Albany County

2024 Multi-Jurisdictional Hazard Mitigation Plan Update

September 2024

Prepared for:

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1 INTRODUCTION

1.1 Background

A hazard is defined by the Federal Emergency Management Agency (FEMA) as an event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural losses, damage to the environment, interruption of business, or other types of harm or loss. A hazard can be natural, technological, or human-caused. Natural hazards are a source of harm created by a meteorological, environmental, or geological event. Events such as floods or earthquakes impact the built environment and pose a threat to people's lives. Human-caused or technological hazards are the result of intentional or unintentional events that are caused by humans or by materials created by humans (FEMA, 2017).

Hazard mitigation is defined by FEMA as a method for reducing or alleviating property loss, preventing damage to the environment, and limiting the number and severity of injuries that occur from hazard events through long and short-term strategies. Responsibility for implementing mitigation measures runs communitywide from individuals to industries, private business and all levels of government (FEMA, 2017).

Hazard mitigation is often considered one of four phases of emergency management after a disaster event occurs. The other phases include preparedness, response and recovery. Each of these phases relate to and rely upon each other. The overarching goal for each of these emergency management phases is the prevention or minimization of loss of life and property in disaster situations.

FEMA provides assistance through the Robert T. Stafford Disaster Relief and Emergency Assistance Act to local governments that are recovering from a hazard event. The Federal Disaster Mitigation Act of 2000 (DMA 2000) recognized the importance and cost-effectiveness of mitigation in specifying that local governments must have a FEMA approved natural hazard mitigation plan to be eligible for mitigation project funding.

To meet the federal requirements of the Disaster Mitigation Act of 2000, Tioga County completed a Multi-Jurisdictional Hazard Mitigation Plan (HMP). HMPs must also be updated every five years to continue municipal eligibility for mitigation project funding. The County was awarded a Pre-Disaster Hazard Mitigation Grant from FEMA to update their 2018 HMP.

1.2 Purpose and Scope

This Multi-Jurisdictional HMP is an update to the Albany County 2018 HMP. This updated HMP will allow the County to remain eligible for future mitigation funding. The purpose of this plan is to document the natural hazards that affect Albany County and outline practical mitigation strategies that can be implemented to reduce the effects of such hazard events.

The development of a County HMP provides the following benefits (FEMA, 2023):

- Encourages community leaders to choose actions to reduce risk that stakeholders and the public will support.

- Focuses resources on the greatest risks and vulnerabilities, including where they are needed the most, i.e. areas and populations disproportionately affected by disasters.
- Builds partnerships with diverse stakeholders. This deepens the pool of data and resources, which can help reduce workloads and achieve shared community objectives.
- Boosts awareness of threats and hazards, including their risks and the community's vulnerability to those risks.
- Aligns risk reduction with other community goals and programs like capital improvements.
- Supports socially vulnerable populations and underserved communities in achieving resilience.

The HMP Update focuses on natural hazards. Technological and human-caused hazards are not included in the scope of the HMP Update, due to the fact that mitigation projects related to such hazards are not eligible for mitigation grant funding through FEMA and will not be evaluated as part of the Hazard Mitigation Plan. Additionally, the HMP Update focuses on hazard mitigation rather than preparedness, response, and recovery. According to FEMA, "Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to life and property from hazards" (FEMA, 2023). More details on mitigation vs. preparedness, response, and recovery are included in Table 1-1.

Table 1-1. The Four Phases of the Emergency Management Cycle

Phase	Description
Preparedness	Preparedness is when we develop or update activities, programs and systems before an event happens. These activities are often tested (or exercised) in non-emergency situations. This tests their effectiveness. Emergency managers also assess potential risks, hazards and vulnerabilities in this phase.
Response	Response focuses on the immediate and short-term effects of a disaster. It is usually focused on life safety and preventing immediate damage.
Recovery	Recovery is a long-term phase that looks to return a community to normal, or to a more resilient state, after a disaster.
Mitigation	Mitigation focuses on building (or rebuilding) in ways that reduce the risk more permanently. It is an activity that can occur at any point in the emergency management cycle. For example, communities can undertake mitigation actions before a disaster (the preparedness phase) or while rebuilding after a disaster (the recovery phase).

Source: Adapted from FEMA's Local Mitigation Planning Handbook (FEMA, 2023). *The Albany County 2024 Hazard Mitigation Plan Update focuses on mitigation, rather than preparedness, response, or recovery.*

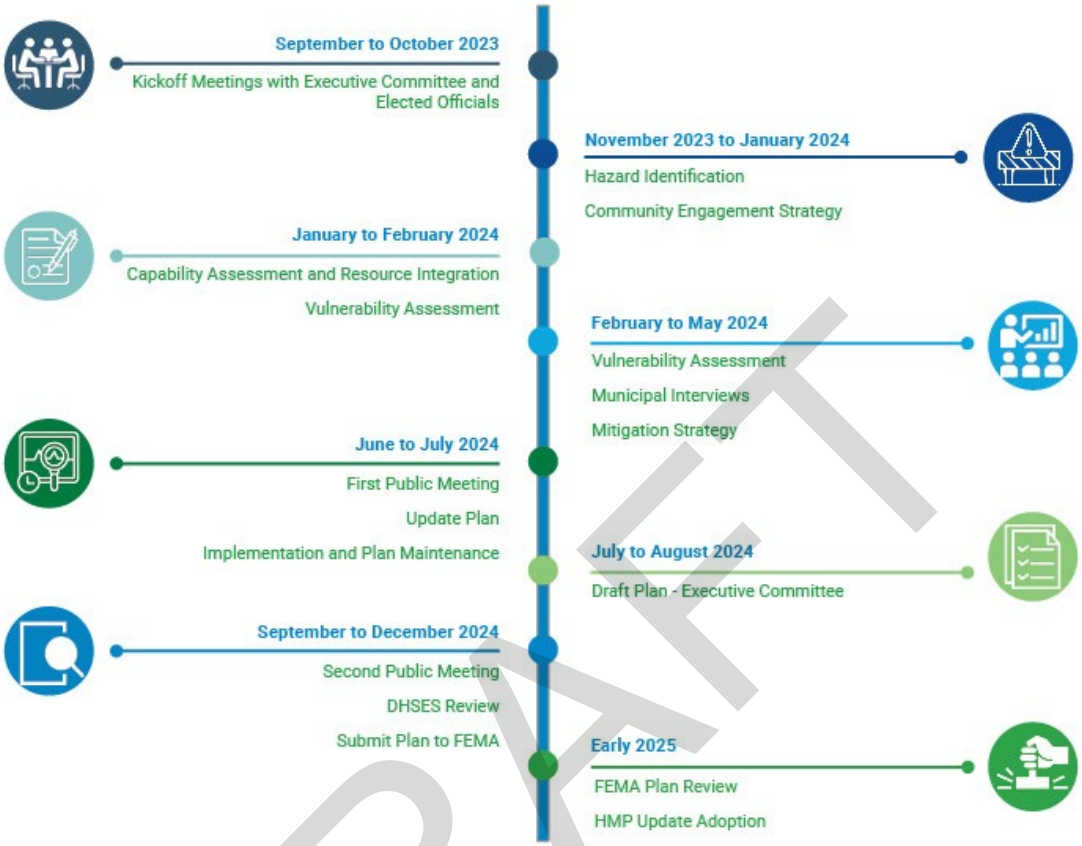
The County and each of its jurisdictions identified and ranked the hazards to which their community is most vulnerable. In addition, the HMP also includes an assessment of the risks and vulnerabilities associated with each hazard and details mitigation strategies to moderate those vulnerabilities and decrease hazard risks. The identified mitigation measures were required to be technically feasible, cost-effective, and environmentally sound.

As described in Section 10, this HMP serves as an important resource for developing and updating various plans and procedures throughout the County. This plan should be incorporated into, considered during, and referenced by future updates and efforts at the County and municipal levels concerning the existing plans, policies, ordinances, programs, studies, reports, and staff included in Section 3 of each jurisdictional annex (Appendix A).

1.3 Hazard Mitigation Planning Process

The Hazard Mitigation Plan was prepared by Barton & Loguidice, D.P.C., in consultation with an Executive Steering Committee, sub-consultant Highland Planning, municipal representatives, stakeholders within Albany County and neighboring counties, and the public. More information on plan participants is provided in Section 3. A schedule of activities is shown in Figure 1-1.

Figure 1-1. Project Timeline



1.4 Jurisdictions Seeking Approval

All 18 municipal jurisdictions in Albany County, plus the County itself, are seeking FEMA approval for the adoption of this Hazard Mitigation Plan Update. These jurisdictions are listed in Table 1-2 below. Further information about jurisdictional participation in the planning process is included in Section 3.2.

Table 1-2. Jurisdictions Seeking Approval for Plan Adoption

Jurisdiction	Seeking Approval For Plan Adoption
Albany County	Yes
Albany, City of	Yes
Altamont, Village of	Yes
Berne, Town of	Yes
Bethlehem, Town of	Yes
Coeymans, Town of	Yes

Jurisdiction	Seeking Approval For Plan Adoption
Cohoes, City of	Yes
Colonie, Town of	Yes
Colonie, Village of	Yes
Green Island, Village of	Yes
Guilderland, Town of	Yes
Knox, Township of	Yes
Menands, Village of	Yes
New Scotland, Town of	Yes
Ravena, Village of	Yes
Rensselaerville, Town of	Yes
Voorheesville, Village of	Yes
Watervliet, City of	Yes
Westerlo, Town of	Yes

1.5 Review of Existing Information

The HMP update was developed in accordance with the guidelines presented in FEMA's Local Mitigation Planning Policy Guide, effective on April 19, 2023 (FEMA, 2023) and the 2022 New York State Hazard Mitigation Planning Standards (NYS DHSES, 2022). In addition to these state and federal resources, many existing plans, studies, reports, and technical information were reviewed for the development of this plan. These sources are documented in the Works Cited section of this plan (Section 11). References are given throughout the document to indicate where each source was incorporated into the plan.

1.6 Contact Information

The Albany Office of the County Executive is the main point of contact for the Albany County 2024 Hazard Mitigation Plan Update. The County Executive's Office is the administrative head of county government, responsible for supervising, directing, and controlling government functions of all administrative units of the county; enforcing laws relating to the administration of county government; and other duties.

Comments or questions concerning this document should be addressed to:

Albany County Executive

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2 ALBANY COUNTY PROFILE

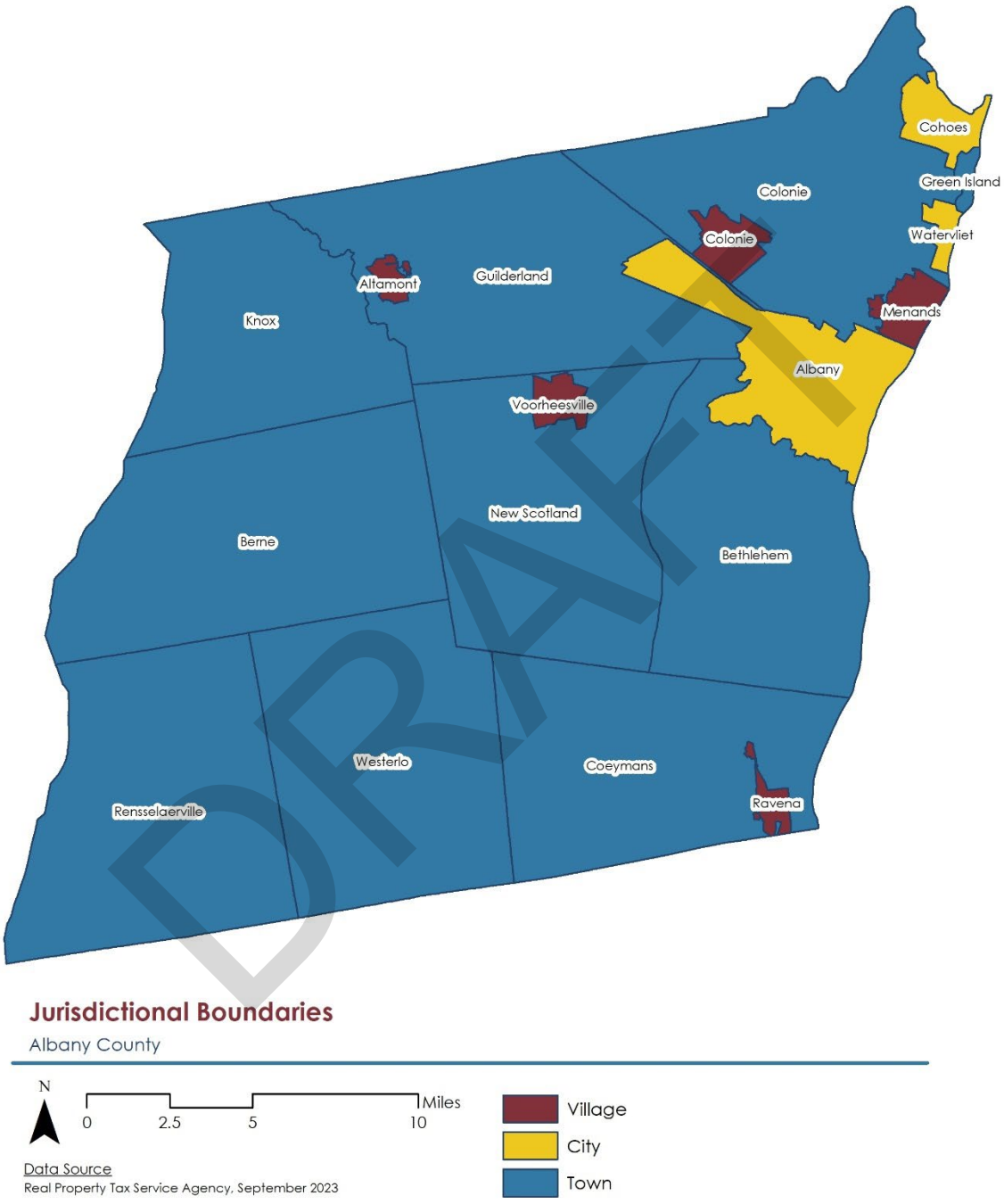
2.1 Geographic Context

2.1.1 Geographic Location

Albany County is located in Upstate New York, northwest of New York City. Albany County is geographically bounded to the east by the Hudson River with Rensselaer County bordering the Hudson River, and the Mohawk River to the north creating the border between Albany County and Saratoga County. Schenectady County lies to the northwest, Schoharie County to the west, and Greene County to the south. Albany County is a part of the region known as the "Capital District". The Capital District is made up of four (4) counties, Albany County, Saratoga County, Rensselaer County, and Schenectady County.

The City of Albany serves as both the Capital of New York State as well as the county seat for Albany County. The County includes three (3) cities, nine (9) towns, five (5) villages, and the Town/Village of Green Island. Albany County consists of a total area of five hundred thirty-three (533) square miles, of which five hundred twenty-three (523) square miles are land area and ten (10) square miles are water area. In terms of total area, the Town of Berne is the largest jurisdiction within Albany County, totaling 64.7 square miles. This equates to 12.16% of the total area of the County. The Town/Village of Green Island is the smallest town in Albany County, totaling 1.0 square miles in area, which represents only 0.17% of the total area of Albany County. Figure 2-1 illustrates the County and its municipalities.

Figure 2-1. Jurisdictions in Albany County



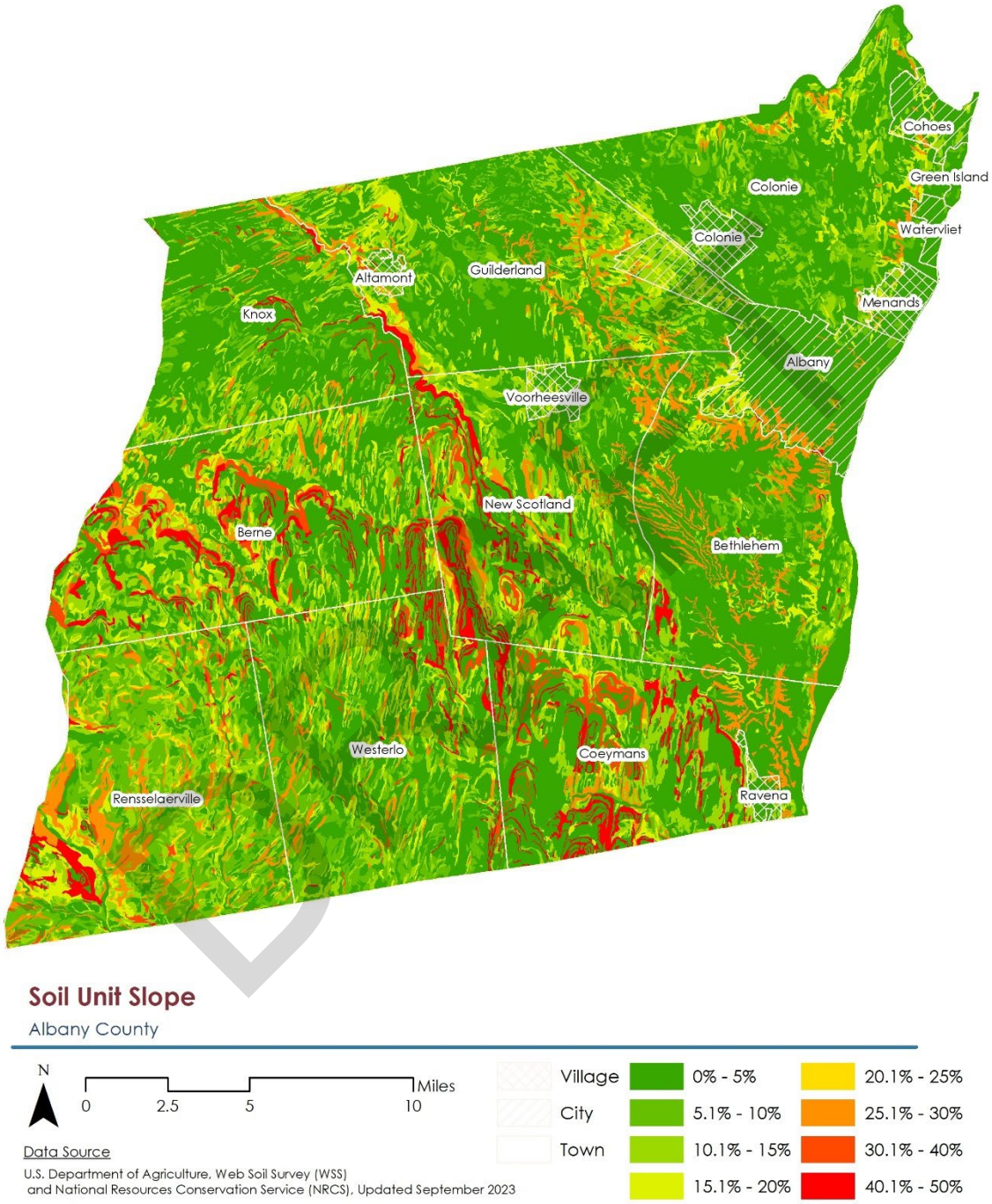
Data Source: Real Property Tax Service Agency, September 2023

2.1.2 Topography and Geology

Within Albany County, the areas surrounding the Hudson and Mohawk River are relatively flat, whereas other areas are high and hilly in the southwest of the Helderberg Escarpment and the Helderberg Mountains. The escarpment is located in John Boyd Thacher State Park, about eleven (11) miles west of the City of Albany (NYSDEC, 2023). The highest summit in the County is located near Henry Hill, and reaches 2,160 feet (658 meters) above sea level; some portions along the Hudson River reach as low as sea level. The Hudson River shoreline in Albany County is subject to ocean tides as part of the Hudson River Estuary (NYSDEC, 2015).

Albany County consists of several different geologic units, the biggest being the Undifferentiated Lower Hamilton Group (shales and sandstones), Normanskill Shale (minor mudstone and sandstone), the Schenectady Formation (graywacke, sandstone, siltstone, and shale) and the Plattekill and Ashokan Formations (shale and sandstone) (USGS, n.d.). Soil unit slopes are depicted in Figure 2-2.

Figure 2-2. Soil Unit Slope in Albany County



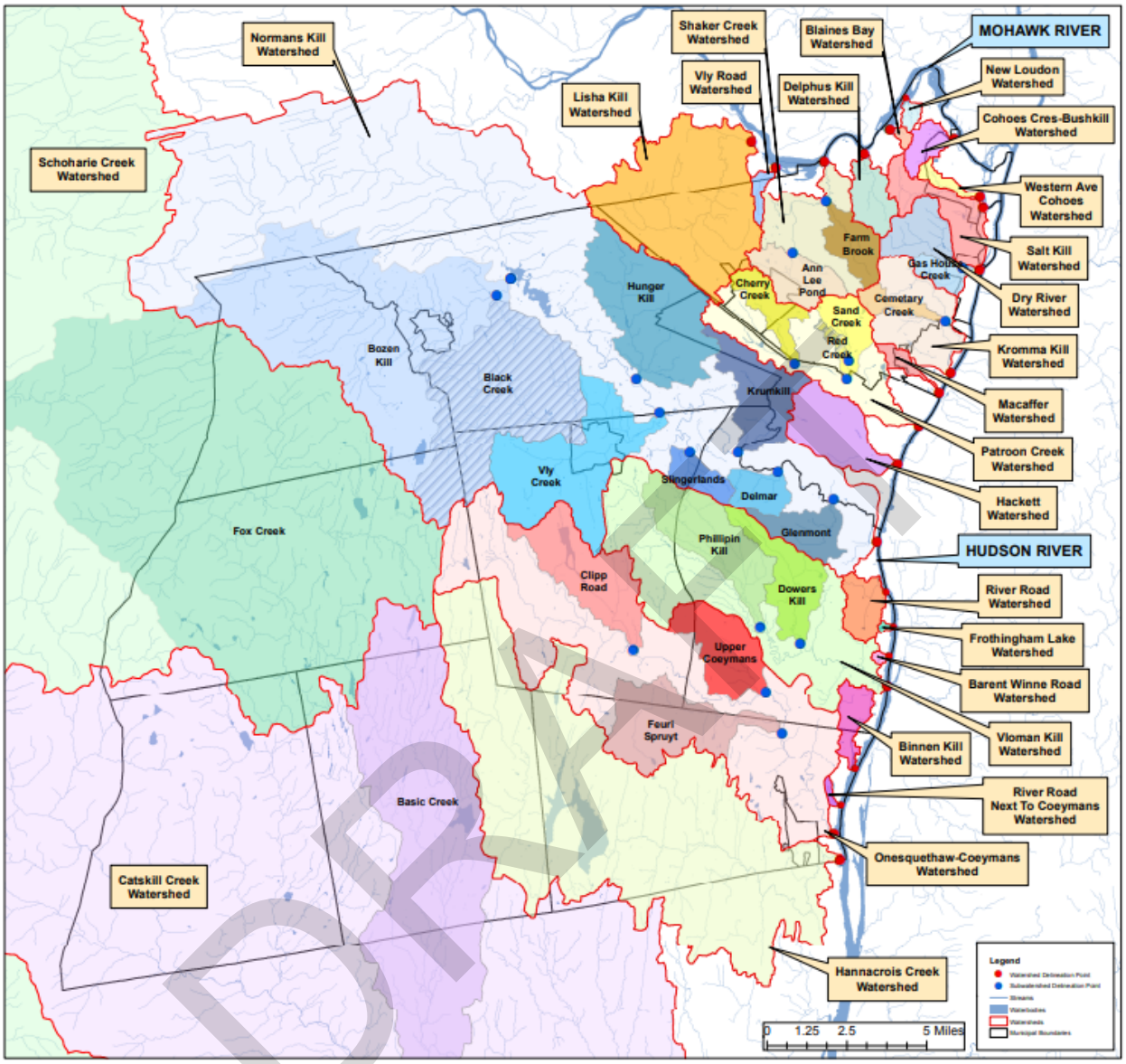
Data Sources: USDA Web Soil Survey, NRCS, September 2023

2.1.3 Drainage Basins

Albany County is located within the Hudson Valley. Although Albany County is not located near the Atlantic Coast shoreline, the Hudson River is tidally influenced, putting portions located along the Hudson River at higher risk of flooding than other parts of the County.

Albany County is comprised of twenty-five (25) major watersheds, which include the Normans Kills, Schoharie Creek, Catskill Creek, Hannacrios Creek, Lisha Kill, Vly Road, Shaker Creek, Delphus Kill, Blaines Bay, New Loudon, Cohoes Cres-Bushkill, Western Ave Cohoes, Salt Kill, Dry River, Kromma Kill, Macaffer, Patroon Creek, Hackett, River road, Frothingham Lake, Barent Winne Road, Vloman Kill, Binnen Kill, River Road Next to Coeymans, and the Onesquethaw-Coeymans. Seven (7) of these watersheds drain to the Mohawk River located along a portion of the northern boundary of the County. The other seventeen (17) watersheds delineate to the Hudson River, which makes up the entire eastern boundary of the County. The Schoharie Creek watershed does not delineate to either the Hudson River or the Mohawk River. There are dozens of sub-watersheds located within these watersheds. Figure 2-3 depicts the watersheds within each municipality within Albany County.

Figure 2-3. Albany County Watersheds and Subwatersheds

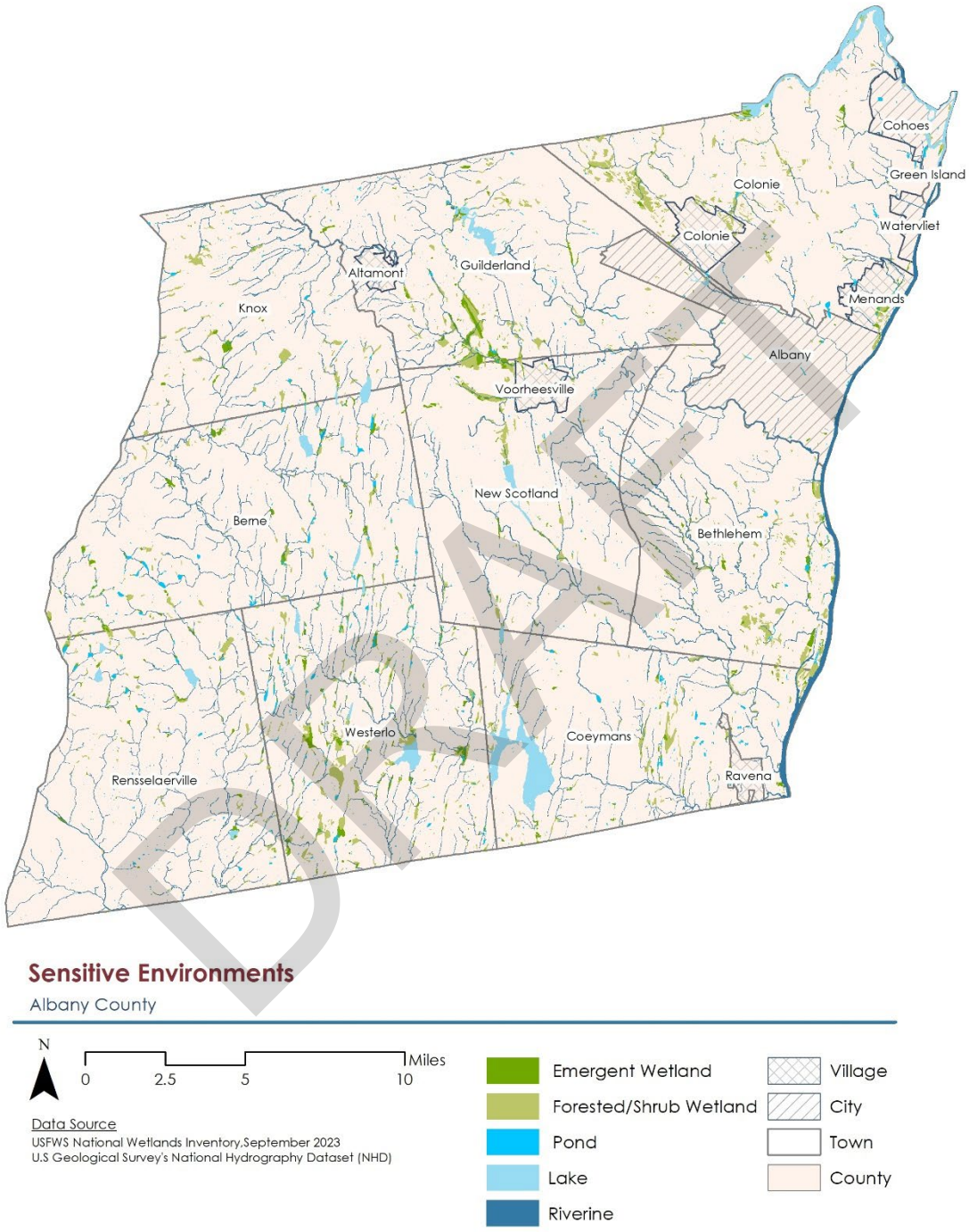


Source: (Stormwater Coalition of Albany County, 2016)

2.1.4 Sensitive Environments

Albany County has several sensitive environments, including wetlands, ponds, lakes, and riverine environments. These are depicted in Figure 2-4.

Figure 2-4. Sensitive Environments in Albany County



Data Sources: USFWS National Wetlands Inventory (September 2023), U.S. Geological Survey's National Hydrography Dataset (NHD)

2.2 Climate

2.2.1 Existing Climate Conditions

New York State's Humid Continental climate is categorized as being quite similar to that of the majority of the Northeastern United States. Humid continental climates have variable weather conditions, due to their location between the polar and tropic air masses. Polar air masses collide with tropical air masses, causing uplift of the moist tropical air and resulting in precipitation.

The location of Albany County is far enough from Lake Ontario that lake-effect weather patterns do not often affect the county. However, the County is located close enough to the coast that heavy snows from Nor'easters affect the area.

The National Weather Service has reported weather-related averages for 1991-2020, based on reporting from the Albany Weather Forecast Office, in the Town of Colonie. In January, high temperatures average around 33°F with average lows around 16°F. In July, the average high temperature is 84°F with lows averaging 63°F. The year-round average temperature is 49.4°F. Total average precipitation is 40.68 inches annually, while annual snowfall averages 59.2 inches (National Weather Service, 2023).

