weather (Hail and Lightning)
- Severe Winter Storm (Heavy Snow, Blizzards, Ice Storms)
- Wildfire

Other natural and human-caused hazards of concern have occurred within Camden County, have a low potential to occur and/or result in significant impacts within the County, 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.