

## SECTION 4. RISK ASSESSMENT

### 4.1 IDENTIFICATION OF HAZARDS OF CONCERN

To provide a strong foundation for mitigation actions considered in Section 6 (Mitigation Strategy) and Section 9 (Jurisdictional Annexes), Rockland County focused on a full range of hazards that could impact the area and then identified and ranked those hazards that presented the greatest concern. The hazard of concern identification process incorporated input from the County and participating jurisdictions; review of the New York State Hazard Mitigation Plan (NYS HMP 2019); review of the 2018 Rockland County HMP; 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.

**Hazards of concern** are those hazards that are considered most likely to impact a community. These are identified using available data and local knowledge.

**Natural hazards** are those hazards that are a source of harm or difficulty created by a meteorological, environmental, or geological event.

#### 4.1.1 Changes from 2018 Hazard Mitigation Plan

Many of the hazards of concern for the Rockland County 2024 HMP update are the same as the County's 2018 HMP. The 2024 update includes best available data throughout the plan to present an updated understanding of the County's hazard risk. The following changes were made for the 2024 HMP:

- In 2018, dam failure was included in the flood profile. For the 2024 update, dam failure is a standalone hazard of concern.
- The prior plan did not address disease outbreak as a natural hazard of concern. Beginning in March 2020, Rockland County was hit with the COVID-19 pandemic, along with the rest of the world. The impacts this outbreak had on the County led to the inclusion of disease outbreak as a hazard of concern in the 2024 HMP.

#### 4.1.2 Hazard Groupings

For this HMP, the Steering Committee, as defined in Section 2 (Planning Process), grouped some natural hazards together, based on the similarity of hazard events, their typical concurrence, their impacts, hazard groupings in the 2019 State of New York HMP, and consideration of how hazards are grouped in FEMA guidance documents ("Understanding Your Risks, Identifying Hazards and Estimating Losses" (FEMA 386-2); "Multi-Hazard Identification and Risk Assessment – The Cornerstone of the National Mitigation Strategy").

#### 4.1.3 Hazards of Concern for the 2024 HMP

Based on input from the County and review of all available resources, 10 hazards were identified as hazards of concern affecting Rockland County and will be assessed in the 2024 HMP, as explained in Table 4.1-1. The hazards include:



The *Dam Failure* hazard can be caused by human-caused accidents and natural disasters such as floods, earthquakes, and landslides. The *Dam Failure* hazard can be caused by human-caused/made accidents and natural disasters such as floods,



earthquakes, and landslides. Potential dam breaks are classified into either high hazard, significant hazard, and low hazard. High hazard dam breaks would most likely result in loss of life and significant property damage.

The *Disease Outbreak* hazard exists when there are more cases of a particular disease than expected in a given area, or among a specific group of people, over a particular period of time. An aggregation of cases in a given area over a particular period, regardless of the number of cases, is called a cluster. In an outbreak or epidemic, it is presumed that the cases are related to one another or that they have a common cause.



A *Drought* is a period characterized by long durations of below normal precipitation. Drought is a temporary irregularity that can affect agriculture, water supply, aquatic ecology, wildlife, and plant life.



An *Earthquake* is the sudden movement of the earth’s surface caused by the release of stress accumulated within or along the edge of the earth’s tectonic plates, a volcanic eruption, or a human-caused explosion.



The *Extreme Temperature* hazard includes both heat and cold events, which can have a significant impact to human health, commercial/agricultural businesses, and primary and secondary effects on infrastructure (e.g., burst pipes and power failure). What constitutes “extreme cold” or “extreme heat” can vary across different areas of the country based on what the population is accustomed to. The 2024 HMP considers the heat island effect that occurs within developed areas.



The *Flood* hazard includes riverine flooding, lakeshore, flash flooding, shallow flooding, ice jam flooding, urban drainage flooding, and dam failure flooding. 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 and the NYS HMP.



The *Landslide* hazard includes rock falls, rock topples, rotational slump, transitional slide, earth flows, creep, block slides, debris avalanche, and debris flows.



The *Severe Storm* hazard includes windstorms that often entail a variety of other influencing weather conditions, including thunderstorms, hail, lightning, and tornadoes. Tropical disturbances (hurricanes, tropical storms, and tropical depressions) are often identified as a type of severe storm. For this HMP update, Severe Storm includes thunderstorms, hail, lightning, tornadoes, hurricanes, and tropical storms.