Table 2-1 depicts the fluctuating average temperatures, average precipitation, and seasonal snowfall totals in Albany County from 1950 to 2020.

Table 2-1. Annual Temperature, Precipitation, and Snowfall Data Recorded Between 1950 and 2020 and Displayed as Decade Averages

Years	Average Temperature (°F)	Average Precipitation (inches)	Seasonal Snowfall Totals (inches)
2010-2020	50.0	41.4	53.9
2000-2009	48.6	43.17	60.61
1990-1999	48.4	38.08	58.42
1980-1989	47.4	36.09	59.02
1970-1979	46.9	39.90	69.37
1960-1969	46.9	31.75	67.06
1950-1959	47.8	36.15	59.69
Overall Average	**48.0**	**38.43**	**62.35**

Source: (National Weather Service, 2023)

2.2.2 Climate Change

Climate change is defined by the National Aeronautics and Space Administration (NASA) as the long-term (at least 30-years) shift in average weather patterns that define Earth's local, regional, and global climates (NASA, 2023). Drivers of climate change are both natural and human caused (anthropogenic). Natural drivers include variations in Earth's orbit, variation in the sun's energy, volcanic activity, cyclical oceanic patterns such as El Niño and La Niña, etc.) Anthropogenic drivers include the burning of fossil fuels, deforestation, farming livestock, and more (National Academy of Sciences and

The Royal Society, 2020). The coupling of natural and anthropogenic drivers has exacerbated climate change.

Several climate change impact assessments discuss how various climate change impacts are already being observed in the state of New York and how these impacts are projected to continue and/or increase in the future. These include but are not limited to NYSERDA's ClimAID report (NYSERDA, 2014), New York State's Climate Impacts Assessment (Lamie, et al., 2023) and DEC's report on Observed and Projected Climate Change in NYS (NYSDEC, 2021). Additionally, the 2023 Albany County Climate Resiliency Plan provides a detailed assessment of the risks and vulnerabilities that Albany County faces from climate change, as well as how the County can build resilience to these impacts (Albany County, 2023). These reports indicate the following trends:

- Overall, scientists have indicated increased temperatures and shifting precipitation patterns for Albany County and New York State. Rates for these changes are projected to increase much faster than historic natural rates over the coming century, and as a result extreme hazard events may increase in frequency and intensity.
- Heat waves will become more frequent and intense, increasing heat-related illness and death and posing new challenges to the energy system, air quality, and agriculture. By the 2080s, New York State's annual average temperatures are projected to increase by 4.1°F to 6.1°F.
- Summer drought is projected to increase, affecting water supply, agriculture, ecosystems, and energy production. Horton et al. project that late-summer, short-term droughts will become more frequent toward the end of the century, but it is not known if the risk of multiyear droughts will change.
- Rate of occurrence for heating and cooling days (days over 90°F and days below 32°F) will change. The frequency of heating days is projected to increase, while the frequency of cooling days is projected to decrease.
- Heavy downpours are increasing and are projected to increase further. For example, in the heaviest 1% of precipitation events in the Northeast U.S., the proportion of total annual precipitation that fell during those events increased by 38% between the periods 1901-1960 and 1986-2016. These events can lead to flooding and related impacts on water quality, infrastructure, and agriculture.
- Major changes to ecosystems including species range shifts allow invasive species and pests to spread, population crashes, and other sudden transformations could have wide-ranging impacts, not only for natural systems but also for health, agriculture, and other sectors.
- Coastal flooding is predicted to increase due to sea level rise. Rising sea levels have the potential to impact the Hudson River and adjacent communities (NYSERDA, 2014) (NYSDEC, 2021).

Specific groups of people that are identified in the 2014 ClimAID Report as being particularly vulnerable include older adults, people with disabilities, health-compromised individuals who are more vulnerable to climate hazards like floods and heat waves; low-income groups that have limited ability to meet higher energy costs; farm workers who may be exposed to more chemicals if pesticide use increases in response to climate change; asthma sufferers who will be more vulnerable to the decline in air quality during heat waves; and people who depend on public

transportation and lack private cars for evacuating during emergencies. Small businesses are also identified as being particularly vulnerable, as they are typically less able to cope with costly climate related interruptions and stresses, such as power and communication service disruptions, than larger businesses (NYSERDA, 2014). In addition, the 2023 Albany County Climate Resiliency Plan considers further factors such as language barriers, micro-location, and housing vulnerability (Albany County, 2023).

In addition, the 2014 ClimAID Report highlights that some areas, including Albany County, are vulnerable in other ways: regions that depend on agriculture and tourism (such as fishing, hiking, and wineries) may be especially in need of adaptation assistance; and low-income urban neighborhoods, especially those within flood zones, are less able to cope with climate impacts such as heat waves and flooding.

More details about the effects of climate change on the impacts, extent, and frequency of each hazard profiled in this Hazard Mitigation Plan are described in Section 6. (Lamie, et al., 2023)

Project IN-CORE Climate Analysis

As described in Section 3.5, AT&T engaged Project IN-CORE to conduct a Climate Analysis for Albany County. The Climate Analysis includes projections of how Albany County will be affected by climate change. The results of the Albany County Climate Analysis can be viewed on this storymap (https://arcg.is/1PObHP) and in Appendix K. In general, Albany County is projected to see an increase in precipitation, an increase in winter temperatures, increases in flood risk in certain areas, and a potential increase in the risk of landslides.

Figure 2-5. Precipitation Increases Projected by Project IN-CORE

Source: (Duffy, Filante, & Guo, 2024)

2.3 Demographic and Economic Characteristics

2.3.1 Population Trends

According to the 2020 U.S. Census, Albany County had a population of 314,848 people. This reflects a 3% increase in population when compared to the County's population in the 2010 U.S. census (304,204). Table 2-2 and Table 2-3 summarize population and demographic statistics for Albany County based on US Decennial Census data (U.S. Census Bureau, 2010) (U.S. Census Bureau, 2020).

The City of Albany contains the largest population center, while the Town of Colonie has the largest population of senior citizens in the County. There is also a significant commuter population, and a significant increase (up to 40%) in population in the hill towns during the summer.

Table 2-2. Population Trends in Albany County, 2010-2020

Jurisdiction	2010 Population	2020 Population	Percent Change	Notes
Albany, City of	97,856	99,224	1%	
Altamont, Village of	1,720	1,675	-3%	
Berne, Town of	2,794	2,689	-4%	
Bethlehem, Town of	33,656	35,034	4%	
Coeymans, Town of*	7,418	7,256	-2%	Includes Village of Ravena
Cohoes, City of	16,168	18,147	12%	
Colonie, Town of*	81,591	85,590	5%	Includes Village of Colonie and Village of Menands
Colonie, Village of	7,793	7,781	0%	
Green Island, Village of	2,620	2,934	12%	
Guilderland, Town of*	35,303	36,848	4%	Includes Village of Altamont
Knox, Township of	2,692	2,635	-2%	
Menands, Village of	3,990	4,554	14%	
New Scotland, Town of*	8,648	9,096	5%	Includes Village of Voorheesville
Ravena, Village of	3,268	3,271	0%	
Rensselaerville, Town of	1,843	1,826	-1%	
Voorheesville, Village of	2,789	2,841	2%	
Watervliet, City of	10,254	10,375	1%	
Westerlo, Town of	3,361	3,194	-5%	
Albany County (Total)	**304,204**	**314,848**	**3%**	

Data Source: U.S. Decennial Census Redistricting Data (U.S. Census Bureau, 2010) (U.S. Census Bureau, 2020).

**Population statistics for these municipalities include another municipality listed in the table.*

Table 2-3. Albany County Demographics, 2020

Statistic	Albany County	New York State
Total Population	314,848	20,201,249
Male Population (%)	48%	48%
Female Population (%)	52%	52%
Population of One Race (%)	93%	91%
White alone (%)	68%	55%
Black or African American alone (%)	14%	15%
American Indian and Alaska Native alone (%)	0%	1%
Asian alone (%)	8%	10%
Native Hawaiian and Other Pacific Islander alone (%)	0%	0%
Some Other Race alone (%)	3%	11%
Two or More Races (%)	7%	9%

Data Source: U.S. Decennial Census Redistricting Data, ACS 5-Year Estimates Subject Tables (U.S. Census Bureau, 2010) (U.S. Census Bureau, 2020) (U.S. Census Bureau, 2020)

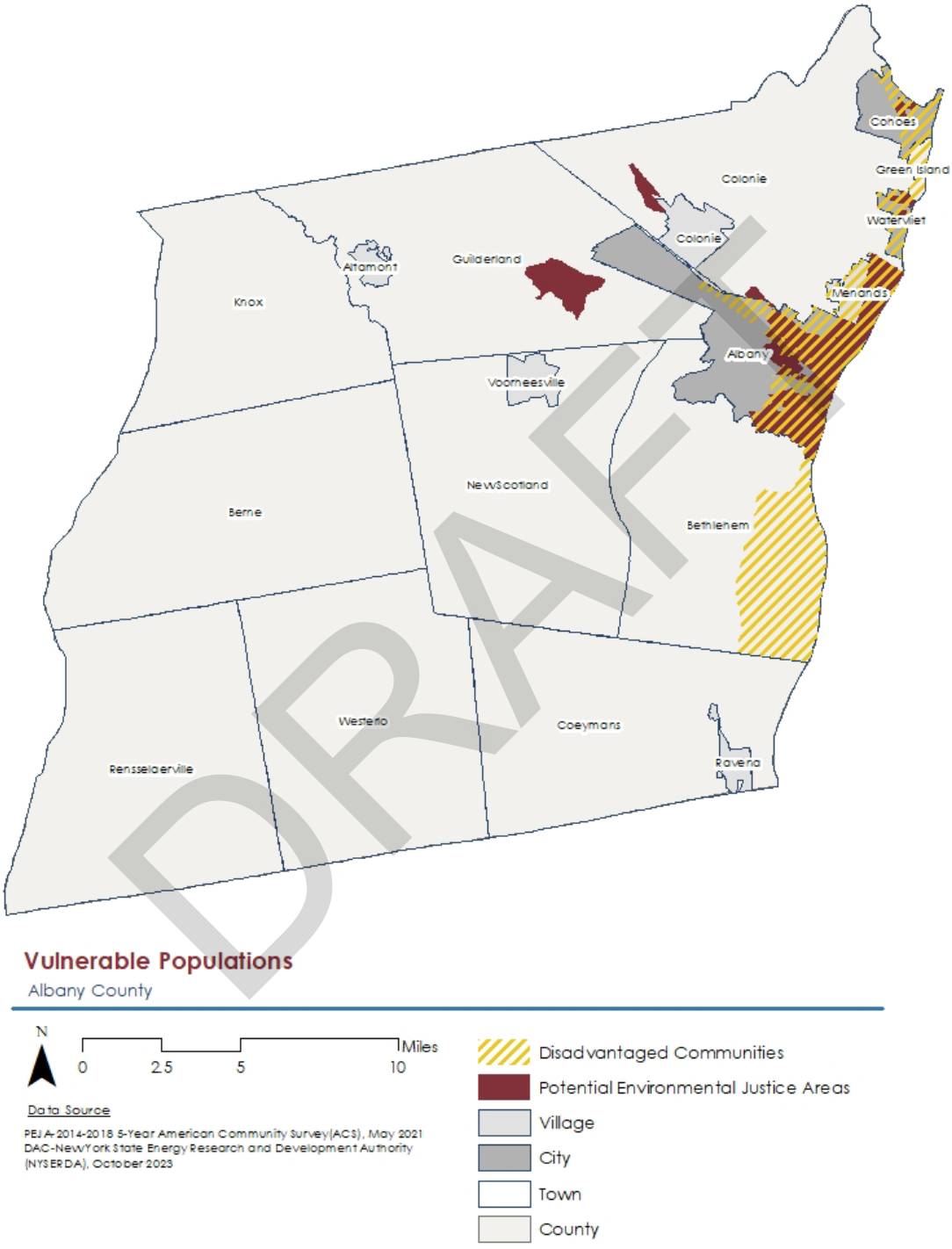
2.3.2 Vulnerable Populations

The Disaster Mitigation Act of 2000 (DMA 2000), which is mandated by the Federal Emergency Management Agency (FEMA), necessitates that hazard mitigation plans (HMP) take into account socially vulnerable groups. Such groups may have a higher vulnerability to hazard events due to various factors, such as their physical and financial capacity to cope with or respond to a hazard, as well as the geographical locations and construction standards of their homes.

Additional information about vulnerable populations in Albany County, is listed in the Engagement Strategy in Appendix C. These include renter households (44% of households), people of color (32% of the population), youth (18%), seniors (17%), people with disabilities (14%), households below the poverty line (13%), households without a vehicle (13%), households without an internet subscription (8.9%), people who do not speak English well (4.8%), and people without health insurance (3.5%). Appendix C also identifies geographic areas that may be more vulnerable to hazards. These include CJEST (Climate and Economic Justice Screening Tool) Disadvantaged Communities, NYS-identified Disadvantaged Communities, Potential Environmental Justice Areas, and areas with a high social vulnerability score on the CDC/ATSDR Social Vulnerability Index. These terms are further explained in Appendix C. Municipalities that have one or more of these communities include the City of Albany, Town of Bethlehem, City of Cohoes, Town of Colonie, Town/Village of Green Island, Town of Guilderland, Village of Menands, and City of Watervliet, with the greatest number of vulnerable communities in the City of Albany, City of Cohoes, and City of Watervliet.

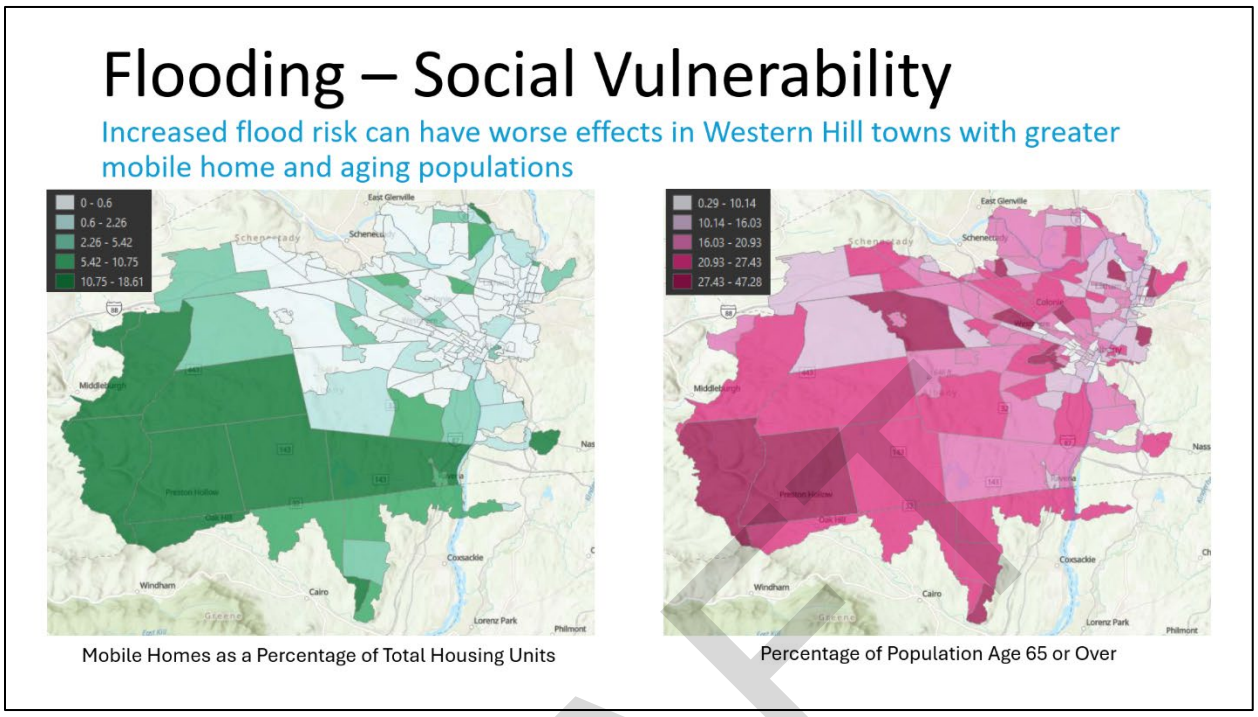
Figure 2-6 shows the distribution of vulnerable populations within Albany County, based on Potential Environmental Justice Area Communities and Interim Disadvantaged Communities specifically. Figure 2-7 shows areas with increased populations of mobile home residents and older adults. These populations may have a higher social vulnerability to flooding.

Figure 2-6. Vulnerable Populations in Albany County



Data Sources: 2014-2018 5-Year American Community Survey (May 2021), NYSERDA (October 2023)

Figure 2-7. Social Vulnerability to Flooding Analyzed by Project IN-CORE



Source: (Duffy, Filante, & Guo, 2024)

2.3.3 Economic Characteristics

The following tables present an overview of the County economy, including agriculture, retail trade, tourism, industry, manufacturing, and educational services. Major industries and employers include the nanotechnology industry, the State Capitol, the Port of Albany, Wadsworth Laboratory, Albany Medical Center, and several colleges and universities.

Table 2-4. Economic Characteristics of Albany County

Statistic	Albany County	New York State
Unemployment Rate (16+ Years Old Civilian Labor Force)	4.90%	6%
Mean Travel Time to Work (Minutes)	20.7	33.5
Median Household Income	$73,810	$71,117
Poverty Rate	11.70%	14%

Data Source: ACS 5-Year Estimates (U.S. Census Bureau, 2021)

Table 2-5. Jobs by Industry in Albany County

Industry	People	Share of Total Jobs
Educational services, and health care and social assistance	45,039	27.70%
Professional, scientific, and management, and administrative and waste management services	20,438	12.60%
Public administration	20,290	12.50%

Industry	People	Share of Total Jobs
Retail trade	16,318	10.00%
Finance and insurance, and real estate and rental and leasing	12,647	7.80%
Arts, entertainment, and recreation, and accommodation and food services	12,587	7.70%
Manufacturing	9,233	5.70%
Other services, except public administration	7,074	4.30%
Construction	6,755	4.20%
Transportation and warehousing, and utilities	5,966	3.70%
Information	2,986	1.80%
Wholesale trade	2,686	1.70%
Agriculture, forestry, fishing and hunting, and mining	626	0.40%

Data Source: ACS 5-Year Estimates (U.S. Census Bureau, 2021)

2.4 Land Use and Development Trends

The largest category of land use within Albany County is residential, with significant portions of the County designated as vacant land (Figure 2-8). Agricultural districts are found primarily south, west, and southwest of Albany, especially near Knox and surrounding Towns (Figure 2-9). The County also contains significant amounts of commercial land, particularly in the northeast part of the County, and industrial land, particularly in the eastern part of Coeymans. Other designations of land – such as recreation and entertainment; community services; industrial land; and wild, forested, and public parks – are also found throughout the County.

Table 2-6 displays the changes in land use in Albany County between 2016 and 2021. The grassland/herbaceous category saw a significant decrease in acreage during that time period, while the shrub/scrub and pasture/hay category saw significant increases. Presumably, many of the acres in the grassland/herbaceous category may have been redesignated as shrub/scrub and pasture/hay. Aside from these categories, the developed medium intensity category saw the largest increase in acreage, while the evergreen forest categories and the developed open space categories saw the largest decrease in acreage.

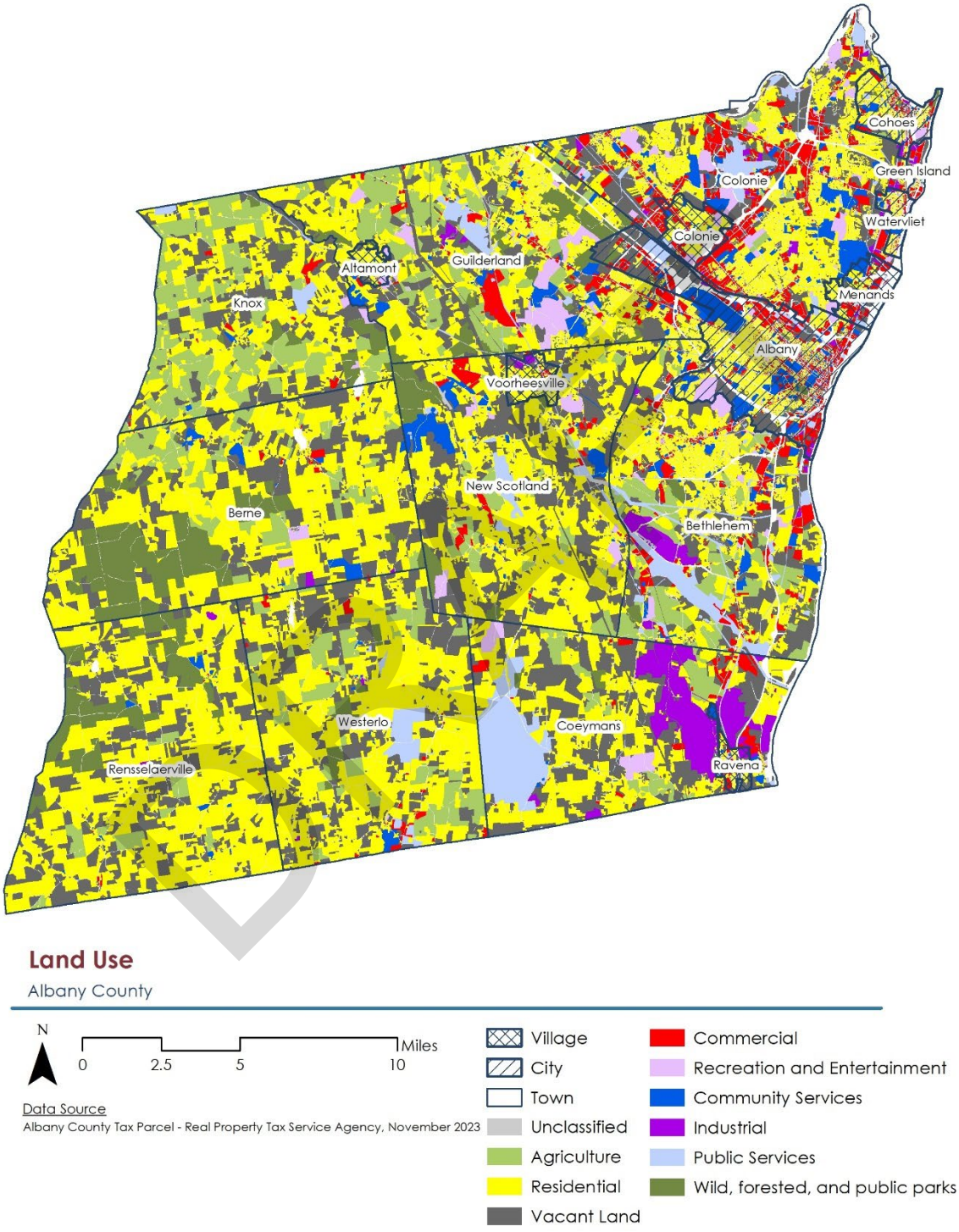
Table 2-7 displays housing vacancy rates in the County for each jurisdiction. A housing unit is determined to be occupied if it is the normal place of residence of the person or persons living in it, including if said person(s) are temporarily absent. A vacant housing unit is classified as such if no one is living in it on a permanent basis, excluding temporary absence. Vacancy rates are calculated during U.S. Census years as a potential indictor of distressed regions. In 2020, Albany County had a total vacancy rate of 9%. The Town of Rensselaerville had the highest vacancy rate (37%), while the Village of Colonie and the Village of Voorheesville had the lowest vacancy rates (4% for each Village).

Structural developments or redevelopments that have been proposed between 2018 and 2023, as well as building permits issued in each jurisdiction, are summarized in each of the jurisdictional annexes. Some of the proposals for the Town may be located in the 0.1% or 0.2% annual chance flood event area, but this was generally not specified in the proposals (Albany County, 2023). As described in Section 6.1.58.2, all of the

municipalities in Albany County participate in the NFIP program, and therefore take flooding into account when considering new developments.

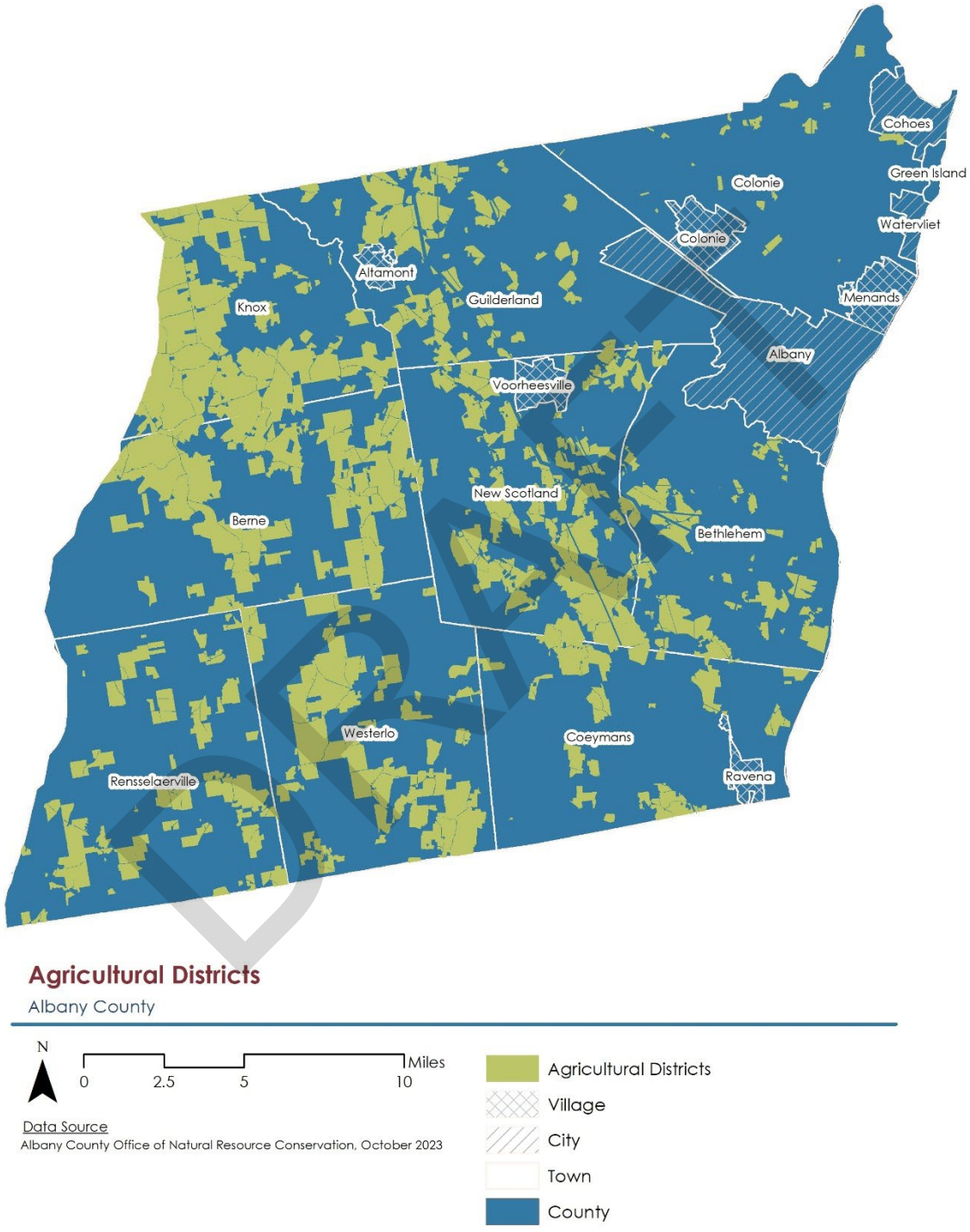
All of the jurisdictions within Albany County have adopted comprehensive/land use plans and/or zoning regulations in order to enforce specific regulations for certain types of land use or structures. The types of land use regulations implemented by each jurisdiction within the County are outlined in Table 4-1 (Section 4.3), and further details are included in the jurisdictional annexes (Appendix A).

Figure 2-8. Land Use in Albany County



Data Source: Real Property Tax Service Agency (November 2023)

Figure 2-9. Agricultural Districts in Albany County



Data Source: Albany County Office of Natural Resource Conservation (October 2023)

*Table 2-6. Change in Land Use in Albany County, 2016-2021**

Land Use Type	2016 Acres	2016 % of Total Acres	2021 Acres	2021 % of Total Acres	2016-2021 Change in Acres	2016-2021 % Change in Acres
Open Water	5,798	1.70%	5,384	1.58%	-414	-7.14%
Developed, Open Space	28,690	8.42%	28,227	8.28%	-463	-1.61%
Developed, Low Intensity	22,677	6.65%	22,735	6.67%	58	0.26%
Developed, Medium Intensity	16,057	4.71%	16,535	4.85%	478	2.98%
Developed, High Intensity	8,426	2.47%	8,559	2.51%	133	1.58%
Barren Land	1,885	0.55%	1,956	0.57%	71	3.77%
Deciduous Forest	61,322	17.99%	61,443	18.02%	121	0.20%
Evergreen Forest	28,284	8.30%	27,786	8.15%	-498	-1.76%
Mixed Forest	85,475	25.07%	85,657	25.13%	182	0.21%
Shrub/Scrub	943	0.28%	2,620	0.77%	1,677	177.84%
Grassland/Herbaceous	6,718	1.97%	3,880	1.14%	-2,838	-42.24%
Pasture/Hay	46,209	13.55%	47,418	13.91%	1,209	2.62%
Cultivated Crops	4,275	1.25%	4,269	1.25%	-6	-0.14%
Woody Wetlands	21,495	6.30%	21,574	6.33%	79	0.37%
Emergent Herbaceous Wetlands	2,668	0.78%	2,857	0.84%	189	7.08%
Total	340,922	100%	340,900	100%	22	-0.01%

** As of October 2023, data from the National Land Cover Database (NLCD) was only available through 2021. Note that the 2016 and 2021 NLCD data sets are off by 22 acres. Data Source: (USGS, 2023).*

Table 2-7. Housing Vacancy Rates by Jurisdiction, 2020

Jurisdiction	Total Housing Units	Vacant Housing Units	Vacancy Rate (%)
Albany, City of	48,031	5,873	12%
Altamont, Village of	729	31	4%
Berne, Town of	1,591	411	26%

Jurisdiction	Total Housing Units	Vacant Housing Units	Vacancy Rate (%)
Bethlehem, Town of	15,099	677	4%
Coeymans, Town of	3,408	349	10%
Cohoes, City of	9,752	1,013	10%
Colonie, Town of	37,118	2,055	6%
Colonie, Village of	3,420	129	4%
Green Island, Village of	1,816	323	18%
Guilderland, Town of	16,018	1,012	6%
Knox, Township of	1,142	100	9%
Menands, Village of	2,259	174	8%
New Scotland, Town of	3,864	226	6%
Ravena, Village of	1,561	169	11%
Rensselaerville, Town of	1,272	474	37%
Voorheesville, Village of	1,184	44	4%
Watervliet, City of	5,429	559	10%
Westerlo, Town of	1,591	247	16%
Albany County (Total)	**146,131**	**13,319**	**9%**

Data Source: U.S. Decennial Census (U.S. Census Bureau, 2020)

3 PLAN PARTICIPATION

3.1 Executive Steering Committee

The Executive Steering Committee took the lead on the development of the Hazard Mitigation Plan update for Albany County. The group met approximately monthly throughout the planning process. The Executive Steering Committee is composed of staff from several County departments, members of the consultant team, and representatives from New York State's Division of Homeland Security and Emergency Services (DHSES). More information is described in the Community Engagement Plan in Appendix C. Details regarding all meetings held throughout the planning process, including attendee lists, are provided in Appendix D and Appendix E.

3.2 Jurisdictional Participation

There are 18 municipal jurisdictions (3 cities, 9 towns, 5 villages, and the Town/Village of Green Island) located within Albany County, in addition to the County itself. All jurisdictions are seeking FEMA approval for this Hazard Mitigation Plan Update. All jurisdictions were invited and encouraged to participate in this plan update, and all jurisdictions met the criteria for participation, as detailed in Table 3-1. Participation criteria was suggested by the consultant team and reviewed by the Executive Steering Committee.

Table 3-1. Jurisdiction Participation Actions

Jurisdiction	Identified Primary Project Contacts*	Attended a Jurisdictional Interview*	Attended an Elected Officials Meeting	Attended Local Emergency Managers Meeting	Attended Floodplain Managers Roundtable	Reviewed Jurisdictional Annex as Needed*	Passed Resolution to Formally Adopt 2024 HMP Update*	SEEKING APPROVAL FOR PLAN ADOPTION
Albany County	Yes	Yes	Yes			Yes	Pending	Yes
Albany, City of	Yes	Yes	Yes			Yes	Pending	Yes
Altamont, Village of	Yes	Yes				Yes	Pending	Yes
Berne, Town of	Yes	Yes				Yes	Pending	Yes
Bethlehem, Town of	Yes	Yes	Yes	Yes		Yes	Pending	Yes
Coeymans, Town of	Yes	Yes		Yes	Yes	Yes	Pending	Yes
Cohoes, City of	Yes	Yes	Yes			Yes	Pending	Yes
Colonie, Town of	Yes	Yes	Yes	Yes	Yes	Yes	Pending	Yes
Colonie, Village of	Yes	Yes				Yes	Pending	Yes
Green Island, Village of	Yes	Yes	Yes			Yes	Pending	Yes
Guilderland, Town of	Yes	Yes	Yes			Yes	Pending	Yes
Knox, Township of	Yes	Yes				Yes	Pending	Yes
Menands, Village of	Yes	Yes	Yes	Yes		Yes	Pending	Yes

Jurisdiction	Identified Primary Project Contacts*	Attended a Jurisdictional Interview*	Attended an Elected Officials Meeting	Attended Local Emergency Managers Meeting	Attended Floodplain Managers Roundtable	Reviewed Jurisdictional Annex as Needed*	Passed Resolution to Formally Adopt 2024 HMP Update*	SEEKING APPROVAL FOR PLAN ADOPTION
New Scotland, Town of	Yes	Yes		Yes		Yes	Pending	Yes
Ravena, Village of	Yes	Yes			Yes	Yes	Pending	Yes
Rensselaerville, Town of	Yes	Yes	Yes			Yes	Pending	Yes
Voorheesville, Village of	Yes	Yes		Yes	Yes	Yes	Pending	Yes
Watervliet, City of	Yes	Yes	Yes	Yes		Yes	Pending	Yes
Westerlo, Town of	Yes	Yes				Yes	Pending	Yes

** Indicates required action*

The Elected Officials Kickoff Meetings took place in September 2023 and were optional. The rest of the activities in Table 3-1 were required. The jurisdictional interview consisted of a meeting with the consultant team in order to:

1. Identify current priorities for hazard mitigation in the jurisdiction
2. Review and update 2018 HMP data
3. Assess natural hazards and determine which have the greatest possibility of impacting the jurisdiction
4. Provide a status update on 2018 mitigation actions
5. Develop at least one mitigation action per hazard identified for inclusion in the HMP update, along with associated information

After the jurisdictional interview, jurisdictions were provided with the opportunity to review their jurisdictional annexes and provide further revisions. All jurisdictions are required to adopt the HMP update by passing a board resolution for Approvable Pending Adoption (APA) after the plan is approved by FEMA. A sample HMP adoption resolution is presented in Appendix B. Jurisdictional annexes are provided in Appendix A, which list the primary and secondary contacts from each jurisdiction and other information, such as mitigation actions for each jurisdiction. A list of the individuals who participated in an interview as part of the process of developing these annexes is provided in Table 3-2. Additional information about jurisdictional participation, including the elected officials meetings and jurisdictional interviews, is provided in the Community Engagement Plan (Appendix C).

Table 3-2. Jurisdictional Interview Participants

Jurisdiction	Interview Date(s)	Participants
Albany County	Multiple; through Executive Steering Committee	Executive Steering Committee (see Appendix C for participant list)

Jurisdiction	Interview Date(s)	Participants
Albany, City of	March 11, 2024 and March 27, 2024	Ann Marie Salmon, Commissioner of Administrative Services, City of Albany Howard Goebel, Chief Engineer Faye Andrews, Commissioner City of Albany Neighborhood and Community Services Chiquita D'Arbeau, Executive Director, Albany Housing Authority Jason West, Director of Sustainability Joseph W Gregory, Chief of Department, Albany Fire Department Brian Wolfgang, Deputy Chief, Albany Fire Department Patrick Hines, Deputy Chief, Albany Fire Department David Newton, Deputy Chief, Albany Fire Department Valerie Scott, Deputy Director of /Buildings and Regulatory Compliance Frank Zeoli, Deputy Commissioner of the Department of General Services Erika Corsi, Planner, City of Albany Richard LaJoy, Director City of Albany Building and Regulatory Compliance Joe Coffey, P.E., Commissioner of Department of Water and Water Supply Bill Simcoe, P.E., Deputy Commissioner of Department of Water and Water Supply
Altamont, Village of	April 4, 2024	Kerry Dineen, Mayor Larry Adams, Acting Superintendent of Public Works Patty Blackwood, Village Clerk
Berne, Town of	April 29, 2024	Dennis Palow, Supervisor Kristin De Oliveira, Town Clerk Randy Bashwinger, Highway Superintendent

Jurisdiction	Interview Date(s)	Participants
Bethlehem, Town of	February 27, 2024	Jack Brennan, Director of Emergency Management Rick Webster, Deputy Director of Emergency Management David VanLuven, Town Supervisor Robert Leslie, AICP; Director of Planning Will Vail, Director of Senior Services Paul Penman, PE, Deputy Commissioner of Public Works Bob Baldwin, Commander, Bethlehem PD. Justin Harbinger, Building Inspector (Additional input from Marc Dorsey, Highway Superintendent)
Coeymans, Town of	February 29, 2024	Dan Baker, Highway Superintendent Candace McHugh, Town Clerk Jason Chmielewski, Code Enforcement Officer
Cohoes, City of	March 15, 2024	Bill Keeler, Mayor Amanda Primeau, Director of Operations Garry Nathan, City Engineer Joseph Fahd, Fire Chief-Emergency Manager Steve Hennessey, Commissioner of Public Works
Colonie, Town of	February 20, 2024	Angelina Searles, Senior Resources Department Jennifer Kennedy, Community Development Paul Sugrue, EMS / Emergency Management Thomas Romano, Highway / DPW Andrew Curry, Supervisor's Office Bob Winn, Police Department Ben Stevens, Fire Services / Buildings Chris Mastroianni, Buildings Daniel Seaver, Latham Water District Erin Kelly, EMS
Colonie, Village of	May 21, 2024	Jamie Blot, Village Clerk Hannah Curran, Deputy Village Clerk

Jurisdiction	Interview Date(s)	Participants
Green Island, Village of	March 5, 2024	Ellen McNulty-Ryan, Mayor Lynn McGivern, Zoning Board, Billing Clerk Tod Ward, Code Enforcement Officer Maggie Alix, Executive Assistant to the Mayor Kristin Swinton, Chair of Planning Board, CEO of Green Island Power Authority
Guilderland, Town of	March 19, 2024	Peter Barber, Town Supervisor Jackie Coons, Chief Building and Zoning Inspector Bob Haver, Highway Superintendent Ken Kovalchik, Town Planner Lynne Buchanan, Town Clerk
Knox, Township of	April 23, 2024	Russ Pokorny, Town of Knox Supervisor
Menands, Village of	February 27, 2024	Brian Marsh, Mayor Don Handerhan, Village Clerk
New Scotland, Town of	February 23, 2024	Doug LaGrange, Town Supervisor John Wood, Public Safety Commissioner Jeremy Cramer, Building Inspector
Ravena, Village of	March 5, 2024	Henry Traver, Village Foreman Jason Leonard, Water Department Chief Operator Joseph J. Burns, Code Enforcement Dominic Bruno, Fireman
Rensselaerville, Town of	April 23, 2024	Jason Rauf, Highway Superintendent for the Town of Rensselaerville, formerly on the Town Board John Dolce, Town Supervisor Edwin Csukas, Water/Sewer District Advisory Committee Chair John van Schaik, Water/Sewer District Advisory Committee, and resident
Voorheesville, Village of	March 20, 2024	Doug Miller, Village Public Safety Commissioner

Jurisdiction	Interview Date(s)	Participants
Watervliet, City of	March 5, 2024	Tom Corcoran, EMS Coordinator Joe LaCivita, General Manager – City of Watervliet Paul Laboissiere, Code Enforcement Officer Chris Chartrand, Secretary to the Mayor
Westerlo, Town of	June 5, 2024	Matthew A. Kryzak, Town Supervisor Lisa DeGroff, Confidential Administrator

3.3 Stakeholder Participation

A list of stakeholders identified for the HMP update is provided in Table 3-3, along with the participation activities they completed. Stakeholder participation activities included Executive Steering Committee meetings (which had both regular members and occasional guests), a Neighboring Communities Survey, a presentation to the Albany County Strategic Alliance for Health, a Presentation to Albany County Local Emergency Managers Meeting, a Floodplain Roundtable, and the opportunity to participate in the two public meetings and take the public input survey. These participation activities are further described in the Community Engagement Strategy in Appendix C.

Table 3-3 identifies stakeholders that were involved in the Hazard Mitigation Planning Process and how they participated. As noted in the table, participants included neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, businesses, academia and other community-based organizations. Jurisdictional participation activities listed in Section were excluded from this table, although many of the jurisdictional participants are also stakeholders (i.e. local and regional agencies involved in hazard mitigation activities or agencies that have the authority to regulate development).

Table 3-3. Stakeholder List and Participation

Name	Title/Affiliation	Category	Attended an Executive Steering Committee Meeting or County Roundtable	Filled Out Neighboring Communities Survey	Filled Out Public Input Survey	Attended Albany County Strategic Alliance for Health Presentation	Attended Albany County Local Emergency Managers Meeting***	Attended Floodplain Managers Roundtable
Patrick Curran	Climate Policy Analyst, Office of the County Executive	Local/Regional Agency*	Yes					
Christina Rust	Health and Mental Health Policy Analyst, Office of the County Executive	Local/Regional Agency*	Yes					
Brian Wood	Emergency Management, Albany County Sheriff's Office	Local/Regional Agency*	Yes				Yes	
Sergeant David Poole	Albany County Sheriff's Office	Local/Regional Agency*	Yes				Yes	Yes
Brent Meredith	Senior Engineer, Albany County Department of Public Works	Local/Regional Agency*	Yes					

Name	Title/Affiliation	Category	Attended an Executive Steering Committee Meeting or County Roundtable	Filled Out Neighboring Communities Survey	Filled Out Public Input Survey	Attended Albany County Strategic Alliance for Health Presentation	Attended Albany County Local Emergency Managers Meeting***	Attended Floodplain Managers Roundtable
Scott Duncan	Deputy Commissioner, Albany County Department of Public Works	Local/Regional Agency*	Yes					
Tricia Bulatao	Director of Public Health Emergency Preparedness and Performance Management	Community-Based Organization, Local/Regional Agency*	Yes					
Sara Lubera	Albany County Medical Reserve Corps	Local/Regional Agency*	Yes					
Beth O'Reilly	NYS DHSES Planning Manager, Hazard Mitigation	State Agency	Yes				Yes	Yes
Kevin Clapp	NYS DHSES Supervisor, Hazard Mitigation	State Agency	Yes				Yes	Yes
Roland Paperman	NYS DHSES	State Agency	Yes					

Name	Title/Affiliation	Category	Attended an Executive Steering Committee Meeting or County Roundtable	Filled Out Neighboring Communities Survey	Filled Out Public Input Survey	Attended Albany County Strategic Alliance for Health Presentation	Attended Albany County Local Emergency Managers Meeting***	Attended Floodplain Managers Roundtable
Michael Taraoff	NYS DHSES	State Agency	Yes					Yes
Scott Feuerstein	NYS DHSES Planning Manager	State Agency	Yes				Yes	Yes
John Wilkinson	NYS DHSES	State Agency						Yes
Colleen Flynn	Schoharie County	Neighboring Community		Yes				
Edward Tremblay	Saratoga County	Neighboring Community		Possibly****				
Mark LaViolette	Schenectady County	Neighboring Community		Yes				
Jay Wilson	Rensselaer County	Neighboring Community		Possibly****				
David Harrison	Columbia County	Neighboring Community		Possibly****				
Daniel King	Greene County	Neighboring Community		Possibly****				
Anonymous	University at Albany	Academia		Yes				

Name	Title/Affiliation	Category	Attended an Executive Steering Committee Meeting or County Roundtable	Filled Out Neighboring Communities Survey	Filled Out Public Input Survey	Attended Albany County Strategic Alliance for Health Presentation	Attended Albany County Local Emergency Managers Meeting***	Attended Floodplain Managers Roundtable
Anonymous	President of Delmar Pointe HOA				Yes			
Anonymous	City Engineer of City of Cohoes				Yes			
Anonymous	Fire Chiefs and First Responders (5)				Yes			
Charles Day	Albany Medical Center	Community-Based Organization				Yes		
Farah Chatila	American Lung Association	Private Organization				Yes		
Eva Bass	Avillage	Community-Based Organization				Yes		
Justin Reuter	Boys & Girls Clubs of the Capital Area	Community-Based Organization				Yes		
Renee Allen	Capital District Center for Independence	Community-Based Organization				Yes		

Name	Title/Affiliation	Category	Attended an Executive Steering Committee Meeting or County Roundtable	Filled Out Neighboring Communities Survey	Filled Out Public Input Survey	Attended Albany County Strategic Alliance for Health Presentation	Attended Albany County Local Emergency Managers Meeting***	Attended Floodplain Managers Roundtable
Samantha Zayas	Capital District Center for Independence	Community-Based Organization				Yes		
Nora Murphy	Capital District Physicians Health Plan	Private Organization				Yes		
Dylan Hall	Community Foundation for the Greater Capital Region	Community-Based Organization				Yes		
Shawn Smeltzer	Fidelis Care	Private Organization				Yes		
Angie Pender-Fox	The Food Pantries for the Capital District	Community-Based Organization				Yes		
Kevin-Jobin-Davis	Healthy Capital District	Community-Based Organization				Yes		
Simone Brooks	MVP Health Care	Private Organization				Yes		
Brian Perrotto	St. Catherine's Center for Children	Community-Based Organization				Yes		

Name	Title/Affiliation	Category	Attended an Executive Steering Committee Meeting or County Roundtable	Filled Out Neighboring Communities Survey	Filled Out Public Input Survey	Attended Albany County Strategic Alliance for Health Presentation	Attended Albany County Local Emergency Managers Meeting***	Attended Floodplain Managers Roundtable
Simona Fish	St. Peter's Health Partners	Community-Based Organization				Yes		
Jeanie Orr	St. Peter's Health Partners	Community-Based Organization				Yes		
Cara Zampi	St. Peter's Health Partners	Community-Based Organization				Yes		
Christine Bozlak	University at Albany, School of Public Health	Academia				Yes		
Jon Wood	Town of New Scotland Public Safety	Local/Regional Agency*					Yes	
Douglas LaGrange	Town of New Scotland Supervisor	Local/Regional Agency*					Yes	
Douglas Miller	Village of Voorheesville Public Safety Commissioner	Local/Regional Agency*						
Thomas Remmert	Albany County Emergency Management	Local/Regional Agency*					Yes	

Name	Title/Affiliation	Category	Attended an Executive Steering Committee Meeting or County Roundtable	Filled Out Neighboring Communities Survey	Filled Out Public Input Survey	Attended Albany County Strategic Alliance for Health Presentation	Attended Albany County Local Emergency Managers Meeting***	Attended Floodplain Managers Roundtable
Kelli Higgins-Roche	NYSDEC	State Agency						Yes

Note: This list excludes jurisdictional participants, who are detailed in Section 3.2.

** Indicates a local or regional agency involved in hazard mitigation activities*

*** Indicates a local or regional agency with the authority to regulate development*

**** The Albany County Local Emergency Managers Meeting also included several municipal representatives, as indicated in Section 3.2.*

***** In addition to the University at Albany participant, two other anonymous participants filled out the Neighboring Communities Survey. The individuals listed as "Possibly" were invited to fill out the survey and may have done so.*

3.4 Public Participation

Two public information meetings and an online survey provided opportunities for the public to give input on the plan. Public feedback from these initiatives was discussed by the Executive Steering Committee and subsequently incorporated into the HMP, including the mitigation action strategy where appropriate, as described in Section 3.5.

Efforts were made to make the public meetings and survey accessible so that vulnerable populations and underserved communities could participate. For example, the public meetings were offered in a hybrid format, including an online and in-person option. They were offered at two different times of day (12 p.m. and 5 p.m.) to maximize the chances of participation for working individuals, while being practical for the planning team. Closed captions were included at the meetings. The online survey provided another opportunity for participation for those who did not want to or have time to attend a meeting. A flyer and social media template posts were created to advertise the meetings and survey.

Additionally, questions about vulnerable populations (e.g. who is vulnerable to hazards, methods to solicit input from vulnerable populations, and/or ways to reduce vulnerability for vulnerable populations) were raised during several engagement activities, including Executive Steering Committee meetings, jurisdictional interviews, the online public input survey, the Albany County Strategic Alliance for Health meeting, and the local emergency managers' meeting. Takeaways were incorporated into mitigation actions and the implementation strategy where applicable.

These participation activities are further described in Appendix C (Community Engagement Plan).

3.4.1 Draft Plan Comment Period

[To be completed once the comment period closes]

3.5 Albany County Climate Analysis

Albany is one of five communities selected to be a part of AT&T's Climate Resilient Communities initiative. As part of this program, AT&T engaged Project IN-CORE to conduct a Climate Analysis for Albany County, leveraging data from the Climate Risk and Resilience Portal (ClimRR, available at https://climrr.anl.gov/). The ClimRR Portal is the result of a collaboration between AT&T, the Federal Emergency Management Agency (FEMA) and the U.S. Department of Energy's Argonne National Laboratory. The portal offers free, dynamically downscaled climate projections produced using Argonne's supercomputer. The results of the Albany County analysis can be viewed on this storymap (https://arcg.is/1PObHP) and were integrated by the County into the Hazard Mitigation Plan, as described in Section 3.6.

3.6 Key Takeaways and Plan Integration

Key takeaways from public, jurisdictional, and stakeholder participation are listed in Table 3-4. More detail on these efforts is provided in the Community Engagement Plan

(Appendix C). Stakeholder and public outreach documentation is provided in Appendix E.

Table 3-4. Participant Takeaways and Plan Integration

Stakeholder Type	Event	Takeaway Message	Integration into Plan or Strategy to Address*
Public	Public Information Meeting #1	Participants asked for increased explanation of Environmental Justice areas and the Climate Justice Corps.	The project team ensured that these explanations were incorporated into the plan (Albany County annex and Appendix C).
	Public Information Meeting #1	Two participants were concerned about severe storms. One was concerned about old growth trees being uprooted, and the other mentioned that their neighborhood has to employ someone to fix any issues that a natural disaster causes, since this person lives on a private road. One was interested in nature-based solutions and the other was interested in structure and infrastructure projects to address these issues.	Since there were only two participants, feedback was considered in conjunction with the public input survey. One participant was put in touch with the emergency manager in their Town.
	Public Input Survey	Many survey respondents expressed a desire for better communication and public education about how to prepare for hazards, especially where to go in the event of an evacuation, as well as how to evacuate, what to do in the event of different hazards, what resources are available, and how to prepare. They currently receive information through multiple channels. Additionally, respondents showed particular concern about impacts of hazards on older adults, power outages, and resources and coordination for emergency services. They also desired updates to infrastructure such as drainage infrastructure, roads, and power lines.	Updates to infrastructure were already widely addressed in jurisdictional mitigation actions. Three new actions at the County level were added to address feedback regarding public education, impact of hazards on vulnerable populations, and coordination and resources among emergency services. One County action ("Energy Resiliency Study") was revised to incorporate concerns about power outages. The hazard impacts most commonly mentioned were incorporated into Section 6 and Section 8.

Stakeholder Type	Event	Takeaway Message	Integration into Plan or Strategy to Address*
	[Public Information Meeting #2 information to be added once the meeting is completed]		
County	Executive Steering Committee Meetings, County Roundtable, Hazard Identification Meeting, Planning Mechanisms and Capabilities Meeting	Hazards to put in the plan were discussed on 1/22/24. Key concerns mentioned in these meetings included flooding and severe storms (especially the provision of shelters for individuals whose homes flood), extreme temperatures (especially the effects on vulnerable populations such as homeless residents, and the provision of warming/cooling centers), and ensuring the adequacy of hazard warning systems.	Hazards were incorporated into the plan based on this discussion. Sheltering capacity, warming/cooling centers, and effects on vulnerable residents were addressed through several jurisdictional mitigation actions related to generators at shelters. The County added a mitigation action related to vulnerable populations. Hazard warning systems are addressed through several jurisdictional mitigation actions, as well as County actions MH5 and MH16. Capabilities discussed during the Planning Mechanisms and Capabilities Meeting were used to inform the County's mitigation actions and implementation section of the plan.

Stakeholder Type	Event	Takeaway Message	Integration into Plan or Strategy to Address*
Jurisdictions	Local Emergency Managers Meeting	Local emergency managers reported that several populations are particularly vulnerable to natural hazards, especially older adults. While certain locations have more vulnerable populations than others, these populations often live in various locations throughout the municipalities. Flooding, transportation/mobility, and housing/evacuation were identified as particular concerns. The emergency managers proposed several ways to reduce the risk to these populations and to engage with these populations.	One new action at the County level was added to address feedback regarding the impact of hazards on vulnerable populations. The hazard impacts most commonly mentioned were incorporated into Section 6 and Section 8.
	Jurisdictional Interviews	Jurisdictions had a range of priorities as summarized in Section 8.2.3.	Feedback from each jurisdiction was used to develop mitigation actions for that jurisdiction.

Stakeholder Type	Event	Takeaway Message	Integration into Plan or Strategy to Address*
Neighboring Communities	Neighboring Communities Survey	Most respondents did not give detailed feedback about how hazards in Albany County affect them. One respondent was concerned about straight line winds that occur during storms. Two respondents mentioned that their County depends on certain critical facilities and infrastructure in Albany County, including medical facilities, Patroon Creek, & Normans Kill Creek. Some Counties offered space to relocate residents from Albany County if needed, and one respondent mentioned that they offer mutual aid if requested and participate in regional training exercises. Some respondents mentioned projects that they could work on with Albany County, including stormwater resilience planning, projects on Catskill Creek and Fox Creek, and monitoring on the Mohawk River.	The hazard "Wind" was incorporated into the "Severe Storms" hazard. One new mitigation action was added to incorporate sheltering capabilities and project ideas. The County annex contains a list of critical facilities.
Other Stakeholders	Presentations to Albany County Strategic Alliance for Health	This was mostly a presentation by B&L and did not involve significant feedback.	N/A
	Floodplain Roundtable	Attendees expressed a desire to work between municipalities to share equipment to respond to hazards. They discussed the idea of intermunicipal agreements, and some attendees felt that having signed agreements would help with this.	The idea of assisting with intermunicipal agreements was discussed with County staff and incorporated into the plan implementation strategy (Section 10.2).

Stakeholder Type	Event	Takeaway Message	Integration into Plan or Strategy to Address*
	Albany County Climate Analysis (funded by AT&T)	Albany County is projected to see increased precipitation, warmer winter temperatures, an increased susceptibility to landslides, and various flood risks by mid-century. Flood water storage presents an opportunity for inter-municipal collaboration.	Findings were integrated into the Future Potential Impacts sub-sections and Location of Landslides sub-section in Section 6 (Hazard Profiles), as well as Section 3.5 (Albany County Climate Analysis), Section 2.3.2 (Vulnerable Populations) and Appendix C (Community Engagement Plan). Additionally, new mitigation actions were added to several municipal annexes to recommendations related to intermunicipal agreements. Other mitigation actions were modified. The results of the analysis were incorporated as an appendix to the plan.

** How was the takeaway integrated into the plan, what other strategy was used to address it, or why was it disregarded?*

4 CAPABILITIES

4.1 County Capabilities

Albany County implements many initiatives related to hazard mitigation and emergency preparedness and response. Capabilities related to hazard mitigation are listed in the County's jurisdictional annex and in each municipality's jurisdictional annex.

Highlights of County capabilities related to hazard mitigation include:

- **Albany County Climate Resiliency Plan (2023)** – The Plan represents "the County's roadmap to prepare for, adapt to, and build resilience to climate change." It includes an assessment of the risk and vulnerabilities of various assets to climate change, including infrastructure, housing, natural resources, and the economy. It also includes projects and strategies to build resilience and adapt to climate change.
- **Climate Smart Communities (CSC) bronze certification status** – Albany County participates in the Climate Smart Communities program, which helps local governments reduce greenhouse gas emissions and prepare for climate change impacts. Climate adaptation strategies implemented include maintaining the Team Green website to provide the community with climate adaptation and mitigation strategies.
- **Albany County Strategic Economic Development Plan (2020)** – The Plan identifies a long-term vision for economic growth and strategies for responding to economic opportunities and threats. It includes methods for investing in infrastructure and making sustainable development and land-use decisions. (Albany County, 2023)

4.2 State and Federal Capabilities

Potential funding sources are listed in Section 10.5. Additional state and federal capabilities that may assist with hazard mitigation are listed in Section 10.6.

4.3 Municipal Capabilities

In addition to the local laws and regulations listed in Table 4-1, many municipalities in Albany County engage in community planning activities that support natural hazard mitigation, preparedness, and response, as detailed in the jurisdictional annexes (Appendix A).

Table 4-1 gives an overview of local laws and regulations for each municipality in Albany County that may relate to hazard mitigation planning. This overview is based on documents that were publicly available on ecode360.com, as well as municipal websites and the Department of State's Local Laws Search engine (https://locallaws.dos.ny.gov/search/laws) where consultation was needed. More information and additional municipal capabilities are included in Section 3 of each jurisdiction's annex (Appendix A). The jurisdictional annexes also identify each municipality's applicable land use regulations, including those encompassed under the "other" category. In addition to the local laws and regulations listed in Table 4-1, many municipalities in Albany County engage in community planning activities that support natural hazard mitigation, preparedness, and response, as detailed in the jurisdictional annexes (Appendix A).