The *Severe Winter Storm* hazard includes blizzards, ice storms, snowstorms, sleet, and freezing rain. Winter storms create a higher risk of car accidents, hypothermia, frostbite, carbon monoxide poisoning, and heart attacks from overexertion. Winter storms including blizzards can bring extreme cold, freezing rain, snow, ice and high winds.



The *Wildfire* hazard can be defined as any non-structural fire that occurs in the wildland. Three distinct types of wildland fires have been defined and include naturally occurring wildfire, human-caused wildfire, and prescribed fire. They may be highly destructive and become difficult to control. Wildfires result in the disturbance of forest and brush and destruction of real estate and personal property and have secondary impacts on other hazards, such as flooding, by removing vegetation and disturbing watersheds.

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

Hazard	Is this a hazard that may occur in Rockland County?	If yes, does this hazard pose a significant threat to Rockland County?	Why was this determination made?	Source(s)
Avalanche	No	No	<ul style="list-style-type: none"> <li>The 2019 NYS HMP identifies avalanche as a hazard of concern.</li> <li>The topography and climate of Rockland County does not support the occurrence of an avalanche.</li> <li>New York State, in general, has a very low occurrence of avalanche events based on statistics provided by National Avalanche Center – American Avalanche Association (NAC-AAA) between 1998 and 2018.</li> <li>Avalanche was identified as a hazard in the NYS HMP, and there have been occurrences in the state; however, there were no occurrences in Rockland County.</li> <li>The Steering Committee and Planning Partnership do not consider the hazard to be a significant concern.</li> </ul>	<ul style="list-style-type: none"> <li>NYS Division of Homeland Security and Emergency Services (DHSES)</li> <li>NAC-AAA</li> <li>Input from Steering and Planning Committees</li> </ul>
Coastal Hazards	No	No	<ul style="list-style-type: none"> <li>The NYS HMP identifies coastal erosion as a hazard of concern for New York State. Erosion can impact of all the state’s coastal counties along Lake Erie and the Niagara River, Lake Ontario and the St. Lawrence River, Atlantic Ocean and Long Island Sound, Hudson River south of the federal dam in Troy, the East River, the Harlem River, the Kill van Kull and Arthur Kill, and all connecting waterbodies, bays, harbors, shallows, and wetlands.</li> <li>Although the Hudson River forms the eastern border of Rockland County, the geology of Rockland County does not make it susceptible to coastal erosion.</li> <li>The Steering Committee and Planning Partnership do not consider the hazard to be a significant concern.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Steering Committee and Planning Partnership</li> </ul>
Dam Failure	Yes	Yes	<ul style="list-style-type: none"> <li>The 2019 NYS HMP does not identify dam failure as a hazard of concern, though it is included in the Flood hazard profile. The 2019 NYS HMP does not identify dam failure as a hazard of concern, though it is included in the Flood hazard profile.</li> <li>According to the NYS DHSES, there are 32 dams in Rockland County, 13 of which are high hazard dams.</li> <li>The Steering Committee and Planning Partnership has identified dam failure as a hazard of concern for Rockland County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Steering Committee and Planning Partnership</li> <li>New York State Department of Environmental Conservation (NYSDEC)</li> <li>NYS Geographic Information System (GIS)</li> </ul>