Table 4-1. Local Laws and Regulations for Municipalities in Albany County

Municipality	Zoning Regulations	Subdivision Review	Site Plan Review	Design Standards/ Overlay Districts	Stormwater Management	Erosion and Sediment Control	Flood Damage Prevention	Wetland and Watercourse Protection	Environmental Quality Review	Historic Preservation	Local Natural Area Protection	Renewable Energy Goals/Laws	Other
City of Albany	Chapter 375 Article II. Zoning Districts	§ 375-404. Subdivision of land		§ 375-206. Overlay districts.	Chapter 133 Part 2 Article XIV. Stormwater Management and Erosion Control	Chapter 133 Part 2 Article XIV. Stormwater Management and Erosion Control	§ 375-206(3) FP-O Floodplain Overlay	Chapter 203. Freshwater Wetlands	Chapter 181. Environmental Quality Review	§ 375-206(1). HR-O Historic Resources Overlay Chapter 333 Article XIV. Exemption for Improvements to Historic Property		Chapter 153. Community Choice Aggregation	
City of Cohoes	Chapter 285. Zoning and Land Use	Chapter 285 Article XIII. Subdivision of Land	Chapter 285 Article XIV. Site Plan Review and Approval	Chapter 285 Article XVII. Form-Based Code	Chapter 285 Article XV. Stormwater Management and Erosion Control	Chapter 285 Article XV. Stormwater Management and Erosion Control	§ 285-45. Floodplain District (FD)	Chapter 159. Freshwater Wetlands		§ 285-44. Historic Overlay District (HD)	§ 285-42. Land Conservation District		§ 285-177. Lighting standards
City of Watervliet	Chapter 272. Zoning		Chapter 272 Article XI. Site Plan Review		Chapter 273. Stormwater Management and Erosion and Sediment Control	Chapter 273. Stormwater Management and Erosion and Sediment Control	Chapter 160. Flood Damage Prevention					Chapter 146. Energy	
Town of Berne	Chapter 190. Zoning	Chapter 170. Subdivision of Land	§ 190-58. Site plan approval.				Chapter 109. Flood Damage Prevention	Chapter 114. Freshwater Wetlands				Chapter 157. Small-Scale Solar Energy Chapter 158. Small-Scale Battery Energy Storage Systems Chapter 187. Wind Energy Facilities	

Municipality	Zoning Regulations	Subdivision Review	Site Plan Review	Design Standards/ Overlay Districts	Stormwater Management	Erosion and Sediment Control	Flood Damage Prevention	Wetland and Watercourse Protection	Environmental Quality Review	Historic Preservation	Local Natural Area Protection	Renewable Energy Goals/Laws	Other
Town of Bethlehem	Chapter 128. Zoning	Chapter 103. Subdivision Regulations	Chapter 128 Article VII. Special Use Permit and Site Plan Review		Chapter 98. Stormwater Management	§ 128-49. Grading, erosion and sediment control.	Chapter 69. Flood Damage Prevention	Chapter 72. Freshwater Wetlands				Chapter 58. Community Choice Aggregation Program	Chapter 80. Local Waterfront Revitalization Program § 76-4. Storage of rubbish, garbage or junk vehicles outside buildings
Town of Coeymans	Chapter 165. Zoning	Chapter 145. Subdivision of Land	Chapter 136. Site Plan Review				Chapter 93. Flood Damage Prevention	Chapter 96. Freshwater Wetlands				Chapter 137. Solar Energy	
Town of Colonie	Chapter 190. Zoning and Land Use		Chapter 190. Zoning and Land Use, Article XI. Site Plan Review and Special Use Permits	Chapter 191. First Prize Center Redevelopment Overlay Zoning District			Chapter 190 Article XVII. Floodplain Management		Chapter 90. Environmental Compliance	Chapter 118. Preservation of Historic Places			

Municipality	Zoning Regulations	Subdivision Review	Site Plan Review	Design Standards/ Overlay Districts	Stormwater Management	Erosion and Sediment Control	Flood Damage Prevention	Wetland and Watercourse Protection	Environmental Quality Review	Historic Preservation	Local Natural Area Protection	Renewable Energy Goals/Laws	Other
Town of Guilderland	Chapter 280. Zoning	Chapter 247. Subdivision of Land	§ 280-53. Site plan approval	§ 280-18.1. Transit-Oriented Development (TOD) District	Chapter 241. Stormwater Management		Chapter 177. Flood Damage Prevention	Chapter 181. Freshwater Wetlands			§ 280-35. Residential cluster/conservation development and open space/parkland Chapter 201. Native Tree Preservation and Protection Chapter 251 Article XVI. Conservation Easement Agreement Exemption	Chapter 150. Community Choice Aggregation Program	
Town of Knox	Zoning Ordinance	Land Subdivision Regulations	Article VI Section 61E. Site Plan Approval				Local Law 2015-1: Flood Damage Prevention Law						
Town of New Scotland	Zoning 2020 LL01 Codification	Subdivision 1993 Local Law 1			Storm Water Management 2007 Local Law 3		Flood Damage Prevention 2015 LL01	Fresh Water Wetlands Regulation 1976		Historic Preservation Law Local Law 6 of 2019		Community Choice Aggregation 2019 LL07 Solar Collector Systems 2017 LL05 Solar Facilities 2019 LL05	Vehicles, Junk and Junk Storage (1984)
Town of Rensselaerville	Zoning Law (Amended by LL3 of 2016)		Article X. Site Plans			Article VII Section 2. Erosion and Sedimentation Control	Local Law #2 of 2015 - Flood Damage Prevention	Article VII Section 16. Wetlands and Wetland Buffers				Local Law #1 of 2021 - Solar Energy Law	

Municipality	Zoning Regulations	Subdivision Review	Site Plan Review	Design Standards/ Overlay Districts	Stormwater Management	Erosion and Sediment Control	Flood Damage Prevention	Wetland and Watercourse Protection	Environmental Quality Review	Historic Preservation	Local Natural Area Protection	Renewable Energy Goals/Laws	Other
Town of Westerlo	Zoning Law (last amended by LL3 of 2022)	Land Subdivision Regulation (amended by LL2 of 2007)	Article 9. Site Plan Review				Flood Damage Prevention 2015 LL01	Freshwater Wetlands 1976 LL1				Commercial and Residential Solar Energy Systems 2021 LL04 Battery Energy Storage 2021 LL02 (Revised 2022) Wind Energy Systems 2021 LL03	Article 13. Junk and Auto Parts
Town/Village of Green Island	Chapter 169. Zoning		§ 169-14. Planning Board; site plan review		Chapter 141. Stormwater Management		Chapter 87. Flood Damage Prevention	Chapter 90. Freshwater Wetlands				Local Law #1 of 2022 - Opt out of Exemption from Taxation for Certain Energy Systems	
Village of Altamont	Chapter 355. Zoning	Chapter 315. Subdivision of Land	Chapter 355 Article V. Special Use Permits and Site Plan Review		Chapter 308. Stormwater Management		§ 355-13. Flood damage protection					Chapter 160. Community Choice Aggregation Program	
Village of Colonie	Chapter 242. Zoning	Chapter 199. Subdivision of Land				Chapter 95. Clearing, Grading and Erosion Control	Chapter 124. Flood Damage Prevention	Chapter 128. Freshwater Wetlands Chapter 237. Watercourses	Chapter 114. Environmental Quality Review				

Municipality	Zoning Regulations	Subdivision Review	Site Plan Review	Design Standards/ Overlay Districts	Stormwater Management	Erosion and Sediment Control	Flood Damage Prevention	Wetland and Watercourse Protection	Environmental Quality Review	Historic Preservation	Local Natural Area Protection	Renewable Energy Goals/Laws	Other
Village of Menands	Chapter 169. Zoning	Chapter 148. Subdivision of Land	(Repealed 2023)		Chapter 143. Stormwater Management and Erosion and Sediment Control	Chapter 143. Stormwater Management and Erosion and Sediment Control	Chapter 93. Flood Damage Prevention						
Village of Ravena	Chapter 119. Zoning	Chapter 102. Subdivision of Land	Chapter 96. Site Plan Review				Chapter 67. Flood Damage Prevention		Chapter 62. Environmental Quality Review			Local Law #5 of 2021 - Regulating Solar Siting	
Village of Voorheesville	Zoning Law (2019)	Drawer 7. Land Use and Development, 4. Land Subdivision	Zoning Law (2019) Article X. Site Plan Review	Wellhead and Aquifer Protection Overlay Areas - Zoning Law (2019) Article V Section C9	Drawer 7. Land Use and Development, 5. Stormwater Management; Soil Erosion and Sediment Control	Drawer 7. Land Use and Development, 5. Stormwater Management; Soil Erosion and Sediment Control	Drawer 7. Land Use and Development, 2. Flood Damage Prevention	Drawer 7. Land Use and Development, 3. Freshwater Wetlands				Article VII Section W. Solar Facilities	

5 HAZARD IDENTIFICATION AND RANKING

5.1 Introduction to Risk Assessment

Risk is the potential for loss or damage when hazards impact a community's people and other assets. It can be thought of as the place where hazards and assets overlap. A risk assessment analyzes and describes this potential risk. It is a data-driven analysis that describes what hazards a community faces, what assets are vulnerable to those hazards, and what impacts might occur. These impacts could include loss of life, injury, economic impacts, property damage, and more. By conducting a risk assessment, communities can then develop strategies to reduce this risk (FEMA, 2023).

The risk assessment process includes the following components:

- Hazard Identification (Section 5) — Determine what hazards may affect a jurisdiction, based on historical data and existing reports.
- Hazard Profiling (Section 6) – Understand what each hazard is, what geographic areas are affected, how severe the hazard can be, how often it has occurred in the past, who and what are vulnerable to the hazard, and how likely it is for the hazard to occur in the future.
- Identify Assets (Section 0) – Identify what is valuable to the County – for instance, people, economic activities, infrastructure, natural resources, historic and cultural resources – in order to understand who and what could be affected by these hazards
- Assess Overall Vulnerability (Section 8) – Understand the overall impacts of hazards to the assets identified in the jurisdiction, based on the sections above, and identify particular vulnerabilities of concern

The HMP Update excludes technological and human-caused hazards from the scope, due to the fact that mitigation projects related to such hazards are not eligible for mitigation grant funding through FEMA and will not be evaluated as part of the HMP. FEMA states that technological hazards and human-caused threats align more with a Threat and Hazard Identification and Risk Assessment (THIRA), as described in the Threat and Hazard Identification and Risk Assessment (THIRA) and Stakeholder Preparedness Review (SPR) Guide (FEMA, 2018).

Albany County is vulnerable to numerous natural hazards. The County conducted a County Emergency Preparedness Assessment (CEPA) analysis update in 2022, which was facilitated by the NYS Division of Homeland Security and Emergency Services (NYS DHSES). During the CEPA update, the County ranked several natural and technological hazards. The 2022 CEPA (Albany County, 2022), the National Risk Index (FEMA, 2023), and the 2023 New York State Hazard Mitigation Plan (DHSES and AVAIL, 2023) were used to inform natural hazard selection and ranking for the HMP update. Details regarding the natural hazards considered are provided within this section of the HMP.

5.2 Hazard Evidence Analyzed

5.2.1 Albany County 2022 CEPA Results

Albany County conducted a County Emergency Preparedness Assessment (CEPA) on June 22, 2022. This event updated the County's previous CEPA that was conducted in 2017. CEPA is a program that was developed by NYS DHSES to analyze hazard risks and the County's capabilities during emergency and disaster events. The hazard analysis completed during the CEPA was used to inform the County's risk and vulnerability assessment for the HMP update.

A number of natural hazards were evaluated during the 2022 CEPA update. The CEPA update also considered multiple technological or human-caused hazards, but these hazards were not considered further for the HMP update. The group analyzed all hazards that were determined to affect Albany County. The CEPA rated each hazard based on the likelihood and consequence ranging from Very High (score of 5) to Very Low (score of 1). Likelihood and Consequence scores are multiplied to provide the overall risk ranking. The Risk Assessment scores are representative of the conversation that Albany County had at this most recent CEPA session.

From the 28 hazards analyzed as part of the CEPA, eight natural hazards were chosen for profiling in the HMP update, and were further grouped into 5 categories: Flood, Drought, Landslide, Severe Storm, and Extreme Temperatures. Three additional natural hazards included in the 2020 CEPA were not included in the HMP Update: animal disease/foreign animal disease, wildfire, and earthquakes. Animal disease/foreign animal disease did not align well with any of FEMA's natural hazard categories. Wildfire was not included because no instances of wildfire have occurred between 1950 and the time of writing of this HMP (NOAA National Centers for Environmental Information, 2023). Although having a medium likelihood and consequence in the 2022 CEPA, Earthquakes were not included because of low magnitude of earthquakes that do occur (U.S. Geological Survey, 2023). These earthquakes are generally between a magnitude of 1 – 3.2 on the Richter scale. Anything under 2.9 is considered a micro earthquake and anything between magnitude 3 – 3.9 are considered a minor earthquake, neither of which have the ability to cause damage and might not even be felt by people in the vicinity (Rafferty, 2023).

The natural hazards listed in the CEPA report are presented in In addition to the local laws and regulations listed in Table 4-1, many municipalities in Albany County engage in community planning activities that support natural hazard mitigation, preparedness, and response, as detailed in the jurisdictional annexes (Appendix A).

Table 4-1 below, along with their associated CEPA Likelihood and Consequence rankings and groupings in the HMP Update. These hazards were grouped into the Flood, Drought, Landslide, Severe Storm, and Extreme Temperatures categories, along with additional sub-hazards as described in Section 5.2.4.

Table 5-1. Albany County Emergency Preparedness Assessment Results

Hazard in CEPA (2022)	CEPA Likelihood Category (2020)	CEPA Consequence Category (2020)	Relative Risk Score	Category in 2024 HMP Update
Flooding	Very High	High	20	Flood
Severe Winter Snowstorm	Very High	High	20	Severe Storm
Ice Storms (at least a ½ inch or more)	High	High	16	Severe Storm
Severe Wind/Tornado	High	Medium	12	Severe Storm
Extreme Temperatures	Very High	Low	10	Extreme Temperatures
Landslides	Medium	Medium	9	Landslides
Hurricanes/Tropical Storm (Wind and Surge)	Medium	Low	6	Severe Storm
Drought	Medium	Low	6	Drought

5.2.2 National Risk Index

The National Risk Index for Albany County profiled the risk that 18 different hazards pose to the County's physical and agricultural assets (FEMA, 2023). According to the report, the County has a risk score of 75.5, which corresponds to Relatively Low. Albany County's risk score is at the 75th percentile for the US and at the 72nd percentile for New York, meaning that its risk score is higher than 75.5% of all census tracts in the nation and higher than 72.6% of the census tracts in New York (FEMA, n.d.). The rankings for the 18 hazards and their status in the HMP Update are provided in Table 5-2.

Table 5-2. Albany County National Risk Index Ratings and Scores

Hazard	Risk Index Rating	Risk Index Score (as a percentile)	Included in 2024 HMP Update?
Riverine Flooding	Relatively Low	62.5	Yes
Cold Wave	Relatively High	84.4	Yes
Ice Storm	Relatively Low	93.7	Yes
Hurricane	Relatively Low	80.9	Yes
Heat Wave	Relatively Low	60.6	Yes
Tornado	Relatively Moderate	87.9	Yes

Hazard	Risk Index Rating	Risk Index Score (as a percentile)	Included in 2024 HMP Update?
Wildfire	Relatively Low	54.5	No
Drought*	No Rating	-	Yes
Landslide	Relatively Moderate	90.9	Yes
Hail	Relatively Low	67.5	Yes
Strong Wind	Relatively Low	57.9	Yes
Earthquake	Relatively Low	80.2	No
Lightning	Relatively Moderate	87.1	No
Winter Weather	Relatively Low	40.9	Yes
Avalanche	-	-	No
Coastal Flooding	Relatively Low	56.1	No
Tsunami	-	-	No
Volcanic Activity	Not Applicable	-	No

**National Risk Index is based on Agricultural (crop only) impacts.*

Source: National Risk Index (FEMA, 2023).

5.2.3 Presidential Disaster Declarations

The President of the United States can make an emergency and/or major disaster declaration under the Stafford Act. If a natural disaster causes a severe amount of damage beyond the State and local government response capabilities, the Governor of the impacted State can request a major disaster declaration from the President. The request from the Governor must include an estimate of the amount and severity of damage to public and private sectors, a description of the State and local efforts and resources used to respond to the disaster, an estimate of the type and amount of Stafford Act assistance needed, and certification that the State and local governments will comply with all applicable cost sharing requirements. Counties typically have to meet a per capita threshold of damage that is set by the Federal government to be eligible for assistance. Major disaster declaration assistance generally provides three types of aid: Individual Assistance, Public Assistance, or Hazard Mitigation Assistance. Most declarations will provide either Individual or Public Assistance along with Hazard Mitigation Assistance.

Albany County has been included in 18 Presidential Declared Natural Disasters between 1954 (date of earliest records) and 2023. 1 of these events occurred between 2018 and 2023. Details of these events are provided in Table 5-3. In addition to federally declared disasters, there have been a number of non-declared disaster events, as detailed in Section 6.

*Table 5-3. Federal Disaster Declarations Including Albany County, 1954-2023**

Disaster Number	Declaration Date	Incident Type	Title
DR-801-NY	11/10/1987	Severe Winter Storm	New York Severe Winter Storm
EM-3107-NY	3/17/1993	Severe Blizzard	New York Severe Blizzard
DR-1083-NY	1/12/1996	Blizzard	New York Blizzard
DR-1095-NY	1/24/1996	Flood	New York Severe Storms/flooding
DR-1296-NY	9/19/1999	Hurricane	New York Hurricane Floyd
DR-1335-NY	7/21/2000	Severe Storm	New York Severe Storms
EM-3173-NY	2/25/2003	Snowstorm	New York Snowstorm
EM-3184-NY	3/27/2003	Snowstorm	New York Snowstorm
DR-1534-NY	8/3/2004	Severe Storm	New York Severe Storms and Flooding
EM-3262-NY	9/30/2005	Hurricane	New York Hurricane Katrina Evacuation
DR-1692-NY	4/24/2007	Severe Storm	Severe Storms and Inland and Coastal Flooding in New York
EM-3299-NY	12/18/2008	Severe Storm	New York Severe Winter Storm
DR-1827-NY	3/4/2009	Severe Storm	Severe Winter Storm in New York
DR-4020-NY	8/31/2011	Hurricane	Hurricane Irene in New York
EM-3341-NY	9/8/2011	Severe Storm	Remnants of Tropical Storm Lee in New York
EM-3351-NY	10/28/2012	Hurricane	Hurricane Sandy in New York
DR-4322-NY	7/12/2017	Snowstorm	Severe Winter Storms in New York
3565-EM-NY	8/22/2021	Hurricane	New York Hurricane Henri

Sources: (Barton & Loguidice, 2018) (FEMA, 2023)

**Disasters shown only include Natural Hazards. Other Disaster Declarations that occurred during this time frame include Fire and Biological incidents.*

5.2.4 2018 HMP

The 2018 Albany County Hazard Mitigation Plan Update profiled the following hazards:

- Extreme Temperatures
- Severe Thunderstorm/Wind/Tornado
- Hurricanes and Tropical Storms
- Floods
- Drought
- Landslides

- Earthquakes
- Winter Storm/Ice Storm
- Wildfires
- Ice Jams

5.3 Hazards Selected

Based on the results from Albany County's 2022 CEPA analysis, the National Risk Index, and Presidential Disaster Declarations, as well as Albany County's 2018 HMP Update and the NYS 2019 HMP, as detailed above, attendees at the Hazard Identification Meeting (1/22/24) selected the hazards to be profiled in the 2024 HMP update. The hazards selected for profiling in the 2024 HMP Update are as follows:

- Flooding – Flooding includes riverine flooding, coastal flooding (including sea level rise), urban flooding, flash flooding, ice jam flooding, flooding due to a dam or levee break, and any other type of flooding that the County may experience.
- Drought – A drought is a period of unusually constant dry weather that causes deficiencies in water supply. The dry weather can last for a short time or for many years, and the deficiencies can be in surface water or groundwater (DHSES and AVAIL, 2023).
- Severe Storm – The "Severe Storm" hazard includes hail, ice storms, wind, thunderstorms and lightning, winter storms, hurricanes, tropical storms, tornado, and any other storm event, as well as associated effects such as power outages.
- Extreme Temperatures (Heat/Cold Wave) – The "Extreme Temperatures" category includes heat, excessive heat, cold and extreme cold weather events, and air pollution (since the effects of air pollution can be exacerbated during heat).
- Landslide - Landslides are defined as the downward and outward movement of slope-forming materials reacting to the force of gravity (U.S. Geological Survey, n.d.).

This selection includes hazards that are commonly recognized to affect the County and includes consideration of the relative risks of the hazards, as discussed in Section 5.2. It excludes hazards which pose a low risk to the County, such as earthquakes and wildfires. It also excludes technological and human-caused hazards, as discussed in Section 5.1.

Hazard groupings were based on the similarity of hazard events, their typical concurrence or their impacts, consideration of hazard grouping in the NYS HMP (DHSES and AVAIL, 2023), and consideration of how hazards have been grouped in Federal Emergency Management Agency (FEMA) guidance documents (FEMA, 2023) (FEMA, 2001) (FEMA, 1997).

5.4 Hazard Ranking

Once the hazards were selected, the Steering Committee completed an updated hazard analysis in 2024 to rank the hazards selected for profiling in the HMP Update for Albany County. For the County itself, the hazard analysis was conducted via a survey, completed by 9 Albany County officials who were on the Executive Steering Committee or were key stakeholders. The survey questions corresponded to the fields in a hazard analysis spreadsheet (Figure 5-1). For the municipalities within Albany County, the hazard analysis spreadsheet was completed during each jurisdictional interview.

Within the spreadsheet, the hazard analysis table was organized by the hazards in rows and the criteria for ranking the vulnerability in columns. For each hazard, four different criteria were analyzed: impact (damage to property, crops, and people), frequency of occurrence, extent of impacts, and level of preparedness. Each of the criteria have three ranking options for measuring their vulnerability. The options for the criteria are as follows: impact - minor, moderate, or major; frequency of occurrence - rare, infrequent, or regular; extent of impacts – one or two problem areas within the county, a significant portion of the county, or county-wide; and level of preparedness - well prepared, moderately prepared, or not prepared.

Figure 5-1. Snapshot of Albany County Hazard Analysis Spreadsheet

Hazard Analysis

Hazard	Impact (Damage to property, crops, people)		Frequency of Occurrence		Extent of Impacts		Level of Preparedness	
Flooding (Riverine, Coastal, Urban, Flash, Ice Jam, Dam or Levee Break, Other)	Minor	☐	Rare	☐	One or two problem areas within the County	☐	Well Prepared	☐
	Moderate	☐	Infrequent	☑	A significant portion of the County	☑	Moderately Prepared	☑
	Major	☑	Regular	☐	County-wide	☐	Not Prepared	☐
Drought	Minor	☑	Rare	☑	One or two problem areas within the County	☑	Well Prepared	☐
	Moderate	☐	Infrequent	☐	A significant portion of the County	☐	Moderately Prepared	☐
	Major	☐	Regular	☐	County-wide	☐	Not Prepared	☑
Severe Storm (Hail, Ice		☐		☐		☐		☐

As shown in Table 5-4, the ranking options for each criteria are all associated with a value of 1, 2 or 3. The lowest value (1) represents a low vulnerability and the highest value (3) represents a high vulnerability. The ranking options that have a value of 1 are minor, rare, one or two problem areas within the County, and well prepared. The ranking options with a value of 2 are moderate, infrequent, a significant portion of the County, and moderately prepared. The ranking options with a value of 3 are major, regular, County-wide, and not prepared.

Table 5-4. Hazard Analysis Criteria

Score	Impact (Damage to property, crops, people)	Frequency	Extent	Level of Preparedness	Total Score	Overall Vulnerability
1	Minor	Rare	One or two problem areas within the County	Well Prepared	4 to 5	Low
2	Moderate	Infrequent	A significant portion of the County	Moderately Prepared	6 to 8	Moderate
3	Major	Regular	County-wide	Not Prepared	9 to 12	High

After checking off the rank of each criteria for each hazard, the values that correspond to the ranking option are displayed in another table in the spreadsheet, as shown in Table 5-4. Based on the ranking options described above, each criteria for each hazard is assigned a value of either 1, 2, or 3. In addition, the table contains an overall vulnerability column as well as a jurisdiction rank column. The overall vulnerability column is the sum of all of the values for each specific hazard. If the overall total vulnerability score has a value of 4-5, the overall vulnerability is considered low. It is considered moderate vulnerability if the total score has a value of 6-8. If the overall vulnerability score has a value of 9-12, the vulnerability is considered high. The jurisdiction rank column is numbered 1, 2, 3… to show which hazard events have the highest to lowest ranking, with a ranking of 1 being the highest and signifying a greater priority to the jurisdiction. The 2024 hazard analysis results for the County are summarized in Table 5-5.

Table 5-5. Hazard Vulnerability by Event for Albany County

Hazard Event	Impact (Damage and Injuries)	Frequency of Occurrence	Extent of Impacts	Level of Preparedness	Overall Vulnerability	Jurisdiction Rank
Severe Storm (Hail, Ice Storms, Wind, Thunderstorms and Lightning, Winter Storms, Hurricane, Tropical Storms, Tornado, Power Outage)	2	3	3	2	10 – High	1
Flood (Riverine, Coastal, Urban, Flash, Ice Jam, Dam or Levee Break, Other)	3	2	2	2	9 – High	2
Extreme Temperatures (Cold Wave, Heat Wave, Air Pollution Effects)	2	2	3	2	9 – High	3
Drought	1	1	1	3	6 – Moderate	4
Landslide	1	1	1	2	5 – Low	5

The rankings from survey completed by Albany County officials were ultimately chosen as the hazard rankings for this HMP. These rankings took into account the evidence presented above, as well as additional evidence, which were presented to the Executive Steering Committee and key stakeholders before they completed the survey.

5.4.1 Comparison to Previous Plans

Table 5-6 provides a comparison of the hazard rankings for the HMP update alongside the 2018 HMP and 2022 CEPA hazard analyses. Technological and human-caused hazards are excluded, as this 2024 HMP Update focuses on natural hazards.

Table 5-6. Hazard Ranking Comparison

Hazard	Hazard Category	2018 HMP Rank	2022 CEPA Rank	2024 HMP Update Rank	Affected by Climate Change
Flood (Riverine, Coastal, Urban, Flash, Ice Jam, Dam or Levee Break, Other)	Natural	Varies (Medium to Low)	High	High	Yes
Severe Storm (Hail, Ice Storms, Wind, Thunderstorms and Lightning, Winter Storms, Hurricane, Tropical Storms, Tornado, Power Outage)	Natural	Varies (High to Low)	Varies (High to Low)	High	Yes
Extreme Temperatures (Cold Wave, Heat Wave, Air Pollution Effects)	Natural	Medium	Moderate	High	Yes
Landslide	Natural	Low	Moderate	Low	Yes
Drought	Natural	Low	Low	Moderate	Yes

The rankings for flood, severe storm, and landslide are in line with rankings from the 2018 HMP and the 2022 CEPA, while extreme temperatures and drought were both ranked more highly than they were in these previous plans. The higher ranking of extreme temperatures took into account the numerous extreme temperature events that have occurred since the last plan update (see Section 6.4.5), as well as the higher future probability of extreme heat events (see Section 6.4.6). The higher ranking of drought took into account the higher future probability of drought events (see Section 6.3.6) as well as the County's lack of preparedness for drought as indicated in Table 5-5 above.

6 HAZARD PROFILES

The natural hazards that were selected for profiling in the HMP update are further detailed below. These include flood, drought, severe storm, extreme temperatures, and landslide. The sub-hazards are described in Section 5.3.

*The County described significant concerns about air quality, such as the smoke that the County experienced in the summer of 2023, due to wildfires in Canada. Since air quality can have especially detrimental health effects during a heat wave, air pollution concerns have been grouped under "Heat Wave." Wildfires were not profiled in this HMP update, as discussed in Section 5.

The following sections include a description of the hazard, geographic extent and frequency within Albany County, historical occurrences and damage estimates, and the probability of future hazard events.

Hazard event information was compiled from local records and publicly available data from the 2023 NYS Hazard Mitigation Plan (MitigateNY), National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC), Climate Mapping for Resilience & Adaptation (CMRA), U.S. Army Corps of Engineers (USACE) Cold Regions Research and Engineering Laboratory (CRREL), and other news reports. Some language in this section was taken directly from the 2023 New York State Hazard Mitigation Plan (DHSES and AVAIL, 2023). Damage estimates were compiled using NOAA data (National Oceanic and Atmospheric Administation, n.d.), National Risk Index data (FEMA, 2023), and National Weather Service data (National Weather Service, n.d.).[1]

6.1 Flood

6.1.1 Description

According to FEMA, a flood is "A general and temporary condition of partial or complete inundation of 2 or more acres of normally dry land area or of 2 or more properties (at least 1 of which is the policyholder's property) from:

- Overflow of inland or tidal waters; or
- Unusual and rapid accumulation or runoff of surface waters from any source; or
- Mudslides (i.e., mudflows) which are proximately caused by flooding and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water and deposited along the path of the current.; or

[1] The NCDC damage estimates are subject to the NCDC disclaimer that while the National Weather Service makes an effort to use the best available information to document the occurrence of storms and other significant weather data, some information may be unverified. The National Weather Service (NWS) estimates damage costs using all available data, but property and crop damages listed for individual storms are considered broad estimates and total damages are often higher than those reported by the NCDC.

- Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above" (FEMA, 2020).

Flooding can occur during any season, but typically occurs during prolonged rainfalls over several days, intense rainfalls over a short period of time, when snowmelt accumulates faster than soils can absorb it, or when an ice or debris jam causes a river or stream to overflow into the surrounding area. Flooding can also result from the failure of a water control structure, such as a levee or dam (DHSES and AVAIL, 2023).

There are many types of floods that can occur. For the purpose of this HMP, riverine flooding, coastal flooding, urban flooding, flash flooding, ice jam flooding, and flooding due to a dam or levee break are the main flood types of concern for the County. These types of flood or further discussed below. However, the flood category includes any type of flood that the County may experience.

Riverine Flooding

Riverine flooding occurs when streams and rivers exceed their natural or constructed capacity and water overflows the banks, spilling out into adjacent low-lying, dry land. Most riverine floods occur after long periods of persistent precipitation that cause rivers to gradually rise and top their banks. Riverine flooding can also result from snowmelt, ice jams, and downstream constrictions that cause water to back up and overflow. Riverine floodwaters can retreat quickly or may take a few weeks to recede and can inundate roads, crops, and homes, wash away bridges, cause soil bank erosion, and, in extreme cases, result in fatalities. The slower onset of riverine flooding allows for the monitoring of rivers and streams and provides officials (and the media) time to establish warnings and/or evacuation orders for areas that are expected to be impacted. Riverine flooding can lead to property damage, disruptions to transportation and infrastructure, and risks to public safety (DHSES and AVAIL, 2023).

Coastal Flooding

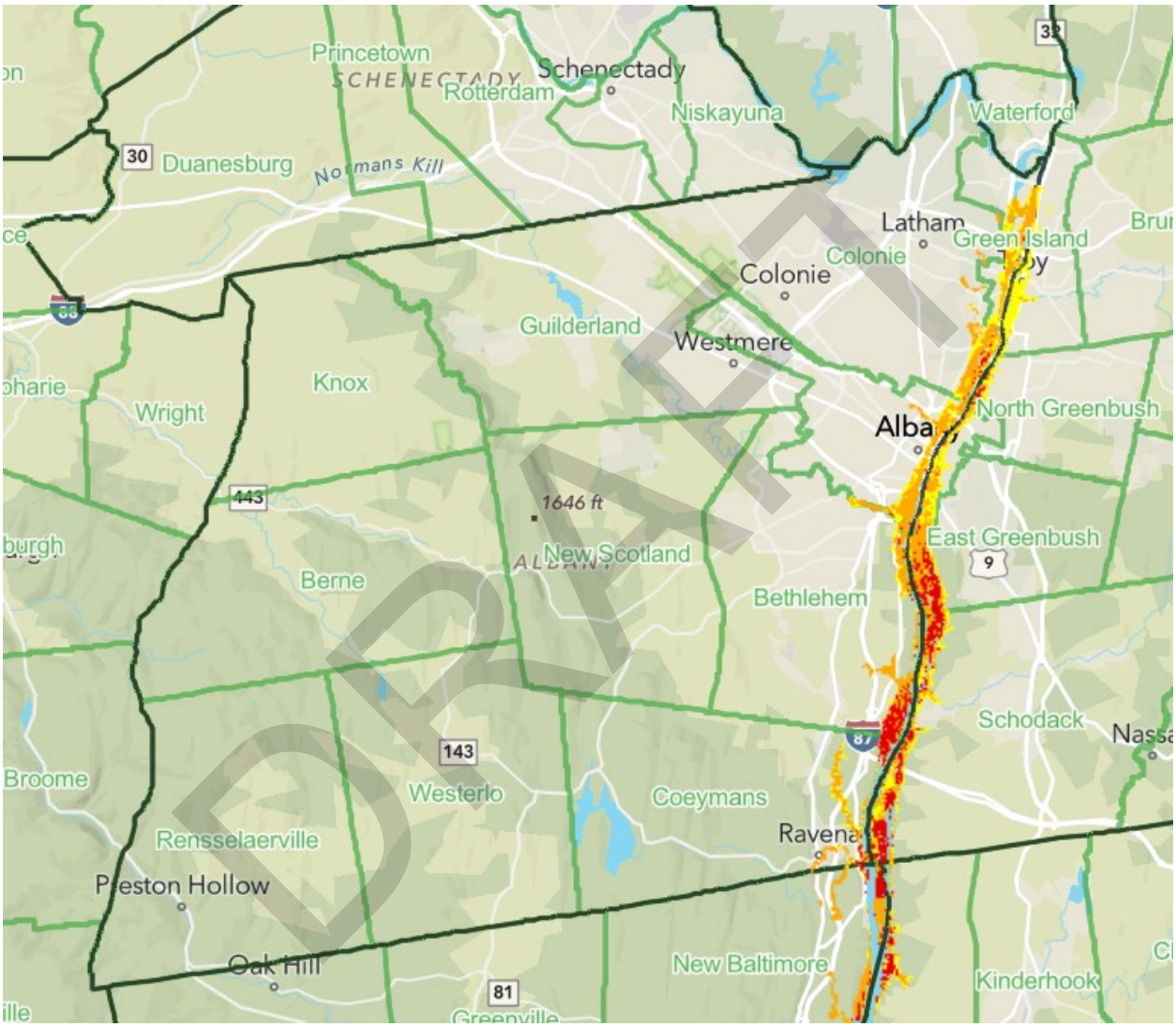
Coastal flooding is the inundation of seawater over coastal land that is normally dry. This is often caused by high or rising tides, storm surge or other factors that elevate the water level above the normal tide levels. The extent to which an area may flood depends on the coastal topography, strength of the storm generating the storm surge, and the depth of the water along the coast. The east coast of the United States experiences the most coastal flooding events in the nation each year (DHSES and AVAIL, 2023).

While Albany County is not located on an ocean, coastal flooding still affects parts of the County. This is because of the Hudson River Estuary, which can be viewed as an extension of the Atlantic Ocean. When sea level rises in the Atlantic Ocean, it also rises in the Hudson River Estuary. The sea level on the Hudson River has risen about a foot over the last century (Scenic Hudson, 2023).

Hudson River Coastal Risk Areas in Albany County are shown in Figure 6-1. According to the NYS DOS, "Risk Areas help illustrate the geographic distribution of coastal risk along

the Hudson River shoreline of Rockland, Orange, Ulster, Greene, Albany, Rensselaer, Columbia, Dutchess, and Putnam Counties." The risks identified in this map includes flooding, erosion, waves and storm surge (NYSDOS, 2024).

Figure 6-1. Hudson River Coastal Risk Areas in Albany County



Data Source: Hudson River Coastal Risk Areas, 2024 (NYSDOS, 2024)

Urban Flooding

Urban flooding refers to the inundation of urban areas, such as cities and towns, caused by heavy rainfall or the overflowing of drainage systems. Unlike rural areas with more natural land cover and porous surfaces, urban environments have extensive impervious surfaces like roads, pavements, and buildings that limit the natural infiltration of rainwater into the ground. This results in increased surface runoff, which can overwhelm drainage systems and lead to flooding in urban areas. Additionally, urbanization often

alters natural watercourses and wetlands, further reducing the area available for water storage and drainage (DHSES and AVAIL, 2023).

In many cases, urban flooding has little to do with bodies of water and happens in places that are well outside of mapped floodplains. Even small amounts of rain can overwhelm the deteriorated or inadequate infrastructure found in many urban areas, especially in impoverished, neglected, and/or socioeconomically isolated urban communities (DHSES and AVAIL, 2023).

Flash Flooding

A flash flood is a rapid and intense flood event that occurs within a short period, typically within six (6) hours, and often within (3) hours, of heavy rainfall. Two key factors that contribute to flash flood are how hard the rain falls (rainfall intensity) and how long the rain lasts (duration). Flash floods are characterized by their swift onset and high intensity (DHSES and AVAIL, 2023).

Most flash flooding is caused by slow-moving or stalled thunderstorms, by thunderstorms repeatedly moving over the same area, or by heavy rains from hurricanes and tropical storms. Heavy, sustained rain can create rapid flooding within a few hours or even minutes, and flooding can occur miles away from where the rain fell (DHSES and AVAIL, 2023).

Ice Jam Flooding

An ice jam, or ice dam, happens when ice clumps together to reduce or block the flow of a river, which leads to flooding or flash flooding. Ice jams can develop near river bends, mouths of tributaries, points where the river slope decreases, downstream of dams, and upstream of bridges or obstructions.

The process of ice jam formation typically involves the following steps:

- Freezing: As temperatures drop, the surface of the river or stream begins to freeze, forming a layer of ice.
- Ice Accumulation: As the winter continues, more ice accumulates and thickens on the river's surface.
- Breaking and Movement: Fluctuations in water flow or warming temperatures cause the ice to break apart and move downstream.
- Obstruction and Accumulation: The moving ice encounters obstacles, such as bends in the river or debris, causing it to pile up and form a jam.
- Backwater Effect: As the ice jam grows, it can create a temporary dam effect upstream, causing water to back up and leading to localized flooding.

Once an ice jam forms, it can persist until it breaks apart or melts due to rising temperatures. The breaking of an ice jam can result in a rapid surge of water downstream, leading to flooding in affected areas (DHSES and AVAIL, 2023).

Dam or Levee Break

A dam failure is usually caused by structural damage or failure, and causes rapid, uncontrolled release of enclosed water from a lake or reservoir. According to the

Association of State Dam Safety Officials, there are five main causes of dam failure: overtopping, foundation defects, cracking, inadequate maintenance and upkeep, and piping. Overtopping is the most frequent cause, accounting for approximately 34% of all dam failures.

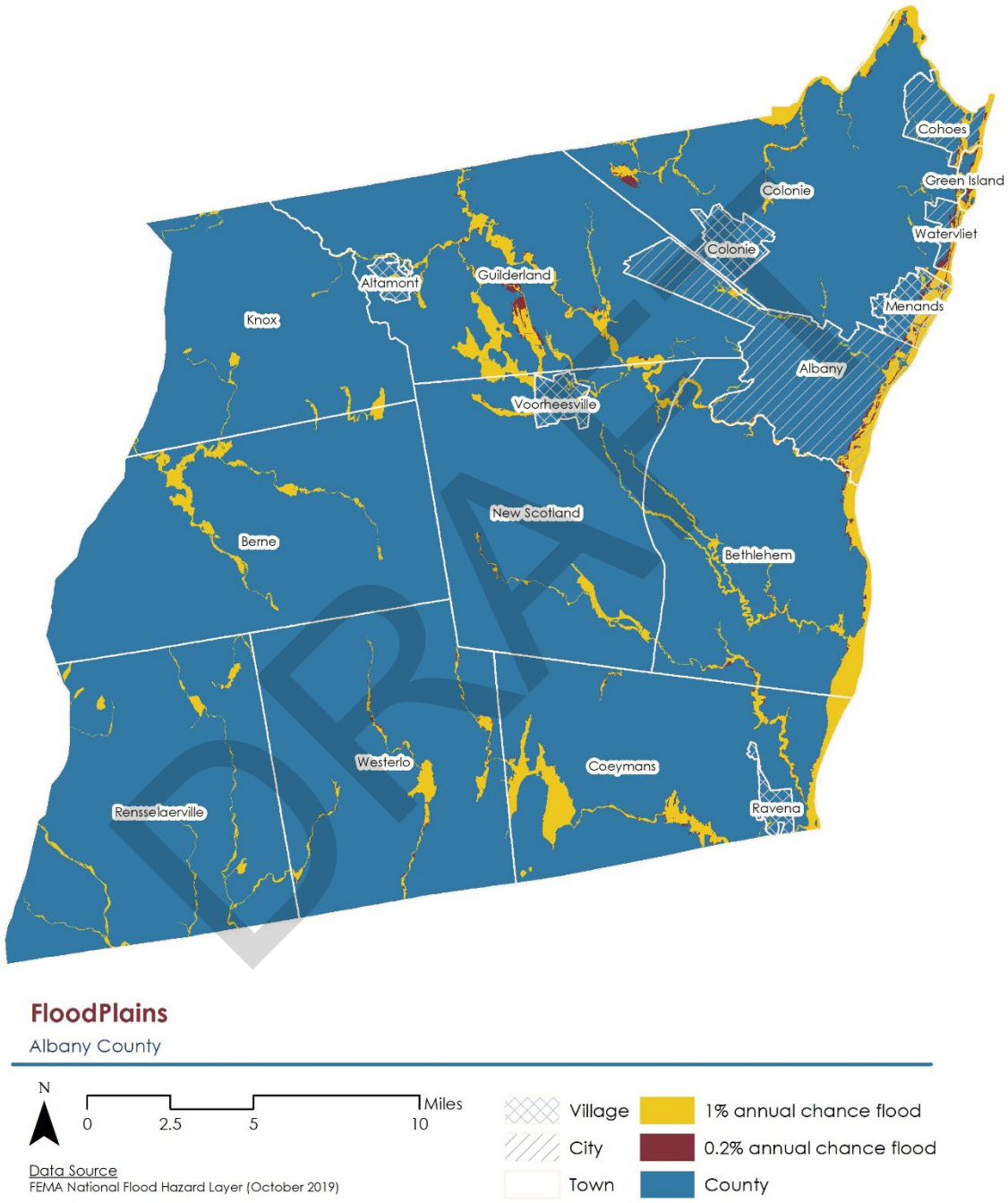
A levee break occurs when the levee wall breaks away, creating a hole for water to flow through, or when water rises high enough to flow over the top of the levee during severe flooding (DHSES and AVAIL, 2023). More information on dams and other high impact facilities in the County and in surrounding areas can be found in Section 7.3.5.

6.1.2 Location

Several areas throughout Albany County are located within the flood zones of the Hudson and Mohawk Rivers as well as along various creeks and streams.

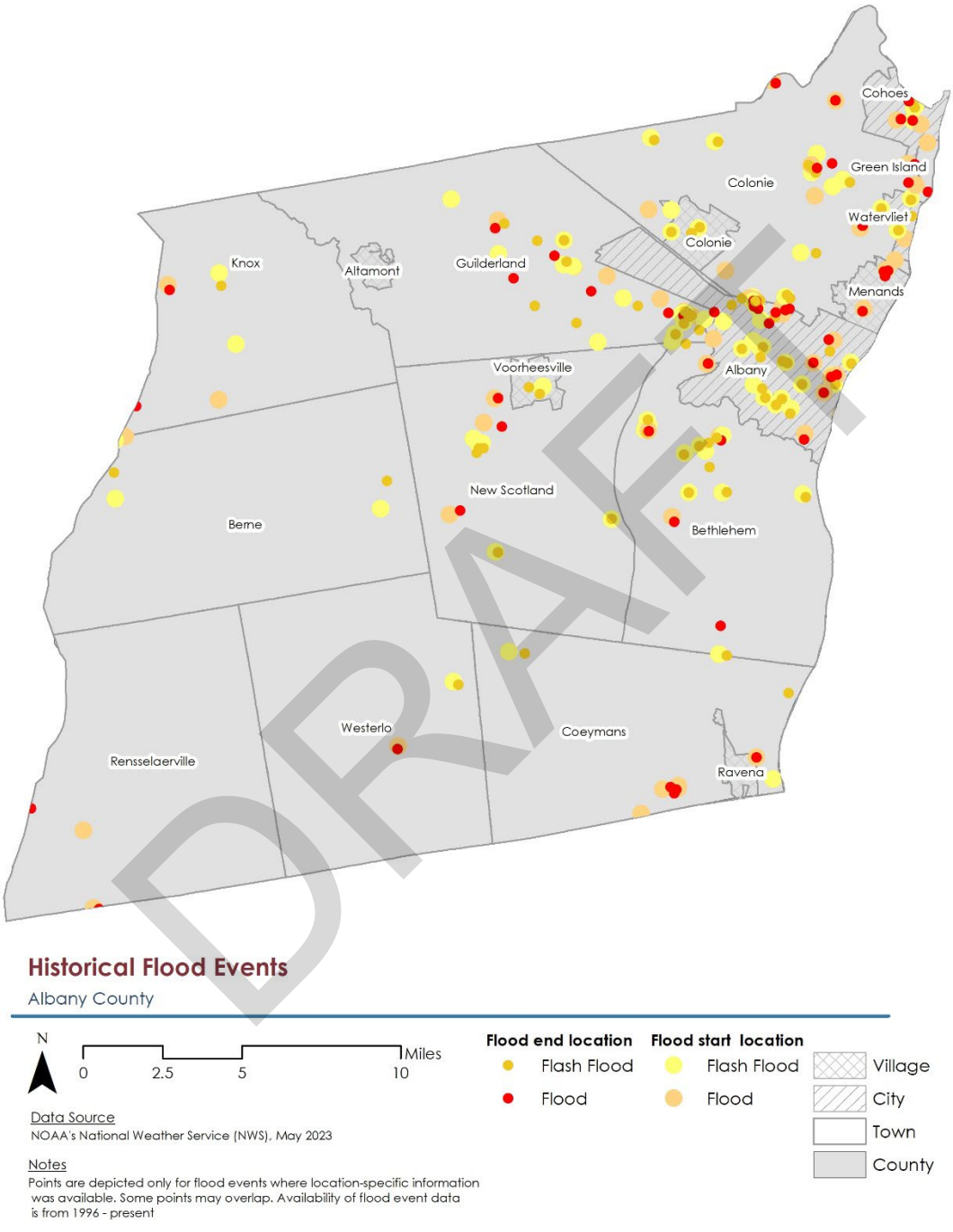
Mapped floodplains in Albany County are shown in Figure 6-2. According to this figure, the 1% and 0.2% annual chance of flood hazard zones are located along the bodies of water located throughout the County. Approximately 5.93% of the County is in a mapped 1% chance floodplain, and 6.47% of the County is in a mapped 0.2% chance floodplain. Additionally, Figure 6-3 displays historical flood events in Albany County from 1996 to early 2023.

Figure 6-2. Floodplains in Albany County



Data Source: FEMA National Flood Hazard Layer (October 2019). The 2019 data reflects the most updated Federal Insurance Rate Maps (FIRMs), which were updated in March of 2015 (FEMA, 2024).

Figure 6-3. Historical Flood Events in Albany County, 1996-2023



Data Source: National Weather Service (May 2023)

6.1.3 Extent

The extent of flooding associated with a 1% probability of occurrence – the "100-year flood" or "base flood" – is used as regulatory boundaries by a number of federal, state and local agencies. Also referred to as the "special flood hazard area", this boundary is a convenient tool for assessing vulnerability and risk in flood prone.

FEMA's DFIRM data, as found in the FEMA National Flood Hazard Layer, was used to identify the location of flood hazard areas in Albany County. The FEMA Flood Insurance Rate Map (FIRM) data uses advanced engineering and refined standards to improve data quality and is regarded as FEMA's most reliable flood hazard data. FEMA's DFIRM mapping was overlaid upon the Albany County GIS Base Map to summarize the flood mapping and flood risk areas for all municipalities in Albany County, and the results are presented in Table 6-1. According to the FIRM data, high/moderate flood risk zones exist in all Albany County municipalities. Out of the municipalities in Albany County, the Town/Village of Green Island has by far the highest proportion of its area within 0.2% Annual Chance Floodplain, followed by the Village of Menands and the City of Watervliet (Table 6-1).

*Table 6-1. Summary of Area in Floodplains**

Jurisdiction	Total Area (square miles)	Percent of Total Area in 1% Annual Chance Floodplain	Percent of Total Area in 0.2% Annual Chance Floodplain**
Albany, City of	22.0	9.99%	11.61%
Altamont, Village of	1.2	10.22%	10.24%
Berne, Town of	64.7	3.51%	3.52%
Bethlehem, Town of	50.0	8.83%	9.35%
Coeymans, Town of	51.6	10.04%	10.57%
Cohoes, City of	4.3	17.80%	20.54%
Colonie, Town of	51.2	6.14%	6.91%
Colonie, Village of	3.3	0.00%	0.00%
Green Island, Village of	1.0	55.42%	70.77%
Guilderland, Town of	57.5	8.97%	9.97%
Knox, Township of	42.0	1.67%	1.67%
Menands, Village of	3.3	33.44%	39.75%
New Scotland, Town of	55.9	3.68%	3.88%

Jurisdiction	Total Area (square miles)	Percent of Total Area in 1% Annual Chance Floodplain	Percent of Total Area in 0.2% Annual Chance Floodplain**
Ravena, Village of	1.5	2.48%	2.51%
Rensselaerville, Town of	61.9	2.60%	2.60%
Voorheesville, Village of	2.1	8.53%	9.54%
Watervliet, City of	1.5	22.30%	37.38%
Westerlo, Town of	58.5	2.65%	2.99%
Albany County (Total)	**533.0**	**5.93%**	**6.47%**

**If a Village lies within a Town, the area within the Village was excluded from the Town's area in the creation of this table. Additionally, calculated areas and percentages are informational estimates only and are not to be used for official purposes.*

***The 0.2% annual chance floodplain in this table includes the area in the 1% annual chance floodplain.*

Data Source: FEMA National Flood Hazard Layer (October 2019). The 2019 data reflects the most updated Federal Insurance Rate Maps (FIRMs), which were updated in March of 2015 (FEMA, 2024).

Several factors determine the severity of floods, including intensity and duration of rainfall or other water sources. A large amount of rainfall over a short period can result in flash flood conditions. Even a small amount of precipitation can result in flood events in locations where the soil is already saturated or in areas with large amounts of impervious surfaces (i.e., large parking lots, roadways, developments, etc.). Topographic and cover type characteristics are also factors that contribute to the severity of flood events. Water runoff is greater in areas with steep slopes and little or no vegetative ground cover. Frequency of inundation depends on the climate, soil, and channel slope of a particular area.

6.1.4 Impacts and Vulnerability

According to the County's hazard analysis in Section 5.4, Albany County is highly vulnerable to floods based on this hazard's major impact (high potential for damage to property, crops and/or people), infrequent occurrence, moderate extent (affects a significant portion of the jurisdiction), and moderate level of preparedness. This assessment is backed by additional information in Section 5 and Section 6.1.

Flooding can cause widespread damage throughout rural, urban, and suburban areas including severe water damage to buildings and building contents, contamination of drinking water sources, sewage backup, bridge and road closures, transit service

disruptions, damage to electrical and communication networks, biodiversity loss, and agricultural loss. Existing drainage systems in New York State were built for past precipitation levels. As storms become more intense, like Ida in 2021 and the rain waters that devastated NYC and Long Island on September 30th, 2023, these drainage systems will continue to be overwhelmed. This risk has been actualized across New York State and will remain as infrastructure investments lag behind the changing climate (DHSES and AVAIL, 2023).

Flood events present many potential cascading effects on individuals and communities, such as loss of hourly wages for those unable to reach their workplaces; hours lost in traffic rerouting and traffic challenges; disruptions in local, regional, and national supply chains; school closings with resultant impacts on parents; temporary or permanent displacement from homes; and health impacts. Floods may cause injuries and loss of life (DHSES and AVAIL, 2023).

In Albany County, the County and jurisdictions are particularly concerned about the impacts of flooding on specific geographic areas within the floodplain, including trailer parks, roads, farms, and remote residents. Jurisdictions mentioned older adults, low-income residents, and people with disabilities as being particularly vulnerable to hazards in the County in general; migrant populations, transient populations, farmers, and others were also mentioned. The County was concerned with having adequate provision of shelters for residents whose homes flood, and enhancing hazard warning systems. The availability of funding for maintaining infrastructure, such as culverts, was cited as an issue in many jurisdictions. Additionally, the Albany County Climate Analysis, funded by AT&T, noted that climate change will increase the potential flood risk to buildings near cities in the County, and that Western Hill Towns with greater mobile home and aging populations would see an increased risk.

Table 4-5 of the County's annex (Appendix A) shows the number and estimated structure value of parcels in the County that intersect 1% chance and 0.2% chance floodplains. In total, there are 6,047 parcels in the 1% annual chance floodplain, with an approximate structure value of $2.3 billion. There are 7,568 parcels in the 0.2% annual chance floodplain (inclusive of the parcels in the 1% annual chance floodplain), with an approximate structure value of $2.6 billion. This is one measurement of the impact of flooding on the County.

Additionally, NFIP policy statistics, claims statistics, and repetitive and severe repetitive loss properties are described in Section 6.1.5, quantifying some of the damage from flooding. The County's overall vulnerability to hazards in this Hazard Mitigation Plan Update is described in Section 0.

6.1.5 National Flood Insurance Program

Long-term mitigation of potential flood impacts can be best achieved through comprehensive floodplain management regulations and enforcement at a local level. The National Flood Insurance Program (NFIP), regulated by FEMA, aims to reduce the impact of flooding on private and public structures by providing affordable insurance for property owners. The program encourages local jurisdictions to adopt and enforce

floodplain management regulations in order to mitigate the potential effects of flooding on new and existing infrastructure (FEMA, 2023).

Communities that participate in the NFIP adopt floodplain ordinances. If an insured structure incurs damage costs that are over 50% of its market value, the owner must comply with the local floodplain regulations when repairing or rebuilding the structure. A structure could be rebuilt at a higher elevation, or it could be acquired and demolished by the municipality or relocated outside of the floodplain. Insured structures that are located within floodplains identified on FEMA's Flood Insurance Rate Maps (FIRMs) may receive payments for structure and content losses if impacted by a flood event.

The NFIP and other flood mitigation actions are important for the protection of public and private property and public safety. Flood mitigation is valuable to communities because it:

- Creates safer environments by reducing loss of life and decreasing property damage;
- Allows individuals to minimize post-flood disaster disruptions and to recover more quickly (homes built to NFIP standards generally experience less damage from flood events, and when damage does occur, the flood insurance program protects the homeowner's investment); and
- Lessens the financial impacts on individuals, communities, and other involved parties.

Albany County Floodplain Mapping

In Albany County, all municipalities' floodplains are mapped out in their entirety via FEMA's Flood Insurance Rate Map (FIRM) panels, which are the official flood maps utilized in the NFIP. For the entire County, these FIRM panels are also available in digital format for download and use in geographic information systems (GIS). FEMA floodplain mapping information and products, including those related to Albany County, can be accessed via FEMA's Map Service Center and National Flood Hazard Layer (NFHL) ArcGIS Viewer: https://www.fema.gov/flood-maps/national-flood-hazard-layer. Information from this digital FIRM data was incorporated into this Hazard Mitigation Plan where appropriate (for example, when identifying which critical facilities are located in the floodplain).

Albany County National Flood Insurance Program (NFIP) Participation

All 18 municipalities within Albany County participate in the NFIP. None of the municipalities in Albany are Community Rating System eligible communities. The CRS is a voluntary incentive program that recognizes and encourages floodplain management activities at the community level. Flood insurance premiums are discounted in CRS communities to reflect the reduced flood risk that results from community actions to meet the program goals: reduce flood loss, facilitate accurate insurance ratings, and promote flood insurance awareness (FEMA, 2023).

NFIP Policy and Claims Statistics

NFIP policy data and claims data as of March 12, 2024 was provided by FEMA to support the development of this HMP. Table 6-2 summarizes the NFIP policy data, while Table 6-3 summarizes the NFIP claims data. Overall, the City of Albany has the largest number of active policies (149), followed by the City of Watervliet with the second largest number of policies (118). The Town of Colonie has the largest number of claims (99), followed by the City of Albany (67). Specific information for each municipality is also summarized in each jurisdictional annex (Appendix A).

Table 6-2. NFIP Policy Statistics for Albany County

Community Name	Number of Policies	Total Premium/Total Paid	Average of Total Premium/Total Paid
Albany, City of	149	$257,200	$1,726
Altamont, Village of	22	$12,866	$585
Berne, Town of	9	$6,954	$773
Bethlehem, Town of	38	$47,173	$1,241
Coeymans, Town of	29	$73,646	$2,540
Cohoes, City of	31	$33,289	$1,074
Colonie, Town of	107	$100,530	$940
Colonie, Village of	2	$1,317	$659
Green Island, Village of	106	$178,322	$1,682
Guilderland, Town of	35	$37,032	$1,058
Knox, Township of	2	$772	$386
Menands, Village of	44	$76,607	$1,741
New Scotland, Town of	16	$13,029	$814
Ravena, Village of	6	$4,450	$742
Rensselaerville, Town of	7	$5,838	$834
Voorheesville, Village of	9	$10,838	$1,204
Watervilet, City of	118	$106,448	$902
Westerlo, Town of	4	$3,345	$836
Total	**734**	**$969,656**	**$1,321**

Source: FEMA-provided data, March 12, 2024. Note: Records were organized based on the NFIP Community Book's Community ID and Name convention.

Table 6-3. NFIP Claims Statistics for Albany County

Community Name	Number of Claims	Total Premium/Total Paid	Average of Total Premium/Total Paid
Albany, City of	67	$788,694	$11,772
Altamont, Village of	13	$32,587	$2,507
Berne, Town of	4	$36,692	$9,173
Bethlehem, Town of	30	$259,070	$8,636
Coeymans, Town of	23	$602,072	$26,177
Cohoes, City of	28	$86,331	$3,083
Colonie, Town of	99	$1,414,654	$14,289
Colonie, Village of	0	$0	$0
Green Island, Village of	5	$29,307	$5,861
Guilderland, Town of	15	$323,567	$21,571
Knox, Township of	2	$0	$0
Menands, Village of	9	$69,503	$7,723
New Scotland, Town of	12	$185,719	$15,477
Ravena, Village of	5	$15,003	$3,001
Rensselaerville, Town of	5	$211,201	$42,240
Voorheesville, Village of	11	$63,431	$5,766
Watervilet, City of	18	$66,328	$3,685
Westerlo, Town of	3	$19,350	$6,450
Total	**349**	**$4,203,511**	**$12,044**

Source: FEMA-provided data, March 12, 2024. Note: Records were organized based on the NFIP Community Book's Community ID and Name convention.

Repetitive and Severe Repetitive Loss Statistics

According to FEMA, a repetitive loss structure is an NFIP-insured structure that has had at least two paid flood losses of more than $1,000 each in any 10-year period since 1978. In Albany County, between 1983 and March 12, 2024, there have been a total of 99 repetitive losses spread between 34 properties, as shown below in Table 6-4. Based on the first loss for each property, 27 of these properties were single-family homes, 3 were two to four family homes, and 4 were designated as some other type of nonresidential use. Collectively, these properties have incurred payments totaling

$2,310,194.19, with an average payment of $23,335.29 per loss. The Town of Colonie had the highest number of repetitive loss properties (14), followed by the City of Albany (7). Of the 34 repetitive loss properties, 5 are designated as severe repetitive loss properties by the NFIP.

Table 6-4. NFIP Repetitive Loss Statistics for Albany County

Community Name	Number of Repetitive Loss Properties	Total Losses	Total Paid
Albany, City of	7	15	$297,873.21
Altamont, Village of	1	2	$7,251.33
Berne, Town of	0	0	$0
Bethlehem, Town of	4	9	$119,546.32
Coeymans, Town of	2*	4	$291,539.30
Cohoes, City of	1	2	$10,473.96
Colonie, Town of	14	52	$1,052,668.55
Colonie, Village of	0	0	$0
Green Island, Village of	0	0	$0
Guilderland, Town of	2	5	$304,574.78
Knox, Township of	0	0	$0
Menands, Village of	1	2	$37,499.46
New Scotland, Town of	1	4	$143,405.63
Ravena, Village of	0	0	$0
Rensselaerville, Town of	0	0	$0
Voorheesville, Village of	1	4	$45,361.65
Watervilet, City of	0	0	$0
Westerlo, Town of	0	0	$0
Total	**34**	**99**	**$2,310,194.19**

Source: FEMA-provided data, March 12, 2024. Note: Records were organized based on the NFIP Community Book's Community ID and Name convention.