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Disease Outbreak	Yes	Yes	<ul style="list-style-type: none"> <li>The 2019 NYS HMP does not identify disease outbreak as a hazard of concern. The 2019 NYS HMP does not identify disease outbreak as a hazard of concern.</li> <li>The County has been impacted by various diseases (e.g., influenza, COVID-19) in recent years.</li> <li>The Steering Committee and Planning Partnership has identified disease outbreak as a hazard of concern for Rockland County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>NYS DEC</li> <li>Input from Steering Committee and Planning Partnership</li> </ul>
Drought	Yes	Yes	<ul style="list-style-type: none"> <li>The NYS HMP identifies drought as a hazard of concern for the state. Rockland County has been impacted by several drought events that have occurred in New York State.</li> <li>Rockland has been impacted by water shortages as a result of drought-related events.</li> <li>New York State was included in one FEMA drought-related disaster declaration (DR-204), which did include Rockland County.</li> <li>Rockland County was included in one recent drought-related U.S. Department of Agriculture (USDA) disaster declaration (S5306) in 2022.</li> <li>The Steering Committee and Planning Partnership has identified drought as a hazard of concern for Rockland County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>FEMA</li> <li>USDA</li> <li>Input from Steering Committee and Planning Partnership</li> <li>National Centers for Environmental Information (NCEI)</li> <li>Northeast Regional Climate Center (NRCC)</li> </ul>
Earthquake	Yes	Yes	<ul style="list-style-type: none"> <li>The NYS HMP identified earthquake as a hazard of concern for the state.</li> <li>The probability of a strong earthquake occurring is moderate.</li> <li>New York State was included in one FEMA earthquake-related disaster declaration (DR-1415); Rockland County was not included in this declaration.</li> <li>From 2017 to 2023, there have been no significant earthquakes with an epicenter in Rockland County. From 2017 to 2023, there have been no significant earthquakes with an epicenter in Rockland County.</li> <li>Based on input from the Steering Committee and Planning Partnership, earthquake has been identified as a hazard of concern for Rockland County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Steering Committee and Planning Partnership</li> <li>U.S. Geological Survey (USGS) – Earthquake Hazards Program, Review of USGS Seismic Maps</li> </ul>
Extreme Temperature (cold and heat)	Yes	Yes	<ul style="list-style-type: none"> <li>The NYS HMP identifies Coldwaves and Heatwaves as hazards of concern for New York State.</li> <li>From 2018 and 2023, Rockland County was not included in any USDA disaster declarations related to extreme temperature.</li> <li>From 1954 to 2023, Rockland County was not included in any FEMA extreme temperature-related disaster declarations.</li> <li>The Steering Committee and Planning Partnership identified extreme temperature as a hazard of concern for Rockland County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Steering Committee and Planning Partnership</li> <li>NOAA-NCEI</li> <li>USDA</li> </ul>

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Flood (riverine, ice jam, urban flooding, and flash flooding)	Yes	Yes	<ul style="list-style-type: none"> <li>The NYS HMP identifies flooding as a hazard of concern. The NYS HMP identifies flooding as a hazard of concern.</li> <li>Between 1956 and 2023, Rockland County was included in the following eight FEMA flood-related declarations:                             <ul style="list-style-type: none"> <li>FEMA DR-311; September 13, 1971; New York Severe Storms, Flooding</li> <li>FEMA DR-338; June 23, 1972; New York Tropical Storm Agnes</li> <li>FEMA DR-487; October 2, 1975; New York Severe Storms, Heavy Rain, Landslides, Flooding</li> <li>FEMA DR-702; March 28 – April 8, 1984; New York Coastal Storms, Flooding</li> <li>FEMA DR-974; December 10-14, 1992; New York Coastal Storm, High Tides, Heavy Rain, Flooding</li> <li>FEMA DR-1534; May 13-June 17, 2004; New York Severe Storms and Flooding</li> <li>FEMA DR-1899; March 13-31, 2010; New York Severe Storms and Flooding</li> <li>FEMA DR-4723; July 9-10, 2023; New York Severe Storms and Flooding</li> </ul> </li> <li>Between 2014 and 2023, Rockland County was included in one flood related USDA disaster declaration (S3747).</li> <li>Based on the history of flooding and its impacts on Rockland County and input from the Steering Committee and Planning Partnership, flooding has been identified as a hazard of concern for the County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Steering Committee and Planning Partnership</li> <li>FEMA</li> <li>NOAA-National Centers for Environmental Information (NCEI)</li> <li>Cold Regions Research and Engineering Laboratory (CRREL)</li> </ul>
Landslide	Yes	Yes	<ul style="list-style-type: none"> <li>The 2019 NYS HMP includes landslide as a hazard of concern. The 2019 NYS HMP includes landslide as a hazard of concern.</li> <li>Between 1954 and 2022, New York State has included in one landslide-related disaster declaration, which did include Rockland County.</li> <li>USGS indicates that the northern section of Rockland County has a high landslide incidence, while the remainder of the County has a low landslide incidence.</li> <li>Based on previous occurrences and input from the Steering Committee and Planning Partnership, the landslide hazard was identified as a hazard of concern for Rockland County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Steering Committee and Planning Partnership</li> <li>FEMA</li> </ul>
Lightning	Yes	Yes	Please see Severe Storm Profile	