**One of the 2 repetitive loss properties located in the Town of Coeymans was not designated as a repetitive loss property by the NFIP, but was designated as a repetitive loss property by the Floodplain Management Association (FMA).*

6.1.6 Historical Hazard Occurrences and Damage Estimates

Table 6-5 shows the flood events that the County has experienced between 2018 and 2023, and their estimated damages. No flood events in that time period were given federal disaster declarations, as shown in Section 5.2.3.

Table 6-5. Flood Event Records, 2018-2023

Location	Event Type	Date	Estimated Property Damage	Estimated Crop Damage
Bethlehem	Flash Flood	7/5/2018	$5,000	0
Colonie	Flood	7/27/2018	0	0
Bethlehem	Flash Flood	8/3/2018	$2,000	0
Albany	Flash Flood	8/3/2018	$1,000	0
New Scotland	Flash Flood	8/3/2018	$1,000	0
Watervliet	Flash Flood	8/3/2018	$1,000	0
Albany	Flash Flood	8/7/2018	$1,000	0
Colonie	Flash Flood	8/7/2018	0	0
Colonie	Flood	1/24/2019	$10,000	0
Green Island	Flood	1/25/2019	$350,000	0
Colonie	Flood	4/15/2019	$1,000	0
Cohoes	Flood	8/21/2019	0	0
Green Island	Flood	8/21/2019	0	0
Colonie	Flood	8/21/2019	0	0
Colonie	Flash Flood	8/4/2020	$1,000	0
Bethlehem	Flash Flood	8/4/2020	$4,000	0
Albany	Flash Flood	8/4/2020	$1,000	0
Menands	Flood	12/25/2020	0	0
Coeymans	Flood	12/25/2020	0	0
Westerloo	Flood	12/25/2020	0	0
Voorheesville	Flood	12/25/2020	0	0
Albany	Flood	6/8/2021	$10,000	0
Colonie	Flood	6/8/2021	0	0
New Scotland	Flash Flood	8/13/2021	0	0
Bethlehem	Flash Flood	8/13/2021	0	0
Green Island	Flood	4/7/2022	0	0

Location	Event Type	Date	Estimated Property Damage	Estimated Crop Damage
Coeymans	Flood	4/7/2022	0	0
Bethlehem	Flash Flood	5/15/2022	0	0
Albany	Flash Flood	5/15/2022	0	0
Bethlehem	Flash Flood	8/4/2022	0	0
Bethlehem	Flood	9/13/2022	0	0
Bethlehem	Flood	10/13/2022	0	0
Coeymands	Flood	12/23/2022	0	0
Colonie	Flood	6/26/2023	0	0
Green Island	Flood	7/10/2023	$5,000	0
Cohoes	Flood	7/13/2023	0	0
New Scotland	Flash Flood	7/18/2023	$10,000	0
Voorheesville	Flash Flood	7/18/2023	$10,000	0
Colonie	Flash Flood	7/18/2023	$15,000	0
Bethlehem	Flash Flood	7/18/2023	$5,000	0

Source: (NOAA National Centers for Environmental Information, 2023).

According to the FEMA National Risk Index's Expected Annual Loss ($) Data, flooding is expected to cause $857,209 in annual total losses (FEMA, 2023). This includes riverine flooding ($698,696 in Expected Annual Losses) and coastal flooding ($158,513 in Expected Annual Losses).

HAZUS Overview

HAZUS was used as an additional tool to analyze potential damages to Albany County from flooding. HAZUS is a nationally standardized, open source, GIS-based risk modeling software developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The HAZUS program is a multi-hazard loss estimation model capable of identifying areas which are vulnerable to a variety of natural hazards including floods, tsunamis, hurricanes, and earthquakes. HAZUS can quantify and map risk vulnerability information including physical damages, economic losses, cost-effectiveness, and social impacts, and is a useful tool in hazard mitigation, recovery, preparedness, and response planning. HAZUS was utilized to assess what areas, infrastructure, and populations are most vulnerable to flooding using the flood modeling tool.

A HAZUS study region was developed for Albany County, which consisted of approximately 64 square miles and included 4,746 census blocks. The region contains over 133 thousand households with a total population of 314,684 according to the 2010

Census Bureau data utilized by the model. The model's building stock inventory estimates a total of 105,181 buildings in the region with a total replacement value of over $ 62,614 million, excluding building contents. Approximately 91.15% of the buildings and 60.01% of the building value included in the study area's building inventory are associated with residential housing. No additional user defined infrastructure inventory data was added to the model.

Flood Model Methodology

The HAZUS flood model was set up using United States Geological Survey Digital Elevation Model (DEM) coverage for the study area, the extent and source of which are determined within HAZUS' model setup resources. Due to the geographic setting of the study region and the lack of coastal areas, the model was set up for riverine flood hazard analysis only. The option to run a coastal flood hazard analysis was not permitted by the software due to its geographic location inland. The study region's stream network was determined using the model's automated stream network development routine which utilized a user defined drainage area of 3 square miles for stream density determination. The DEM coverage and developed stream network were processed by the model for riverine hydrologic analysis and floodplain extents. Following establishment of the study region's hydrology and floodplains, the model was run to determine physical, economic, and social impacts of flood events for the 1% chance flood and 0.2% chance flood return periods. HAZUS analysis was run on the County-level, and model output represents Countywide damages, economic losses, and social impacts. The HAZUS flood model summary reports are provided in Appendix F.

HAZUS Flood Model Results

HAZUS estimates total economic annualized losses for buildings in Albany County to be $1,552.70 million and $1,948.22 million for the 1% chance flood and 0.2% chance flood return periods, respectively. The HAZUS loss estimates are much greater than damages that have been reported with historic severe flood events. Direct economic annualized losses estimated for the 1% chance flood and 0.2% chance flood return periods are summarized below in Table 6-4, including capital stock losses of buildings and their contents, as well as associated income losses.

Table 6-4. HAZUS Flood Model: Direct Economic Annualized Losses for Buildings

	Capital Stock Losses (Millions of Dollars)			**Income Losses (Millions of Dollars)**				**Total Loss (Millions of Dollars)**
Return Period	Building Loss	Contents Loss	Inventory Loss	Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
1% Annual Chance Flood Event	174.26	327.67	29.17	111.89	238.97	606.04	64.70	1,552.70

Return Period	Capital Stock Losses (Millions of Dollars)			Income Losses (Millions of Dollars)				Total Loss (Millions of Dollars)
	Building Loss	Contents Loss	Inventory Loss	Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
0.2% Annual Chance Flood Event	231.30	445.85	38.40	135.10	286.39	731.65	79.53	1,948.22

HAZUS estimated the total debris generated from 1% chance and 0.2% chance flood events to be 4,598 tons and 6,123 tons, respectively. The estimated tonnage of debris generated from the 1% chance flood and 0.2% chance flood return periods are summarized in Table 6-5, including debris generated from building finishes, structure, and foundation.

Table 6-5. HAZUS Flood Model: Debris Generation

Return Period	Debris Generated (Tons)			
	Finishes	Structure	Foundation	Total Debris
1% Annual Chance Flood Event	3,978	345	275	4,598
0.2% Annual Chance Flood Event	5,117	563	443	6,123

HAZUS estimates the total population displaced from a 1% chance and 0.2% chance flood events to be 8,395 and 10,927 people, respectively. These results suggest that between 2.67% and 3.47% of the total study region population would be displaced as a result of a 1% chance flood event and 0.2% chance flood event. Within these displaced populations, some individuals will require short term accommodation in temporary public shelters. HAZUS results indicate that between 0.48% and 0.56% of the study region population would require shelter as a result of a 1% chance and 0.2% chance flood event. A summary of the estimated number of displaced persons and persons requiring short term shelter for each flood return period is provided in Table 6-6.

Table 6-6. HAZUS Flood Model: Shelter Requirements

Return Period	Persons Seeking Short-Term Shelter (and percentage of total County population)	Displaced Population (and percentage of total County population)
1% Annual Chance Flood Event	1,518 (0.48%)	8,395 (2.67%)
0.2% Annual Chance Flood Event	1,754 (0.56%)	10,927 (3.47%)

HAZUS estimates the direct economic losses for wastewater utility facilities to be $148.92 and $190.98 in millions of dollars for the 1% chance flood and 0.2% chance flood return periods, respectively. HAZUS also estimates a direct economic loss for potable water facilities to be $0.42 in millions of dollars for the 0.2% chance flood return period. HAZUS estimates the direct economic losses for highway bridges to be $28,410 and $62,800 for the 1% chance and 0.2% chance flood return periods, respectively. The direct economic loss reports for transportation and utilities along with other HAZUS model output summary reports are provided in Appendix F.

HAZUS Hurricane Model

The HAZUS hurricane loss estimation model estimates potential economic and social losses resulting primarily from hurricane winds. The HAZUS hurricane model can also be used in combination with the HAZUS flood model to estimate potential economic and social losses due to storm surge. The two model scenario options for the hurricane model are probabilistic and single deterministic track. The default probabilistic scenario considers associated impacts of thousands of potential storm tracks and intensities typical of the region. The deterministic track requires additional user defined inputs through either defining a storm track manually or importing historic storm event data.

Since Albany County identified flooding as one of their hazards of concern, the project team investigated the combined hurricane and flood hazard model to estimate potential losses from storm surge. However, the combined hurricane and flood model was infeasible due to limitations of the model. The two primary limitations are:

1. The portion of the Hudson River in Albany County would not be considered "coastal" by the HAZUS model. As such, a shoreline would not be able to be generated which is a necessary input of the hurricane model.
2. The HAZUS hurricane model would not consider the Hudson River to have a storm surge due to the fact that it has no shoreline and would not be considered "coastal".

6.1.7 Future Potential Impacts and Relation to Climate Change

Probability of Future Events

Based on the Albany County CEPA Results, the National Risk Index, previous Presidential Disaster Declarations, Hazard Identification and Ranking, and Historical Hazard Occurrences, the County's overall vulnerability to a flood remains high. According to the NOAA National Climate Data Center (NCEI) and the CRREL database, Albany County experienced 89 flood events between 1950 and 2023, including 40 riverine floods, 39 flash floods, and 10 ice jams. The table below shows these statistics, as well as the annual average number of events and the probability of these individual flood hazards occurring in Albany County in future years, if there are no other changes (National Oceanic and Atmospheric Administration, 2023; Ice Engineering Research Group, 2023).

The probabilities are calculated using the formula P = e / (e + y - 1) *100% where P is the probability of one or more of a given type of event occurring in a given year (e.g. the probability that there would be at least one ice jam in 2023), e is the total number of events over a given number of years (e.g. 1950-2023), and y is the number of years (e.g. 73 years between 1950 and 2023). In these probability calculations, the simplifying assumption has been made that these events are independent of each other – i.e. that the events are not related to one another. This assumption could be incorrect if, for example, an ice jam occurred and then later caused a different flood event when it melted.

Table 6-6. Probability of Future Occurrence of Flooding Events Given No Other Changes

Hazard Type	Number of Occurrences between 1950 and 2023	Rate of Occurrence or Annual Number of Events (Average)	Recurrence Interval (in years) (# Years/Number of Events)	Probability of Event in Any Given Year (%)
Flash Flood	40	.547	1.825	35.7%
Riverine Flood	39	.534	1.871	35.1%
Dam Failure	0	0	0	0.0%
Ice Jams	10	0.137	7.3	12.2%
ALL FLOODS	89	1.219	.96	55.2%

Probability listed is based on 1950-2023 data only. The actual probability may differ; for example, the actual probability of an Ice Jam is greater than 0%.

As mentioned, the table above displays the probability of future events if there are no other changes; it is solely based on historical probability. However, the County's future vulnerability to flooding can be impacted by several factors, including land use changes, population changes, mitigation actions, and climate change. For example, future developments may affect where flooding occurs. Development trends are described in Section 2.4 and a list of recent developments is contained in each

jurisdictional annex (Appendix A). Increases in population may lead to additional development pressures in the floodplain (potentially increasing vulnerability), while decreases in population may lead to more vacant properties and less development pressure in the floodplain. Additionally, the County and its jurisdictions proposed numerous flood-related mitigation actions, such as upgrades to culverts, updates to municipal regulations that impact flooding, and nature-based flood mitigation solutions. Once implemented, these projects will reduce the County's overall vulnerability to flood damages. These actions are further described in the jurisdictional annexes (Appendix A). Climate change may also impact the County's vulnerability to flooding, as described below.

Relation to Climate Change

Climate change is expected to increase the future vulnerability of the County to flood events, by slightly increasing the severity and frequency of flooding, and flooding additional locations. Based on the U.S. Global Change Research Program's Climate Mapping For Resilience and Adaptation tool (U.S. Federal Government, 2022), it is predicted that Albany County will experience slightly fewer wet days, but slightly more heavy precipitation events by mid-century. Specifically, the County may experience 1.5 to 2.5 fewer days per year with any precipitation by mid century (2035-2064), compared with 1976-2005, according to mid-level projections. However, the county may experience 6.7 to 7.4 days per year that exceed 99th percentile precipitation by mid-century, compared to 5.2 days per year from 1976-2005, according to mid-level predictions. These days that exceed the 99th percentile precipitation will result in an increase in flooding. Locations of flood events would also expand when there are more severe floods; for instance, more locations in the 1% chance floodplain may experience flooding on a more regular basis, and areas that are near the 1% chance floodplain may also experience flooding. The types of flooding may not change significantly, except that the increase in average temperatures caused by climate change may lead to less ice buildup and less ice jam flooding.

More generally, with the anticipated increase in severe storms due to climate change, heavy precipitation, and associated flash floods will likely become more common (Horton, Bader, Rosenzweig, DeGaetano, & Solecki, 2014). The annual average amount of precipitation is projected to increase, resulting in a rise in the frequency and severity of flash flooding events in New York State (Rosenzweig, et al., 2011). The Albany County Climate Analysis, funded by AT&T, projected that by mid-century, Albany County would see a 13% increase in inches of winter precipitation for some areas of the County, a 4 degree increase in winter temperatures across the County, and a 7-inch increase in precipitation for some watersheds in the County (Duffy, Filante, & Guo, 2024). Increased winter precipitation could lead to more winter floods, especially if the ground is frozen and less permeable. In addition, rising air and water temperatures would cause ice and snow to melt more rapidly, which could cause more frequent flooding during the winter and early spring months.

6.2 Severe Storm

6.2.1 Description

As described above, for the purpose of this HMP update, "Severe Storm" includes hail, ice storms, wind, thunderstorms, winter storms, hurricanes, tropical storms, tornado, and any other storm event, as well as associated effects such as power outages.

Hail

Hail, also referred to as hailstones, is a type of precipitation formed when drops of water freeze together in the cold upper regions of thunderstorm clouds. Most hailstones measure between five (5) millimeters and 15 centimeters in diameter and can be round or jagged. The severity of hail events range based on size of hail, winds, and structures in the path of a hailstorm. Fortunately, most hailstorms produce marble-sized or smaller hailstones, though there is always the possibility that storms can generate larger hail, ranging upward of softball sized.

Hail in New York occurs mainly during the warmer months and can lead to extensive risks and damages. Hail poses a threat to agriculture, with crops and yields at risk due to hailstone damage, potentially resulting in financial losses. Property owners face threats to structures and vehicles, necessitating potentially costly repairs. The natural environment is also vulnerable, as hail can disrupt forest ecosystems, damage trees, and harm wildlife habitats. The severity of hail events range based on size of hail, wind, and vulnerabilities in the path of a hailstorm (DHSES and AVAIL, 2023).

Ice Storms

An ice storm is freezing rain (rain that freezes on surface contact) with significant ice accumulations of 0.25 inches or greater. Ice storms can lead to heavy accumulations on trees, roads, buildings, and infrastructure.

Ice storms occur when a layer of warm, moist air overrides a layer of cold air near the surface. Rain falls on the warmer air and passes through the cold layer, where air temperatures fall below freezing. As the raindrops come into contact with objects and surfaces, they freeze upon impact, forming a layer of ice. The freezing rain accumulates as a glaze of ice on surfaces, which can vary in thickness from a thin coating to several inches. The severity of an ice storm is measured by the thickness of the ice accumulation. Significant ice buildup is not only extremely slippery, but also heavy in weight.

Wind

High winds are winds with sustained speeds of 40 mph lasting for at least an hour or wind speeds up to 58 mph or greater for any duration of time. High-wind events are often associated with hurricanes and nor'easters, severe thunderstorms, and tornados, but may occur independently.

Straight-line winds are used to describe any thunderstorm wind not associated with rotation that is normally indicative of a tornado. When straight-line winds meet or exceed 58 miles per hour they are classified as severe by the National Weather Service. Straight-line wind intensity can be as powerful as a tornado.

Windstorms, including derechos and microbursts, may or may not be accompanied by precipitation and can vary in intensity, duration, and geographical extent. These intense and localized wind events can result in significant property damage, toppled trees, and power outages (DHSES and AVAIL, 2023).

Thunderstorms and Lightning

Lightning is a brief, visible electrical discharge that occurs between a cloud and the ground or from cloud to cloud. Lightning strikes occur when strong negative charges build up within a thunderstorm cloud while strong positive charges on the ground move up tall objects, such as buildings, trees, and telephone poles.

A lightning bolt can reach temperatures of approximately 50,000 °F. This extreme temperature causes the air surrounding the bolt to rapidly heat and expand, resulting in an explosive shockwave we hear as thunder. Thunderstorms are dangerous storms that include lightning and can include powerful winds over 50 mph, create hail, and cause flash flooding and tornadoes.

There are four different types of lightning:

- Cloud to Sky lightning is a discharge jumping from a cloud into the surrounding sky.
- Intra-cloud lightning is the most common. Intra-cloud lightning occurs when oppositely charged centers within the same cloud ignite and cause a bright flash.
- Inter-cloud lightning occurs between oppositely charged areas of different clouds.
- Cloud to Ground lightning is the most dangerous to people and therefore the most researched. It occurs when the negative charge of the bottom of a cloud travels to the positively charged ground below (DHSES and AVAIL, 2023).

Winter Storms

Severe winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. The severity of a winter storm depends on temperature, wind speed, type of precipitation (snow, sleet, freezing rain, etc.), accumulation rate and length of the storm which can last a few hours or several days. Winter storms, including blizzards and nor'easters, can bring extreme cold, freezing rain, snow, ice and high winds.

A blizzard is a severe and potentially dangerous snowstorm characterized by several specific weather conditions and criteria. While heavy snowfall is a prominent feature of a blizzard, it's the combination of factors that distinguish it from a regular snowstorm. Blizzards typically involve intense and sustained snowfall, which can significantly reduce visibility and create deep snow accumulations. They are characterized by strong,

sustained winds of at least 35 miles per hour or greater. These high winds can blow the falling and accumulated snow, reducing visibility to near zero in some cases. To be classified as a blizzard, these conditions must persist for an extended period of three (3) hours or longer.

A Nor'easter is a storm along the East Coast, so called because the winds over the coastal area are typically from the northeast. These storms may occur at any time of year but are most frequent and most violent between September and April. They nearly always bring precipitation in the form of heavy rain or snow, as well as winds of gale force, rough seas, and, occasionally, coastal flooding to the affected regions. Past Nor'easters have been responsible for billions of dollars in damage; severe economic, transportation, and human disruption; and in some cases, disastrous coastal flooding (DHSES and AVAIL, 2023).

Hurricanes and Tropical Storms

A hurricane is a type of storm called a tropical cyclone, which forms over tropical or subtropical waters.

A tropical cyclone is a rotating low-pressure weather system that has organized thunderstorms but no fronts (a boundary separating two air masses of different densities). Tropical cyclones with maximum sustained surface winds of less than 39 miles per hour (mph) are called tropical depressions. Those with maximum sustained winds of 39 mph or higher are called tropical storms. When a storm's maximum sustained winds reach 74 mph, it is called a hurricane.

When a hurricane reaches land, it pushes a wall of ocean water ashore. This wall of water is called a storm surge. Heavy rain and storm surge from a hurricane can cause flooding.

Parts of a hurricane include:

- Eye: The eye is the "hole" at the center of the storm. Winds are light in this area. Skies are partly cloudy, and sometimes even clear.
- Eye wall: The eye wall is a ring of thunderstorms. These storms swirl around the eye. The wall is where winds are strongest, and rain is heaviest.
- Rain bands: Bands of clouds and rain go far out from a hurricane's eye wall. These bands stretch for hundreds of miles. They contain thunderstorms and sometimes tornadoes.

"Hurricane Season" begins on June 1 and ends on November 30, although hurricanes can, and have, occurred outside of this time frame. NOAA's National Hurricane Center predicts and tracks these massive storm systems, which occur, on average, 12 times a year in the Atlantic basin (DHSES and AVAIL, 2023).

Tornado

A tornado is a violently rotating column of air extending from the base of a thunderstorm cloud to the ground, and often (but not always) visible as a funnel cloud.

A tornado's wind speeds can range from 65 mph to 300 mph, and they can be among the most violent of all atmospheric phenomena and can cause devastating destruction. Usually short-lived, these storms begin as transparent funnels and acquire their grayish coloration as they pick up debris and dust. Their gray color can also be caused by a cloud, because water vapor condenses in the funnel due to its low pressure. Most tornadoes advance west-to-east, but tornadoes can often move southwest to northeast, at an average speed of 30 mph.

Tornadoes are rarely predictable in advance and can uproot trees, demolish buildings, flip cars and turn harmless objects into deadly missiles in a matter of seconds. The path of destruction can exceed one mile in width and 50 miles in length. Additionally, tornadoes can change directions at random, or backtrack if the bottom of the tornado is hit with outflow winds from the thunderstorms core (DHSES and AVAIL, 2023).

Power Outages

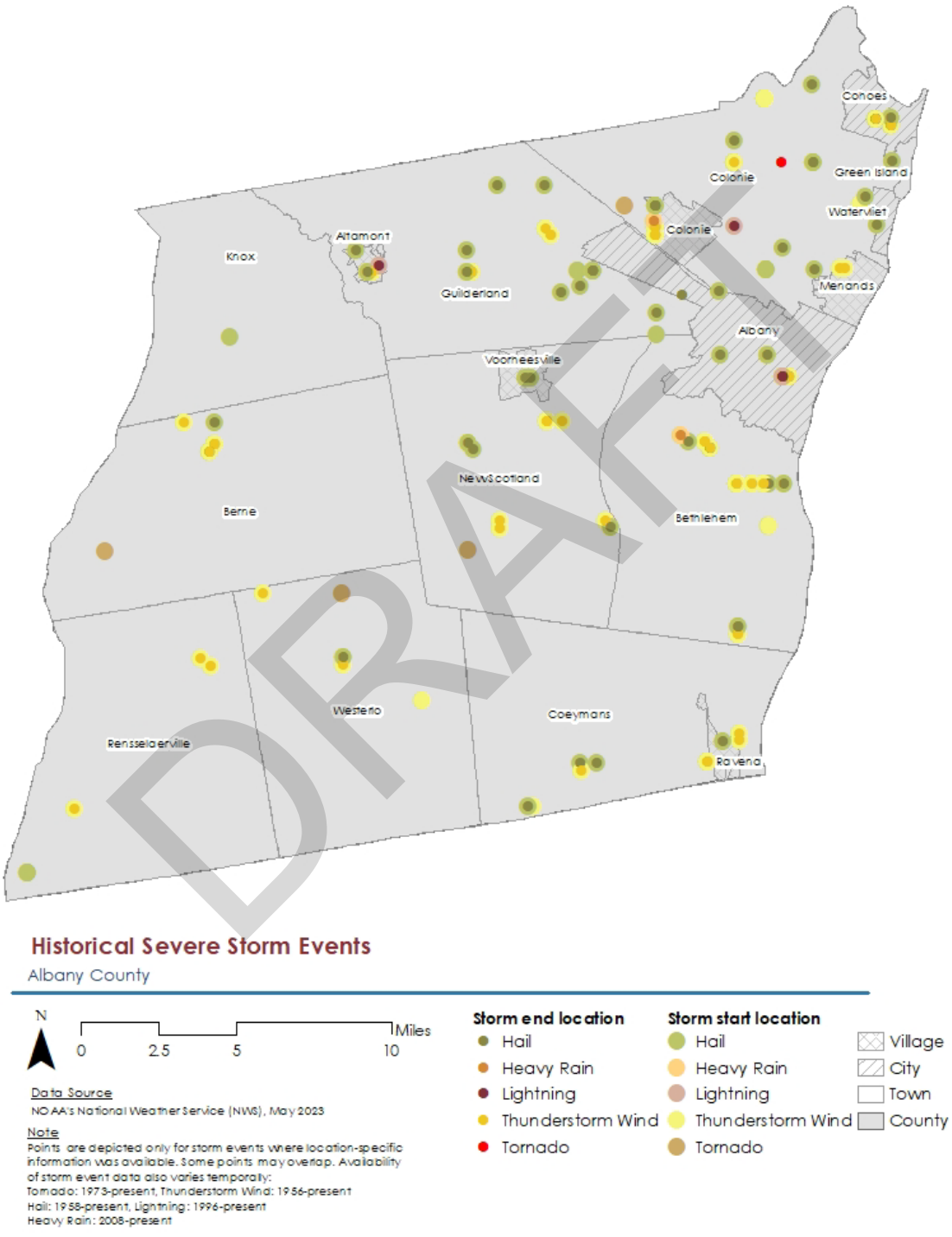
While they are not a type of severe storm event, power outages are often associated with severe storm events. A power outage occurs when electrical power turns off unexpectedly. According to Ready.gov, a power outage may:

- Disrupt communications, water and transportation.
- Close retail businesses, grocery stores, gas stations, ATMs, banks and other services.
- Cause food spoilage and water contamination.
- Prevent use of medical devices (U.S. Department of Homeland Security, 2023).

6.2.2 Location

All of Albany County is subject to severe storm events. While events like winter storms and hurricanes affect large areas of the County at the same time, severe storm events can also occur in small, localized areas, such as some thunderstorm events. Ridgetops and hilltops, very flat areas, and areas with tall buildings can experience especially strong winds. Higher elevations also see increased snowfall, and hilltops and ridgetops can experience stronger thunderstorms. Figure 6-4 displays a map of severe storm events in Albany County.

Figure 6-4. Historical Storm Event Records in Albany County



Data Source: NOAA National Weather Service (May 2023)

6.2.3 Extent

Specific details regarding extent and frequency for each type of severe storm event considered are provided below. More details on the severity of the severe storm events that the County has actually experienced are given in Section 6.2.5.

Hail

Hailstorms are categorized on the TORRO Hailstorm Intensity Scale (TORRO, 2022), which is provided in Table 6-7.

Table 6-7. TORRO Hailstorm Intensity Scale

Intensity Category		Typical Hail Diameter (mm)	Probable Kinetic Energy, J-m2	Typical Damage Impacts
HO	Hard Hail	5	0-20	No Damage
H1	Potentially Damaging	5-15	>20	Slight general damage to plants, crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	Severe damage to fruit and crops. Damage to glass and plastic structures, paint, and wood scored
H4	Severe	25-40	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60	-	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75	-	Severe roof damage, risk of serious injuries
H8	Destructive	60-90	-	Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100	-	Extensive structural damage. Risk of severe of even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100	-	Extensive structural damage. Risk of severe of even fatal injuries to persons caught in the open

Source: (TORRO, 2022)

Ice Storms

The severity of an ice storm is measured by the thickness of the ice accumulation (DHSES and AVAIL, 2023), as shown in Figure 6-5.

Figure 6-5. Sperry-Piltz Ice Accumulation Index

The Sperry-Piltz Ice Accumulation Index

Ice damage index	Radial ice	Wind	Damage and impact descriptions
0	0–0.25 in	0-15 mph	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	0.10–0.25 in	15–25 mph	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25–0.50 in	0–15 mph	
2	0.10–0.25 in	25–35 mph	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25–0.50 in	15–25 mph	
	0.50–0.75 in	0–15 mph	
3	0.10–0.25 in	Over 35 mph	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 to 5 days.
	0.25–0.50 in	25–35 mph	
	0.50–0.75 in	15–25 mph	
	0.75–1.00 in	0–15 mph	
4	0.25–0.50 in	Over 35 mph	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structures. Outages lasting 5 to 10 days.
	0.50–0.75 in	25–35 mph	
	0.75–1.00 in	15–25 mph	
	1.00–1.50 in	0–15 mph	
5	0.50–0.75 in	Over 35 mph	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75–1.00 in	Over 25 mph	
	1.00–1.50 in	Over 15 mph	
	Over 1.50 in	Any	

Source: (DHSES and AVAIL, 2023)

Wind

The Beaufort Scale measures winds on a scale from 0 - 12 (calm, less than 1 knot - hurricane 64+ knots).

Table 6-8. Beaufort Wind Scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects On the Water	Appearance of Wind Effects On Land
0	Less than 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 ft taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-19 ft, white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Moderately high (18-25 ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Twigs breaking off trees, generally impedes progress
9	41-47	Strong Gale	High waves (23-32 ft), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs

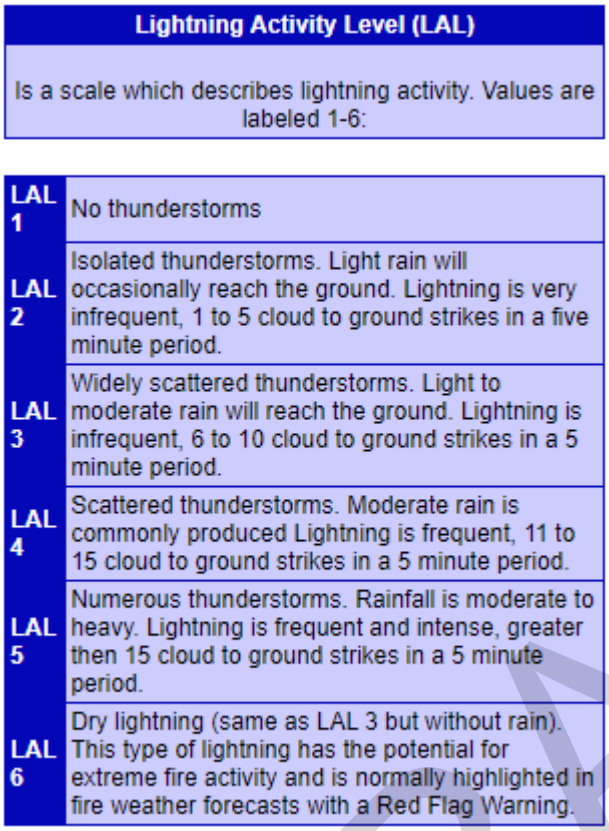
Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects On the Water	Appearance of Wind Effects On Land
10	48-55	Storm	Very high waves (29-41 ft) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	Exceptionally high (37-52 ft) waves, foam patches cover sea, visibility more reduced	
12	64+	Hurricane	Air filled with foam, waves over 45 ft, sea completely white with driving spray, visibility greatly reduced	

Source: (NOAA and NWS, n.d.)

Thunderstorms and Lightning

Lightning is measured using the Lightning Activity Level (LAL). This is a measurement of cloud-to-ground lightning activity observed (or forecasted to occur) within a 30-mile radius of an observation site (DHSES and AVAIL, 2023).

Figure 6-6. Lightning Activity Level



Lightning Activity Level (LAL)	
Is a scale which describes lightning activity. Values are labeled 1-6:	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater then 15 cloud to ground strikes in a 5 minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

Winter Storms

Severe winter storms can be characterized using the Regional Snowfall Index, shown in Table 6-9 below (NOAA National Centers for Environmental Information, 2022). The Regional Snowfall Index is based on levels of snowfall, the storm's spatial extent, and the population affected.

Table 6-9. RSI Ranking Categories

Category	Description	RSI Value
1	Notable	1-3
2	Significant	3-6
3	Major	6-10
4	Crippling	10-18
5	Extreme	18.0+

Note: RSI = Regional Snowfall Index. Source: (NOAA National Centers for Environmental Information, 2022)

Hurricanes and Tropical Storms

There are five types, or categories, of hurricanes. The scale of categories is called the Saffir-Simpson Hurricane Scale. The categories are based on wind speed, and are listed as follows:

- Category 1: Winds 119-153 km/hr (74-95 mph) - faster than a cheetah
- Category 2: Winds 154-177 km/hr (96-110 mph) - as fast or faster than a baseball pitcher's fastball
- Category 3: Winds 178-208 km/hr (111-129 mph) - similar, or close, to the serving speed of many professional tennis players
- Category 4: Winds 209-251 km/hr (130-156 mph) - faster than the world's fastest rollercoaster
- Category 5: Winds more than 252 km/hr (157 mph) - similar, or close, to the speed of some high-speed trains (DHSES and AVAIL, 2023).

Hurricane warnings indicate that hurricane conditions (sustained winds of 74 mph or higher) are expected somewhere within the specified area. Because hurricane preparedness activities become difficult once winds reach tropical storm force (sustained winds of 39 to 73 mph), the hurricane warning is issued 36 hours in advance of the anticipated onset of tropical-storm-force winds to allow for important preparation.

A hurricane watch means that hurricane conditions (sustained winds of 74 mph or higher) are possible within the specified area. A hurricane watch is issued 48 hours in advance of the anticipated onset of tropical-storm-force winds in an area (DHSES and AVAIL, 2023).

Tornado

NOAA issues tornado watches and warnings. A tornado watch means that a tornado is possible. A tornado watch is issued when weather conditions favor the formation of tornadoes. A tornado warning means that a tornado has been sighted or indicated by weather radar. People should immediately take shelter during a tornado warning.

The Enhanced Fujita Scale (EF Scale) is used to assign a tornado rating based on estimated wind speeds and related damage. The EF Scale was revised from the original Fujita Scale in 2007 to reflect better examinations of tornado damage surveys to align wind speeds more closely with associated storm damage. The new scale has to do with how most structures are designed (DHSES and AVAIL, 2023). The EF Scale is shown in Figure 6-7.

Figure 6-7. Enhanced Fujita Scale

EF Rating	Wind Speeds	Expected Damage	
EF-0	65-85 mph	'Minor' damage: shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled.	
EF-1	86-110 mph	'Moderate' damage: more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged.	
EF-2	111-135 mph	'Considerable' damage: roofs torn off well constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed.	
EF-3	136-165 mph	'Severe' damage: entire stories of well constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark.	
EF-4	166-200 mph	'Extreme' damage: Well constructed homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse.	
EF-5	> 200 mph	'Massive/incredible' damage: Well constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain severe structural damage, trees are usually completely debarked, stripped of branches and snapped.	

Source: (National Weather Service, 2015)

6.2.4 Impacts and Vulnerability

According to the updated hazard analysis in Section 5.4, Albany County is highly vulnerable to severe storms based on this hazard's moderate impact (moderate potential for damage to property, crops and/or people), regular occurrence, large extent (county-wide extent of impacts), and moderate level of preparedness. This assessment is backed by additional information in Section 5 and Section 6.1.

Impacts to the County from severe storm events include fallen trees from severe winds, which can damage overhead utility lines, resulting in power outages. These events are likely to result in damages to private and public infrastructure and property. In addition, during severe winter storm events, roadway safety is a primary concern and impacts the safety of residents and operation of critical facilities. Washouts, erosion, and traffic safety around steep slopes are also concerns during storm events. Damages to the County's critical infrastructure or primary transportation routes would be particularly impactful to residents. Storm damages can have a particular impact the more

populated portions of the County, as well as residents in more remote areas who may experience long power outages and longer wait times for snow removal. They can also cause drinking water concerns and communication issues. The County is concerned with having adequate provision of shelters during severe storms, and enhancing hazard warning systems. Public Survey respondents were concerned with impacts on transportation (51% of respondents), home or business damage due to a storm (42% of respondents), flooding of home or business (22% of respondents), power outages (mentioned in survey comments), and emergency response resources and coordination (mentioned in survey comments). Survey respondents most commonly felt that the following populations in their community were at risk from hazards: older adults, residents in certain areas (e.g. low-lying areas or along creeks and rivers), low-income residents, people with disabilities and health issues, and families with young children.

The County's overall vulnerability to hazards in this Hazard Mitigation Plan Update is described in Section 0.

6.2.5 Historical Hazard Occurrences and Damage Estimates

Table 6-10 shows the severe storm events that the County has experienced between 2018 and 2023, and their estimated damages. One (1) severe storm event in that time period was given federal disaster declarations, as shown in Section 5.2.3.

Table 6-10. Severe Storm Event Records, 2018-2023

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
County Wide	Severe Winter Storm	1/4/2018	-		
Eastern Albany County	Severe Winter Storm	1/16/2018	-		
Western Albany County	Severe Winter Storm	2/4/2018	-		
County Wide	Severe Winter Storm	2/7/2018	-		
County Wide	Severe Winter Storm	3/2/2018	-		
County Wide	Severe Winter Storm	3/7/2018	-		
County Wide	Severe Winter Storm	3/12/2018	-		
Eastern Albany County	High Winds	4/4/2018	50		

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
County Wide	Severe Winter Storm	4/15/2018	-		
Berne	Thunderstorm Wind	5/4/2018	50		
Colonie	Thunderstorm Wind	5/4/2018	50		
Guilderland	Thunderstorm Wind	5/4/2018	50		
Bethlehem	Thunderstorm Wind	5/4/2018	50		
New Scotland	Thunderstorm Wind	5/4/2018	50		
Albany	Thunderstorm Wind	5/4/2018	50		
Bethlehem	Thunderstorm Wind	7/10/2018	50		
Albany	Thunderstorm Wind	7/10/2018	50		
Colonie	Thunderstorm Wind	7/27/2018	50		
Menands	Thunderstorm Wind	7/27/2018	50		
Watervliet	Thunderstorm Wind	7/27/2018	50		
Bethlehem	Thunderstorm Wind	7/27/2018	50		
Bethlehem	Thunderstorm Wind	7/27/2018	60		
Albany	Thunderstorm Wind	7/27/2018	60		
Albany	Thunderstorm Wind	7/27/2018	50		
Colonie	Thunderstorm Wind	7/27/2018	50		
Colonie	Hail	7/27/2018	1.5		
Colonie	Hail	7/27/2018	1		
Colonie	Hail	7/27/2018	.75		

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
Watervliet	Hail	7/27/2018	1.75		
Albany	Hail	7/27/2018	.75		
New Scotland	Heavy Rain	8/3/2018	-		
Bethlehem	Thunderstorm Wind	8/3/2018	50		
Bethlehem	Heavy Rain	8/3/2018	-		
Albany	Heavy Rain	8/3/2018	-		
New Scotland	Thunderstorm Wind	8/3/2018	50		
Cohoes	Thunderstorm Wind	8/4/2018	50		
Albany	Thunderstorm Wind	8/7/2018	50		
County Wide	Strong Wind	11/3/2018	43		
County Wide	Strong Wind	11/10/2018	43		
Eastern Albany County	Winter Weather	11/14/2018	-		
County Wide	Winter Weather	11/15/2018	-		
County Wide	Winter Weather	12/17/2018	-		
County Wide	Strong Wind	12/17/2018	41		
County Wide	Strong Wind	12/22/2018	42		
Western Albany	Strong Wind	1/1/2019	40	$1,000	
Eastern Albany	High Wind	1/1/2019	50		
County Wide	Winter Storm	1/19/2019	-		
County Wide	Winter Weather	1/29/2019	-		
County Wide	Strong Wind	2/8/2019	49	$2,000	
County Wide	Winter Storm	2/12/2019	-		
County Wide	High Wind	2/24/2019	53	$60,000	

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
County Wide	Winter Weather	2/27/2019	-		
Western Albany	Winter Weather	3/22/2019	-		
County Wide	Strong Wind	4/3/2019	45	$2,000	
County Wide	Strong Wind	4/9/2019	45	$2,000	
Bethlehem	Thunderstorm Wind	5/23/2019	50		
Guilderland	Thunderstorm Wind	7/20/2019	50		
Coeymans	Thunderstorm Wind	7/20/2019	50		
Renselaerville	Thunderstorm Wind	7/29/2019	-		
Bethlehem	Lightning	7/29/2019	-	$1,000	
Guilderland	Thunderstorm Wind	7/30/2019	50		
Coeymans	Hail	8/3/2019	1		
Albany	Thunderstorm Wind	8/3/2019	50		
Bethlehem	Thunderstorm Wind	8/3/2019	50		
Ravena	Thunderstorm Wind	8/3/2019	50		
Albany	Hail	8/7/2019	0.88		
Watervliet	Hail	8/7/2019	1		
Albany	Thunderstorm Wind	8/7/2019	50		
Menands	Thunderstorm Wind	8/7/2019	50		
Knox	Thunderstorm Wind	8/8/2019	50		
Westerlo	Thunderstorm Wind	8/8/2019	50		
Ravena	Thunderstorm Wind	8/8/2019	50		

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
Coeymans	Thunderstorm Wind	8/8/2019	50		
Colonie	Thunderstorm Wind	8/8/2019	51		
Albany	Thunderstorm Wind	8/16/2019	50		
Albany	Thunderstorm Wind	8/16/2019	52		
Albany	Thunderstorm Wind	8/16/2019	70		
Bethlehem	Thunderstorm Wind	8/16/2019	50		
Menands	Thunderstorm Wind	8/16/2019	50		
Menands	Thunderstorm Wind	8/16/2019	70		
Knox	Thunderstorm Wind	8/17/2019	50		
Westerlo	Thunderstorm Wind	8/18/2019	50		
New Scotland	Thunderstorm Wind	8/18/2019	50		
Watervliet	Thunderstorm Wind	8/18/2019	50		
Cohoes	Thunderstorm Wind	8/21/2019	50		
Colonie	Hail	8/21/2019	1		
Cohoes	Hail	8/21/2019	1		
County Wide	Strong Wind	10/16/2019	49		
County Wide	Strong Wind	10/31/2019	45		
County Wide	High Wind	11/1/2019	50		
County Wide	Winter Weather	11/12/2019	-		
County Wide	Winter Weather	11/23/2019	-		
County Wide	Heavy Snow	12/1/2019	-		

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
County Wide	Strong Wind	12/15/2019	45		
Western Albany County	Ice Storm	12/29/2019	-		
Eastern Albany County	Winter Weather	12/29/2019	-		
County Wide	Strong Wind	1/12/2020	45	$2,000	
County Wide	Strong Wind	1/16/2020	40	$2,000	
County Wide	Winter Weather	1/18/2020	-		
County Wide	Winter Weather	2/6/2020	-		
County Wide	Strong Wind	2/7/2020	45		
Western Albany County	Winter Weather	3/23/2020	-		
County Wide	Strong Wind	4/13/2020	45	$2,000	
Western Albany County	Winter Weather	4/17/2020	-		
Western Albany County	Winter Weather	4/26/2020	-		
Rensselaerville	Thunderstorm Wind	5/15/2020	46	$1,000	
Colonie	Thunderstorm Wind	5/15/2020	50		
Cohoes	Thunderstorm Wind	5/15/2020	50		
Albany	Thunderstorm Wind	5/15/2020	50		
Westerlo	Thunderstorm Wind	5/15/2020	50		
Bethlehem	Thunderstorm Wind	5/15/2020	50		
Altamont	Hail	6/5/2020	1		

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
Bethlehem	Thunderstorm Wind	6/5/2020	50		
Cohoes	Thunderstorm Wind	7/2/2020	50		
Albany	Thunderstorm Wind	7/2/2020	50		
Knox	Thunderstorm Wind	7/2/2020	50		
Bethlehem	Thunderstorm Wind	7/2/2020	50		
Bern	Thunderstorm Wind	7/2/2020	50		
Coeymans	Thunderstorm Wind	7/2/2020	50		
County Wide	Strong Wind	8/4/2020	45	$2,000	
Eastern Albany County	Strong Wind	8/4/2020	40	$1,000	
Coeymans	Thunderstorm Wind	8/10/2020	50		
Guilderland	Thunderstorm Wind	8/10/2020	50		
Bethlehem	Thunderstorm Wind	8/10/2020	50		
Bethlehem	Hail	8/23/2020	1		
Bethlehem	Hail	8/23/2020	1.5		
Coeymans	Thunderstorm Wind	8/23/2020	50	$7,500,000	
Bethlehem	Thunderstorm Wind	8/23/2020	50		
Guilderland	Thunderstorm Wind	10/7/2020	50		
Colonie	Thunderstorm Wind	10/7/2020	59		
Colonie	Thunderstorm Wind	10/7/2020	50		

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
New Scotland	Thunderstorm Wind	10/7/2020	50		
Bethlehem	Thunderstorm Wind	10/7/2020	50		
Coeymans	Thunderstorm Wind	10/7/2020	50		
Albany	Thunderstorm Wind	10/7/2020	45		
Westerlo	Thunderstorm Wind	10/7/2020	50		
Rensselaerville	Thunderstorm Wind	10/7/2020	50		
Western Albany County	Winter Weather	10/29/2020	-		
County Wide	Heavy Snow	12/16/2020	-		
Western Albany County	Winter Weather	1/3/2021	-		
Western Albany County	Winter Weather	1/15/2021	-		
County Wide	Winter Weather	1/26/2021	-		
County Wide	Winter Storm	2/1/2021	-		
County Wide	Winter Weather	2/15/2021	-		
Eastern Albany County	High Wind	3/1/2021	50		
Western Albany County	Strong Wind	3/1/2021	42		
Eastern Albany County	Winter Weather	3/1/2021	-		

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
Eastern Albany County	Strong Wind	3/12/2021	47		
Eastern Albany County	Strong Wind	3/226/2021	48		
Eastern Albany County	Strong Wind	3/28/2021	44		
Western Albany County	Strong Wind	3/28/2021	49		
Western Albany County	Winter Weather	4/15/2021	-		
County Wide	Strong Wind	4/30/2021	45		
New Scotland	Thunderstorm Wind	7/6/2021	50		
Coeymans	Thunderstorm Wind	7/7/2021	50		
New Scotland	Thunderstorm Wind	7/7/2021	50		
Cohoes	Thunderstorm Wind	7/27/2021	50		
Bethlehem	Hail	7/27/2021	.75		
Colonie	Thunderstorm Wind	8/12/2021	50		
Colonie	Lightning	8/12/2021	-	$2,000	
Voorheesville	Hail	8/13/2021	1		
New Scotland	Thunderstorm Wind	8/13/2021	50		
Bethlehem	Thunderstorm Wind	8/13/2021	50		
Albany	Thunderstorm Wind	8/13/2021	50		
Coeymans	Thunderstorm Wind	8/13/2021	50		

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
Bethlehem	Thunderstorm Wind	9/8/2021	50		
Colonie	Thunderstorm Wind	9/8/2021	50		
Colonie	Thunderstorm Wind	9/8/2021	61		
Albany	Thunderstorm Wind	9/8/2021	50		
Western Albany County	Strong Wind	12/6/2021	40		
Eastern Albany County	Strong Wind	12/6/2021	38		
Eastern Albany County	Strong Wind	12/11/2021	46		
Western Albany County	Strong Wind	12/11/2021	40		
Eastern Albany County	Winter Weather	12/18/2021	-		
County Wide	Winter Weather	12/22/2021	-		
County Wide	Winter Weather	12/22/2021	-		
County Wide	Winter Weather	1/9/2022	-		
Eastern Albany County	Winter Weather	1/16/2022	-		
Western Albany County	Winter Storm	1/16/2022	-		
County Wide	Winter Storm	2/3/2022	-		
Western Albany County	Strong Wind	2/17/2022	45		

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
Eastern Albany County	Strong Wind	2/17/2022	40		
County Wide	Winter Weather	2/19/2022	-		
Eastern Albany County	Strong Wind	2/19/2022	45		
Western Albany County	Strong Wind	2/19/2022	35		
County Wide	Winter Storm	2/25/2022	-		
County Wide	Strong Wind	3/7/2022	40		
Rensselaerville	Thunderstorm Wind	3/7/2022	48	$1,000	
Rensselaerville	Thunderstorm Wind	3/7/2022	50		
Westerlo	Thunderstorm Wind	3/7/2022	50		
Eastern Albany County	Strong Wind	3/7/2022	49		
Western Albany County	Strong Wind	3/7/2022	45		
County Wide	Winter Weather	3/9/2022	-		
County Wide	Winter Weather	3/12/2022	-		
Western Albany County	Winter Storm	4/18/2022	-		
Albany	Thunderstorm Wind	5/15/2022	50		
Rensselaerville	Thunderstorm Wind	5/16/2022	50		
Westerlo	Thunderstorm Wind	5/16/2022	50		

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
Ravena	Thunderstorm Wind	5/16/2022	50		
Guilderland	Thunderstorm Wind	5/16/2022	50		
Colonie	Thunderstorm Wind	5/22/2022	50		
Bethlehem	Thunderstorm Wind	5/22/2022	50		
Knox	Thunderstorm Wind	7/24/2022	50		
Westerlo	Thunderstorm Wind	7/24/2022	50		
Bethlehem	Thunderstorm Wind	7/24/2022	50		
Albany	Thunderstorm Wind	8/4/2022	50		
New Scotland	Thunderstorm Wind	8/4/2022	50		
Watervliet	Thunderstorm Wind	8/17/2022	50		
Knox	Thunderstorm Wind	9/13/2022	45	$1,000	
Voorheesville	Thunderstorm Wind	9/13/2022	45	$1,000	
New Scotland	Thunderstorm Wind	9/13/2022	45	$1,000	
County Wide	Winter Weather	11/15/2022	-		
Eastern Albany County	Winter Weather	11/20/2022	-		
Western Albany County	Strong Wind	12/1/2022	40		
County Wide	Winter Weather	12/11/2022	-		

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
Western Albany County	Winter Storm	12/15/2022	-		
Eastern Albany County	Winter Weather	12/15/2022	-		
Eastern Albany County	Strong Wind	12/23/2022	48		
Western Albany County	Strong Wind	12/23/2022	40		
Eastern Albany County	Winter Weather	1/17/2023	-		
County Wide	Winter Storm	1/22/2023	-		
Western Albany County	Strong Wind	2/3/2023	40		
Eastern Albany County	Strong Wind	2/3/2023	46	$1,000	$3,000
County Wide	Winter Weather	2/27/2023	-		
County Wide	Winter Storm	3/3/2023	-		
County Wide	Winter Storm	3/13/2023	-		
Bethlehem	Thunderstorm Wind	7/4/2023	50		
Ravena	Thunderstorm Wind	7/4/2023	45		
Coeymans	Thunderstorm Wind	7/4/2023	50		
Coeymans	Thunderstorm Wind	7/4/2023	45		
Albany	Thunderstorm Wind	7/9/2023	50		
Bethlehem	Thunderstorm Wind	7/9/2023	50		

Location	Event Type	Date	Magnitude	Estimated Property Damage ($)	Estimated Crop Damage ($)
Guilderland	Thunderstorm Wind	7/9/2023	50		
Colonie	Thunderstorm Wind	7/13/2023	50		
Coeymans	Hail	7/25/2023	1.25		
Guilderland	Hail	9/7/2023	.88		
Guilderland	Thunderstorm Wind	9/7/2023	50		
Bethlehem	Thunderstorm Wind	9/7/2023	50		

Source: (NOAA National Centers for Environmental Information, 2023).

Units for magnitude are expressed as the following: Hail: inches, High Wind: knots, Thunderstorm Wind: knots

According to the FEMA National Risk Index's Expected Annual Loss ($) Data, severe storm events are expected to cause $12,791,901 in annual losses (FEMA, 2023). These statistics are displayed in Table 6-11, and include tornado, hurricane, ice storm, lightning, strong wind, hail, and winter weather.

Table 6-11. Expected Annual Losses from Severe Storm Events

Event	Expected Annual Loss (Approximate)
Tornado	$5,993,887
Hurricane	$4,501,662
Ice Storm	$1,010,994
Lightning	$505,678
Strong Wind	$477,731
Hail	$261,489
Winter Weather	$40,460
TOTAL	**$12,791,901**

Data Source: (FEMA, 2023)

6.2.6 Future Potential Impacts and Relation to Climate Change

Probability of Future Events

Based on the Albany County CEPA Results, the National Risk Index, previous Presidential Disaster Declarations, Hazard Identification and Ranking, and Historical Hazard

Occurrences, the County's overall vulnerability to a severe storm remains high. According to the NOAA National Climate Data Center (NCEI), Albany County experienced 971 severe storm events between 1950 and 2023. The table below shows these statistics, as well as the annual average number of events and the percent chance of these individual severe storm hazards occurring in Albany County in future years (National Oceanic and Atmospheric Administration, 2023).

The probabilities are calculated using the formula P = e / (e + y - 1) *100% where P is the probability of one or more of a given type of event occurring in a given year (e.g. the probability that there would be at least one hail event in 2023), e is the total number of events over a given number of years (e.g. 1950-2023), and y is the number of years (e.g. 73 years between 1950 and 2023). In these probability calculations, the simplifying assumption has been made that these events are independent of each other – i.e. that the events are not related to one another. This assumption could be incorrect if, for example, a single event was counted as both a hail event and a strong wind event.

Table 6-2. Probability of Future Occurrence of Severe Storm Events Given No Other Changes

Hazard Type	Number of Occurrences between 1950 and 2023	Rate of Occurrence or Annual Number of Events (Average)	Recurrence Interval (in years) (# Years/Number of Events)	Probability of Event in Any Given Year (%)
Lightning	21	.287	3.476	22.6%
Hail	183	2.506	.398	71.8%
Tornado	7	.095	10.428	8.9%
High Winds	48	.657	1.52	40%
Strong Wind	84	1.15	.869	53.8%
Thunderstorm Wind	480	6.575	.152	86.9%
Hurricane	0	0	0	0.0%
Tropical Storm	1	.013	73	1.4%
Tropical Depression	0	0	0	0.0%
Heavy Rain	6	.082	12.166	7.7%
Severe Winter Storm*	141	1.931	.517	66.1%
ALL SEVERE STORM EVENTS	971	13.301	.0751	93.1%

Probability listed is based on 1950-2023 data only. The actual probability may differ; for example, a hurricane has a greater than 0% probability, because there is some chance that it will occur in the future even if it has not occurred between 1950 and 2023.

**The Severe Winter Storm category includes the following events: blizzard, heavy snow, ice storm, winter storm, and winter weather.*

As mentioned, the table above displays the probability of future events if there are no other changes; it is solely based on historical probability. However, the County's future vulnerability to severe storm events can be impacted by several factors, including land use changes, mitigation actions and climate change. For example, an increase in tree cover in a given area may decrease the severity of winds in that area; however, tree cover near a building may lead to an increase risk of branches or trees falling on that building. Tree cover may be impacted by changes in population and development, as well as mitigation actions such as tree plantings. Climate change may also impact severe storms, as described below.

Relation to Climate Change

Climate change is expected to change the types of severe storm events that the County is vulnerable to, likely making the County more vulnerable to severe thunderstorm, windstorm, and hail events and less vulnerable to heavy snow, ice storms, winter storms and winter weather.

The County's overall vulnerability to severe thunderstorms, windstorm, and hail events remains high. New York State Energy and Research Development Authority's (NYSERDA) ClimAID report states that temperatures will continue to rise over the next several decades (Rosenzweig, et al., 2011). U.S. Global Change Research Program's Climate Mapping for Resilience and Adaptation tool shows similar results, with annual maximum temperature averages increasing. The County may experience 5.2 °F to 6.9°F higher annual maximum temperature averages by mid-century (2035-2064), compared with 1976-2005, according to mid-level projections (U.S. Federal Government, 2022). As a result, weather patterns are projected to increase in severity. Higher temperatures allow storm clouds to hold more vapor, which in turn produces more intense precipitation during storm events. The Albany County Climate Analysis, funded by AT&T, projected that by mid-century, Albany County would see a 13% increase in inches of winter precipitation for some areas of the County, a 4 degree increase in winter temperatures across the County, and a 7-inch increase in precipitation for some watersheds in the County (Duffy, Filante, & Guo, 2024). Due to projected increases in precipitation and increases in yearly average temperatures, severe storm events are anticipated to increase in frequency and intensity.

The County's overall vulnerability to heavy snow, ice storms, winter storms and winter weather may decrease. Based on the U.S. Global Change Research Program's Climate Mapping for Resilience and Adaptation tool, the County may experience 15.9 to 19.8 fewer days with a maximum temperature of 32°F by mid-century (2035-2064), compared to modeled history (1976-2005) (U.S. Federal Government, 2022).

6.3 Drought

6.3.1 Description

A drought is a period of unusually constant dry weather that persists long enough to cause deficiencies in water supply (surface or underground). Droughts can last a short period or for many years (DHSES and AVAIL, 2023). Five types of droughts are recognized:

- Meteorological droughts are caused by a lack of precipitation that leads to dry conditions;
- Hydrological droughts are caused by changes in surface and groundwater supplies, and the effects of these events can persist for multiple years;
- Agricultural droughts relate to impacts to crops, forestry, and/or livestock caused by meteorological and hydrological droughts;
- Socioeconomic droughts reflect water shortages that adversely impact the population at both small and large scales; and
- Ecological droughts are deficits in water supplies that create multiple stresses across ecosystems (National Drought Mitigation Center, 2023).

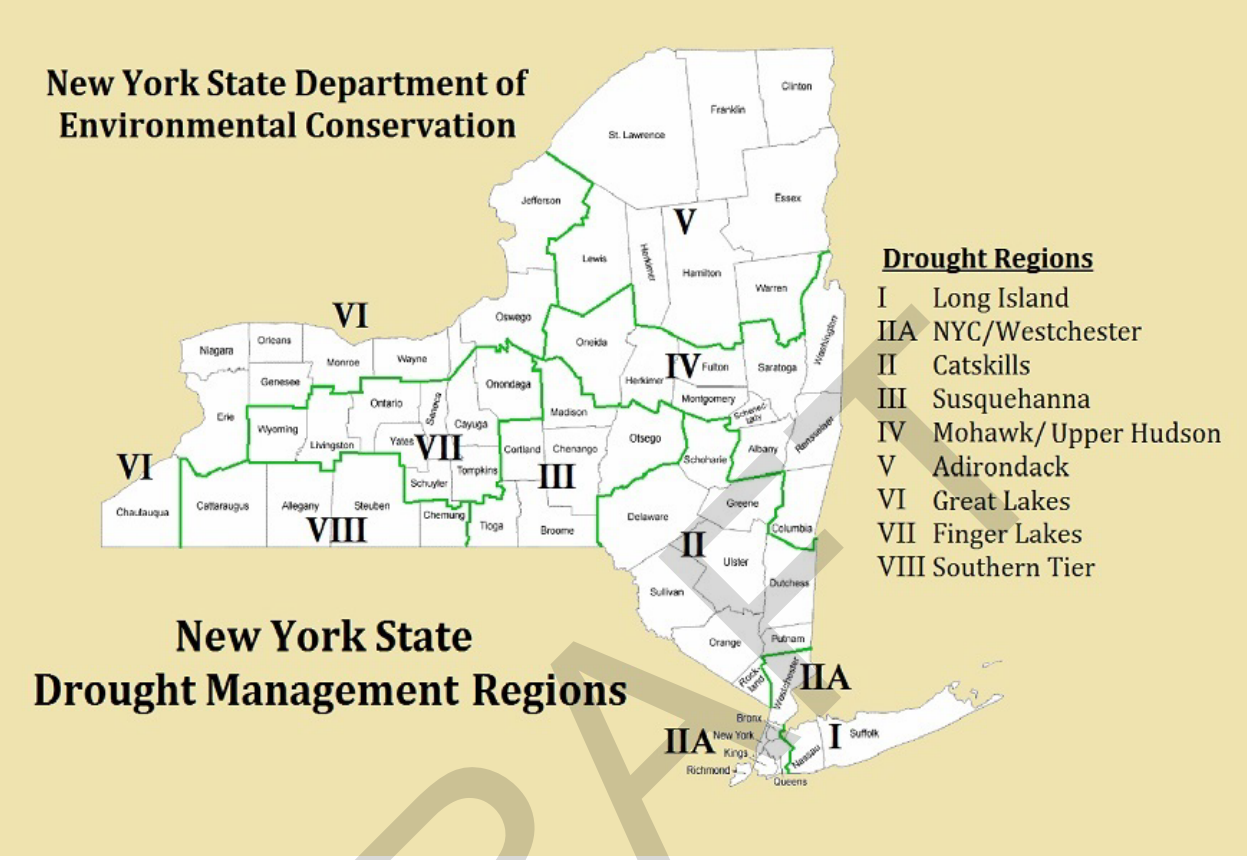
Drought is often referred to as a "creeping disaster" since they develop gradually over time. This can make it hard to recognize the true impacts of drought and respond with the urgency required (NOAA, NIDIS, 2022). While they are slow-onset hazards, over time they can severely affect vegetation and crops, wildlife, municipal water supplies and recreational resources. If drought conditions extend for long periods, the direct and indirect economic impacts can be significant. For example, significant drought can result in food shortages for wildlife, livestock, and people, and result in surging food prices and diminished revenues for local economies. High temperatures, high winds, and low humidity can worsen drought and human activities and demands for water resources can accelerate drought-related impacts (DHSES and AVAIL, 2023).