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Severe Storm (hurricane, lightning, hail, windstorms, thunderstorms, nor'easters, hail, and tornadoes)	Yes	Yes	<ul style="list-style-type: none"> <li>The NYS HMP identifies severe storm as a hazard of concern for New York State; however, for the state HMP, the hazards were profiled in individual sections lightning, hail, tornadoes, high winds, nor'easters and hurricanes/tropical storms. For the Rockland County HMP, the hazards were combined into one profile.</li> <li>Between 1954 and 2022, Rockland County was included in 21 FEMA severe storm-related declarations.</li> <li>Based on previous occurrences and input from the Steering Committee and Planning Partnership, severe storms are identified as a hazard of concern for Rockland County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>FEMA</li> <li>NOAA-NCEI</li> <li>SPC</li> <li>Input from Steering Committee and Planning Partnership</li> </ul>
Severe Winter Storm (heavy snow, blizzards, ice storms)	Yes	Yes	<ul style="list-style-type: none"> <li>The NYS HMP identifies ice storms and snowstorms as hazards of concern for New York State. According to the 2019 NYS HMP, it is calculated that Rockland County can expect one severe winter storm event each year.</li> <li>FEMA included Rockland County in the following three winter storm-related disaster declarations:                             <ul style="list-style-type: none"> <li>FEMA EM-3107; March 13-17, 1993; New York Severe Blizzard</li> <li>FEMA DR-1083; January 12, 1996; New York Severe Snowstorm</li> <li>FEMA EM-3184; March 27, 2003; Snowstorm</li> </ul> </li> <li>Based on previous occurrences and input from the Steering Committee and Planning Partnership, severe winter storms are identified as a hazard of concern for Rockland County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>FEMA</li> <li>NOAA-NCEI</li> <li>Input from Steering Committee and Planning Partnership</li> </ul>
Tsunami	No	No	<ul style="list-style-type: none"> <li>Tsunami is identified as a hazard of concern in the NYS HMP.</li> <li>The Steering Committee and Planning Partnership do not consider tsunami to be a hazard of concern for Rockland County as the County is not a coastal county.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Steering Committee and Planning Partnership</li> </ul>
Volcano	No	No	<ul style="list-style-type: none"> <li>The NYS HMP identifies volcano as a hazard of concern. The NYS HMP identifies volcano as a hazard of concern. However, the Steering Committee and Planning Partnership do not consider volcano to be a hazard of concern for Rockland County as volcanos are not present in the County.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Steering Committee and Planning Partnership</li> </ul>
Wildfire	Yes	Yes	<ul style="list-style-type: none"> <li>The NYS HMP identifies wildfire as a hazard of concern. The NYS HMP identifies wildfire as a hazard of concern.</li> <li>Rockland County was not included in any FEMA wildfire-related disaster declarations.</li> <li>Wildfires have occurred within Rockland County.</li> <li>Based on available data and the nature of the county, the Steering Committee and Planning Partnership identified Wildfire as a hazard of concern.</li> </ul>	<ul style="list-style-type: none"> <li>NYS DHSES</li> <li>Input from Steering Committee and Planning Partnership</li> <li>FEMA</li> </ul>

<i>CRREL</i>	<i>Cold Regions Research and Engineering Laboratory</i>
<i>DR</i>	<i>Presidential Disaster Declaration Number</i>
<i>EM</i>	<i>Presidential Disaster Emergency Number</i>
<i>FEMA</i>	<i>Federal Emergency Management Agency</i>
<i>NCEI</i>	<i>National Centers for Environmental Information</i>
<i>NRCC</i>	<i>Northeast Regional Climate Center</i>
<i>NYS DEC</i>	<i>New York State Department of Environmental Conservation</i>
<i>NYS DHSES</i>	<i>New York State Division of Homeland Security and Emergency Services</i>
<i>NYS HMP</i>	<i>New York State Hazard Mitigation Plan</i>
<i>PGA</i>	<i>Peak ground acceleration</i>
<i>SPC</i>	<i>Storm Prediction Center</i>
<i>USDA</i>	<i>U.S. Department of Agriculture</i>
<i>USGS</i>	<i>United States Geologic Survey</i>