Although New York State is rich with water resources, normal fluctuations in regional weather patterns can lead to periods of dry weather. Occasional drought is a normal, recurrent feature of virtually every climate in the United States, including those in New York State.

6.3.2 Location

The New York State Department of Environmental Conservation (NYSDEC) has divided New York State into nine drought management regions based roughly on drainage basins and county lines. NYSDEC monitors precipitation, lake and reservoir levels, stream flow, and groundwater level at least monthly in each region and more frequently during periods of drought. NYSDEC uses this data to assess the condition of each region, which can range from "normal" to "drought disaster" (NYSDEC, 2023). Figure 6-8 shows the drought regions of New York State. Albany County is located within the Mohawk/Upper Hudson (Region IV).

Figure 6-8. NYS Drought Management Regions



6.3.3 Extent

Data generated by DEC is used to assess and analyze each of the region's conditions and is classified by four levels of state drought advisories if conditions are not normal: watch, warning, emergency and disaster.

The State Drought Index compares four parameters to historic or "normal" values to evaluate drought conditions: stream flows, precipitation, lake and reservoir storage levels, and groundwater levels. New York's Drought Management Task Force uses those factors as well as water use, duration of the dry period, and season to assess drought in different parts of the state. The State Drought Index helps the State assess the impact on water supply, the regional economy, and the environment (DHSES and AVAIL, 2023).

There are four stages of drought that can be declared in New York State, as follows:

- **Drought Watch** - The least severe of the stages, a drought watch is declared when a drought is developing. Public water suppliers begin to conserve water and urge customers to reduce water use.

- **Drought Warning** - Voluntary water conservation is intensified. Public water suppliers and industries update and implement local drought contingency plans. Local agencies make plans in case of an emergency declaration.
- **Drought Emergency** - The Governor may declare an emergency. The Disaster Preparedness Commission coordinates a response. Mandatory local/county water restrictions may be imposed. Communities may need to tap alternative water sources to avoid depleting water supplies, protect public health and provide for essential uses.
- **Drought Disaster** - Disaster plans are implemented. Water use is further restricted. The Governor may declare a disaster and request federal disaster assistance. Emergency legislation may be enacted. The State provides equipment and technical assistance to communities.

New York also tracks other drought measurements including the Palmer Drought Severity Index (PDSI) and the Standardized Precipitation Evapotranspiration Index (SPEI). These other indicators can be used to evaluate the level of soil moisture, which can help us understand potential impacts to agriculture (DHSES and AVAIL, 2023).

6.3.4 Impacts and Vulnerability

According to the updated hazard analysis in Section 5.4, Albany County is moderately vulnerable to a drought based on this hazard's minor impact (minor potential for damage to property, crops and/or people), rare occurrence, small extent (affect one or two problem areas in the jurisdiction), and low level of preparedness. This assessment is backed by additional information in Section 5 and Section 6.1.

Several municipalities within Albany County are served by public water supplies that cover all or almost all residents of the municipality (City of Albany, Village of Altamont, Town of Bethlehem, City of Cohoes, Village of Colonie, Town/Village of Green Island, Town of Guilderland, Village of Menands, Village of Ravena, Village of Voorheesville, and City of Watervliet). The remaining municipalities have water supplies that cover a portion of their residents (Town of Berne, Town of Coeymans, Town of Colonie, Town of Knox, Town of New Scotland, Town of Rensselaerville, Town of Westerlo).[2] These water supplies, and certain water and wastewater facilities, could be susceptible to impacts during a drought due to low water yields, particularly if a back-up water supply has not been formally established. Additionally, residents who rely on private wells would also be susceptible to the impacts of a drought due to low water yields, including water quality concerns.

Agricultural areas in the County would also experience impacts from drought. For example, agricultural operators who rely on natural rain events, rainwater collection, and healthy soils for crop maintenance and livestock care may be susceptible to the impacts of low water yields during a drought.

[2] Source: https://www.health.ny.gov/environmental/water/drinking/pws_contacts/alba_contacts.htm

The County's overall vulnerability to hazards in this Hazard Mitigation Plan Update is described in Section 0.

6.3.5 Historical Hazard Occurrences and Damage Estimates

Albany County experienced no drought events between 2018 and 2023 according to the NOAA Storm Events Database (NOAA National Centers for Environmental Information, 2023). According to the FEMA National Risk Index's Expected Annual Loss ($) Data, droughts are expected to incur no annual losses, based on recent historical data (FEMA, 2023). However, as discussed in Section 6.3.6, there have been 3 drought events since 1950, and droughts could occur in the future and cause damage.

6.3.6 Future Potential Impacts and Relation to Climate Change

Probability of Future Events

Based on the Albany County CEPA Results, the National Risk Index, previous Presidential Disaster Declarations, Hazard Identification and Ranking, and Historical Hazard Occurrences, the County's overall vulnerability to a drought remains moderate. According to the NOAA National Climate Data Center (NCEI) Albany County experienced 3 drought events between 1950 and 2023. The table below shows these statistics, as well as the annual average number of events and the percent chance of drought events occurring in Albany County in future years (National Oceanic and Atmospheric Administration, 2023).

The probabilities are calculated using the formula P = e / (e + y - 1) *100% where P is the probability of one or more of a given type of event occurring in a given year (e.g. the probability that there would be at least one drought in 2023), e is the total number of events over a given number of years (e.g. 1950-2023), and y is the number of years (e.g. 73 years between 1950 and 2023). In these probability calculations, the simplifying assumption has been made that these events are independent of each other – i.e. that the events are not related to one another. This assumption could be incorrect if, for example, two drought events occurred in a single summer but were caused by the same weather patterns (such as an El Niño year causing unusually high temperatures).

Table 6-2. Probability of Future Occurrence of Drought Events Given No Other Changes

Hazard Type	Number of Occurrences between 1950 and 2022	Rate of Occurrence or Annual Number of Events (average)	Recurrence Interval (in years) (# Years/Number of Events)	Probability of Event in Any Given Year (%)
Drought	3	.041	24.333	4%

Probability listed is based on 1950-2023 data only. The actual probability may differ.

As mentioned, the table above displays the probability of future events if there are no other changes; it is solely based on historical probability. However, the County's future vulnerability to drought events can be impacted by several factors, including land use

changes, population changes, mitigation actions and climate change. For example, a decrease in the amount of agricultural operations in a given area or less water-intensive operations may lead to fewer strains on the water system during times of drought. This could decrease the severity of a drought. A significant increase in population in a given area could put more strain on the water system, increasing the severity and frequency of droughts. The use of water-saving techniques, as is included in some jurisdictions' mitigation actions, could decrease the severity of a drought. Climate change may also impact droughts, as described below.

Relation to Climate Change

Climate change is expected to increase the future vulnerability of the County to drought events. Properties that rely on private wells (particularly those that are vulnerable to supply issues) and agricultural areas are particularly likely to be impacted by a drought in the future. The frequency of droughts in New York State, particularly short-duration events occurring in the late summer months, is expected to increase in the future due to projected temperature increases associated with climate change (Horton, Bader, Rosenzweig, DeGaetano, & Solecki, 2014).

Specifically, based on the U.S. Global Change Research Program's Climate Mapping For Resilience and Adaptation tool, it is predicted that Albany County will experience slightly more dry days (U.S. Federal Government, 2022). The County may experience 2.8 to 3.7 more days per year with no precipitation by mid century (2035-2064), compared with 1976-2005, according to mid-level projections. Maximum consecutive dry days increases by 0.4 to 0.7 days per year for the same time period, based again on mid-level projections.

Additionally, changes in precipitation may affect the groundwater supply. As mentioned above, climate change predictions indicate that Albany County will experience slightly more heavy precipitation events, as well as more dry days. If all else is equal, then if the same volume of water falls as heavy precipitation events, rather than more frequent lighter precipitation events, more water would run off into streams and lakes. Consequently, less water would enter the ground and recharge the aquifers. This would lead to a reduced water supply that can be utilized during droughts (Department of Environmental Conservation, 2023), even if Albany County does experience an overall increase in precipitation (Duffy, Filante, & Guo, 2024).

6.4 Extreme Temperatures

6.4.1 Description

Extreme temperature events are defined as extended periods of excessive cold or hot weather with a serious impact on human and/or animal populations.

Extreme Heat

The National Weather Service generally defines a heat wave as a period of abnormally hot weather (typically 10°F or more above average temperatures) generally lasting

more than two consecutive days. Extreme heat-related events can occur during all seasons. However, an extreme heat event in the winter is very different from one in the summer, as what is "extreme" is relative to historical averages for that specific time. Whereas extreme heat events in the winter can result in significant damages to winter crops, summer extreme heat events are more likely to cause health challenges and deaths (DHSES and AVAIL, 2023).

For New York State, heat advisories are issued at the county level when the heat index is predicted to remain above 95°F for 2 or more consecutive days or above 100°F for any period of time. Excessive heat warnings are issued at the county level when the heat index is at or above 105°F for 2 hours or more at any location within the affected county or counties. A heat warning means that some people can be seriously affected by heat if precautions are not taken. Mortality begins to increase exponentially as the heat increases or stays above a heat index of 104°F. Excessive heat watches are issued one to two days in advance, when the probability the excessive heat warning criteria will be met is 50 to 79 percent (DHSES and AVAIL, 2023).

The urban heat island effect is a term used to describe higher air and structure temperatures in an urban setting as opposed to the lower temperatures found in more rural areas. With fewer trees in cities and large communities, solar energy is more readily absorbed into manmade structures, causing higher urban area temperatures. The urban heat island effect contributes to higher ambient temperatures, air pollution, greater demands on cooling systems, and health problems related to heat and pollution (DHSES and AVAIL, 2023).

In extreme heat and high humidity, evaporation is slowed and the body must work harder to maintain a normal temperature. People exposed to extreme heat exposure may develop symptoms that include, sunburn, dehydration, heat exhaustion, or heat stroke.

Extreme Heat and Air Pollution

Extreme heat can worsen air pollution due to a number of factors. Hotter temperatures increase the risk of wildfires; while wildfires are not of particular concern within Albany County, smoke from wildfires elsewhere can travel to Albany County and worsen Albany County's air quality. Hotter temperatures also increase the risk of drought, which can cause more dust. Additionally, hotter temperatures encourage the development of ozone gas, which is a lung irritant and can contribute to health problems like bronchitis and heart conditions (Borunda, 2023).

Extreme Cold

Extreme cold is characterized by a rapid fall in temperature within 24 hours and extreme low temperatures for an extended period. The arctic air, together with brisk winds, can lead to dangerously cold wind chill values.

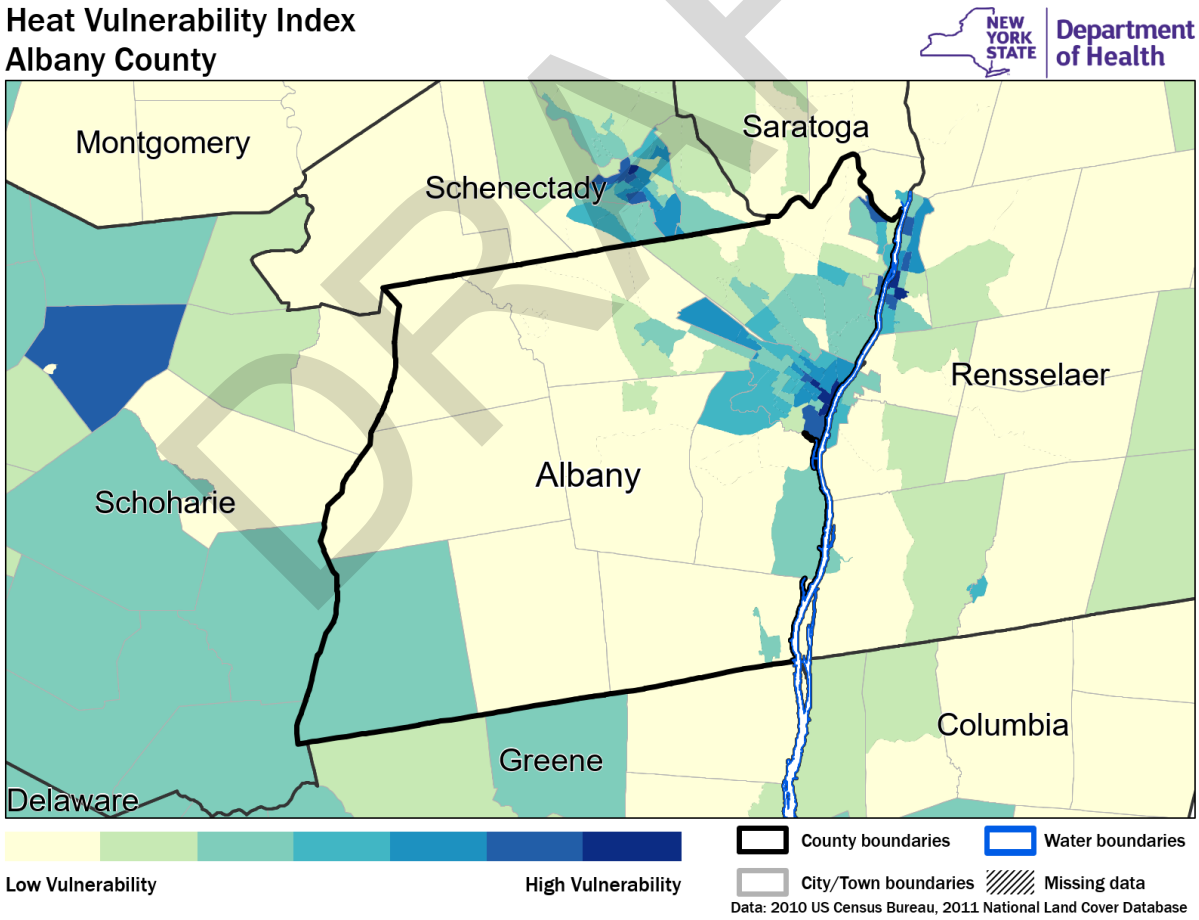
New York State, despite its reputation for bustling cities and vibrant communities, is not immune to the harsh realities of extreme cold weather events. Extreme cold in New York can encompass frigid temperatures, heavy snowfall, ice storms, and bitter wind chills. The northeastern location of the state makes it highly susceptible to extreme cold.

Varying land elevations, character of the landscape, and large bodies of water play a significant role in the state's temperatures. It is common for large portions or the entire state to experience extreme cold. In the face of extreme cold events, schools may close to prevent students, teachers, and staff from commuting to and from school, and there may be risks to public health, infrastructure, and daily life across the state (DHSES and AVAIL, 2023). In extreme cold conditions, people can experience wind chill, frostbite, or hypothermia.

6.4.2 Location

Extreme temperatures may occur anywhere within the county. However, amount of pavement, tree cover, and elevation are all factors that affect where extreme temperatures occur within the county. For example, areas with more pavement, less tree cover, and lower elevation experience increased temperatures in the summer, whereas areas of higher elevation experience colder winter days. Figure 6-9 displays a map of heat vulnerability in the County.

Figure 6-9. Heat Vulnerability Index for Albany County



Source: (NYS Department of Health, 2017)

6.4.3 Extent

The NWS Heat Index, a function of temperature and relative humidity, is used to predict the likelihood that someone could develop heat disorders. The NWS Wind Chill Index is a function of temperature and wind velocity. The NWS Heat and Wind Chill Indices are included in Figure 6-10 and Figure 6-11.

According to the National Centers for Environmental Information's (NCEI) Climate at a Glance Time Series, from 1895 to 2023 in Albany County, July 1955 had the highest monthly maximum temperature (87.9°F), while February 1934 had the lowest monthly minimum temperature (-2.8°F) (NOAA National Centers for Environmental Information, 2024).

Figure 6-10. NWS Heat Index

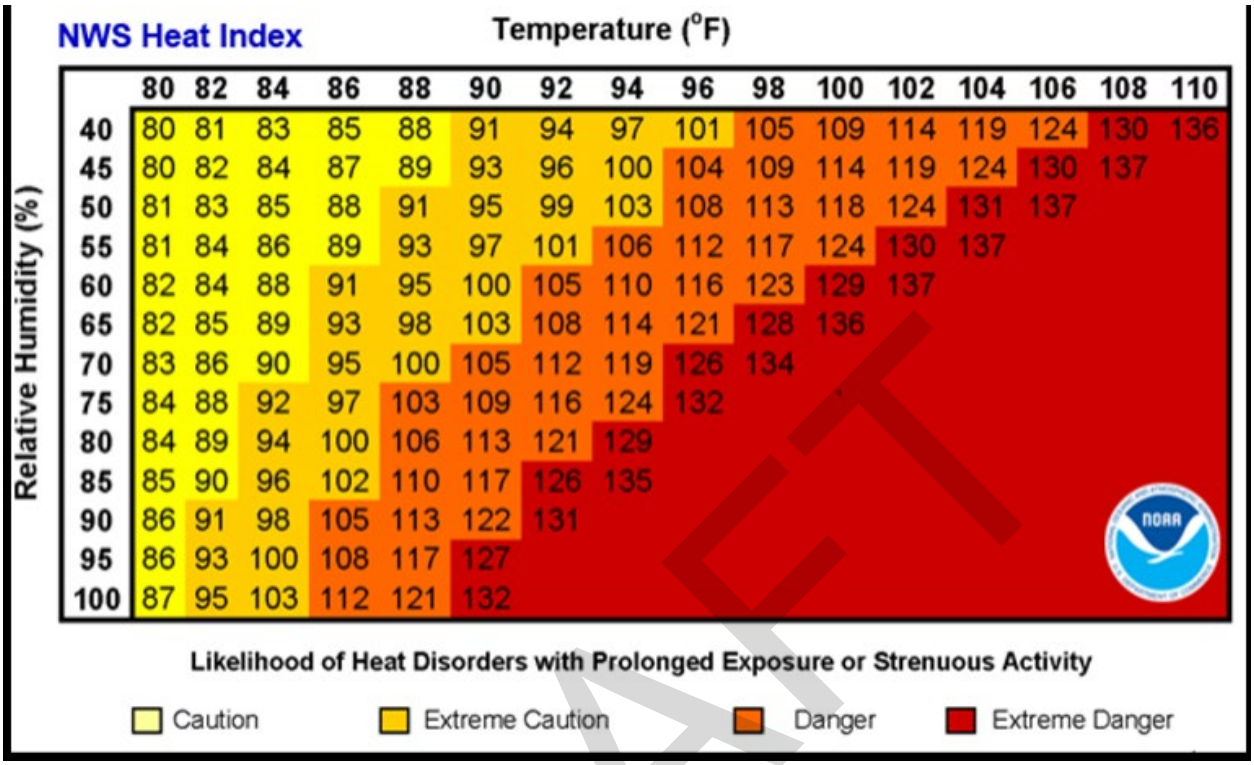
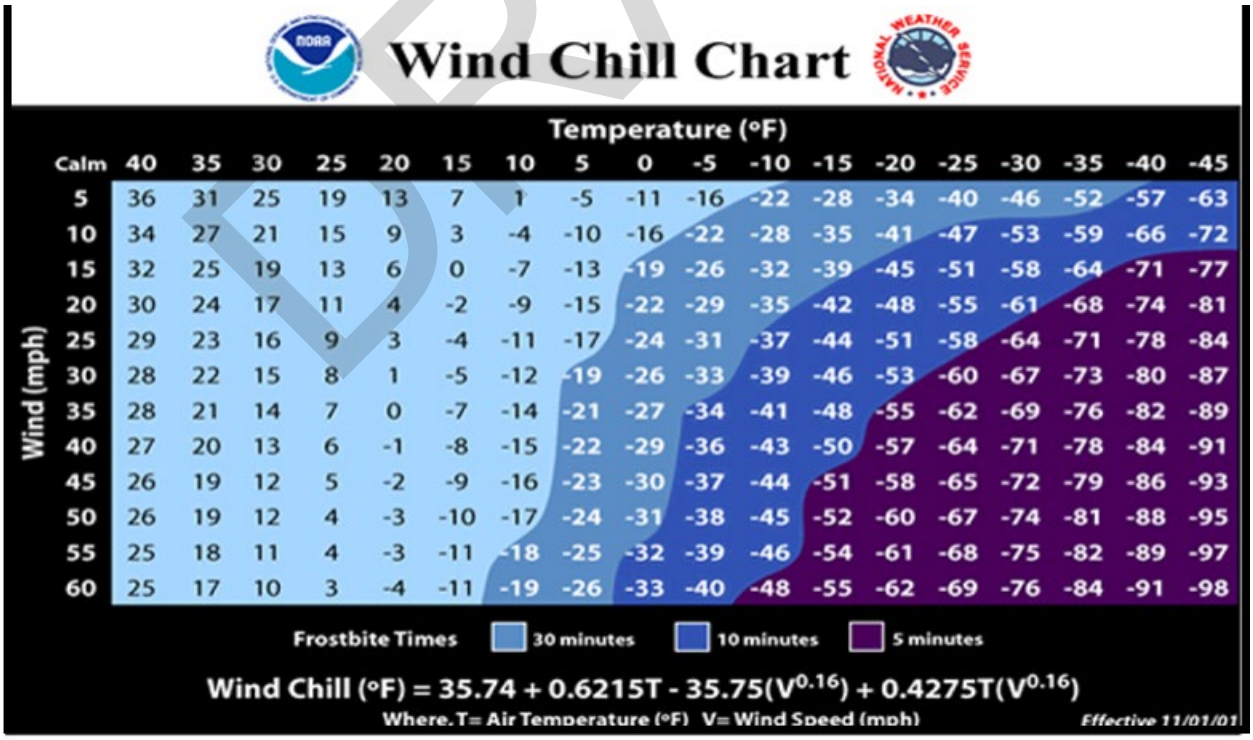


Figure 6-11. NWS Wind Chill Chart



6.4.4 Impacts and Vulnerability

According to the updated hazard analysis in Section 5.4, the County is highly vulnerable to extreme temperature events based on this hazard's moderate impact (moderate potential for damage to property, crops and/or people), infrequent occurrence, large extent (county-wide extent of impacts), and moderate level of preparedness. This assessment is backed by additional information in Section 5 and Section 6.4.

Extreme temperature events tend to have greater impacts on vulnerable populations, including older adults (over 65 years), young children (under 5 years), people with health problems, or people who cannot afford to sufficiently heat or cool their homes. Approximately 5.0% of the population in Albany County is under 5 years old, and 16.9% of the population is 65 years old and above. These statistics mean that approximately 21% of the population is at higher risk for greater impacts to extreme temperatures based on age (U.S. Census Bureau, 2020). Additionally, 11.7% of the families within the County are below the poverty level, and 13.8% of the County's population has a disability (U.S. Census Bureau, 2023). Extreme temperatures principally affect the health and safety of the human population, although they can also impact livestock and crops, and may also cause damage to infrastructure and property. As described in Section 6.4.1, extreme heat events can also lead to worsened health effects from air pollution, such as respiratory and cardiac problems.

Additionally, Albany County is projected to experience an increase in winter maximum temperatures, as described in Section 6.4.6. This will likely lead to increases in the freeze-thaw cycles, which can deteriorate infrastructure. However, the increase of winter temperatures could also be beneficial to agriculture, by extending the growing season in the spring.

There are multiple cooling center locations established throughout the County (Department of Health, 2024). The County recommends that residents utilize facilities such as libraries, public pools, grocery stores, and shopping centers to seek relief from extreme heat.

Albany County and its jurisdictions are particularly concerned about the impacts of extreme temperature events on vulnerable populations, such as those listed in Section 2.3.2. Senior citizens were mentioned frequently. Additionally, warmer winters can cause damage to infrastructure, such as road degradation from freeze-thaw cycles.

The County's overall vulnerability to hazards in this Hazard Mitigation Plan Update is described in Section 0.

6.4.5 Historical Hazard Occurrences and Damage Estimates

Table 6-12 shows the extreme temperature events that the County has experienced between 2018 and 2023, and their estimated damages.

Table 6-12. Extreme Temperature Event Records, 2018-2023

Location	Event Type	Date	Estimated Property Damage	Estimated Crop Damage
Western Albany County	Extreme Cold/Wind Chill	1/1/2018	$0	$0
Eastern Albany County	Cold/Wind Chill	1/1/2018	$0	$0
County Wide	Extreme Cold/Wind Chill	1/5/2018	$0	$0
Western Albany County	Cold/Wind Chill	1/13/2018	$0	$0
Eastern Albany County	Heat	6/18/2018	$0	$0
Eastern Albany County	Heat	6/30/2018	$0	$0
Eastern Albany County	Excessive Heat	7/1/2018	$0	$0
Western Albany County	Heat	7/1/2018	$0	$0
Eastern Albany County	Heat	7/16/2018	$0	$0
Eastern Albany County	Heat	8/28/2018	$0	$0
Eastern Albany County	Heat	8/29/2018	$0	$0
Eastern Albany County	Heat	9/3/2018	$0	$0
Western Albany County	Cold/Wind Chill	11/22/2018	$0	$0
Western Albany County	Extreme Cold/Wind Chill	1/20/2019	$0	$0
Eastern Albany County	Cold/Wind Chill	1/20/2019	$0	$0
Eastern Albany County	Cold/Wind Chill	1/30/2019	$0	$0

Location	Event Type	Date	Estimated Property Damage	Estimated Crop Damage
Western Albany County	Extreme Cold/Wind Chill	1/30/2019	$0	$0
Western Albany County	Cold/Wind Chill	2/1/2019	$0	$0
Eastern Albany County	Heat	7/19/2019	$0	$0
Eastern Albany County	Excessive Heat	7/20/2019	$0	$0
Western Albany County	Heat	7/20/2019	$0	$0
Eastern Albany County	Heat	7/30/2019	$0	$0
Eastern Albany County	Heat	8/19/2019	$0	$0
Western Albany County	Cold/Wind Chill	12/18/2019	$0	$0
Eastern Albany County	Heat	7/9/2020	$0	$0
Eastern Albany County	Heat	7/11/2020	$0	$0
Eastern Albany County	Heat	7/19/2020	$0	$0
Western Albany County	Heat	7/27/2020	$0	$0
Eastern Albany County	Heat	7/27/2020	$0	$0
Eastern Albany County	Heat	8/10/2020	$0	$0
County Wide	Cold/Wind Chill	1/28/2021	$0	$0
Western Albany County	Cold/Wind Chill	1/29/2021	$0	$0
Eastern Albany County	Heat	6/7/2021	$0	$0
Eastern Albany County	Heat	6/21/2021	$0	$0

Location	Event Type	Date	Estimated Property Damage	Estimated Crop Damage
Eastern Albany County	Heat	6/27/2021	$0	$0
County Wide	Heat	8/11/2021	$0	$0
Eastern Albany County	Excessive Heat	8/12/2021	$0	$0
Eastern Albany County	Heat	8/13/2021	$0	$0
County Wide	Heat	8/26/2021	$0	$0
County Wide	Cold/Wind Chill	1/14/2022	$0	$0
Western Albany County	Cold/Wind Chill	1/20/2022	$0	$0
Western Albany County	Cold/Wind Chill	1/29/2022	$0	$0
Eastern Albany County	Heat	7/20/2022	$0	$0
Eastern Albany County	Heat	7/23/2022	$0	$0
Eastern Albany County	Heat	7/28/2022	$0	$0
County Wide	Heat	8/4/2022	$0	$0
Western Albany County	Heat	8/7/2022	$0	$0
Eastern Albany County	Heat	8/30/2022	$0	$0
County Wide	Extreme Cold/Wind Chill	2/3/2023	$0	$0
Eastern Albany County	Heat	7/6/2023	$0	$0
Eastern Albany County	Heat	9/5/2023	$0	$0

Source: (NOAA National Centers for Environmental Information, 2023).

According to the FEMA National Risk Index's Expected Annual Loss ($) Data, heat waves are expected to cause $152,411 in annual total losses, and cold waves are expected to cause $487,787 annual total losses (FEMA, 2023). Cold waves, as defined by FEMA's National Risk Index, are considered "a rapid fall in temperature within 24

hours and extreme low temperatures for an extended period" (FEMA, 2023). This differs slightly from the National Oceanic and Atmospheric Administration's definition of extreme cold, which is identified as "A period of extremely low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined warning criteria (typical value around -35° F or colder)" (NOAA National Centers for Environmental Information, 2023).

6.4.6 Future Potential Impacts and Relation to Climate Change

Probability of Future Events

Based on the Albany County CEPA Results, the National Risk Index, previous Presidential Disaster Declarations, Hazard Identification and Ranking, and Historical Hazard Occurrences, the County's overall vulnerability to an extreme temperature event is high. According to the NOAA National Climate Data Center (NCEI) Albany County experienced 86 extreme temperature events between 1950 and 2023. The table below shows these statistics, as well as the annual average number of events and the percent chance of these individual extreme temperature hazards occurring in Albany County in future years (National Oceanic and Atmospheric Administration, 2023).

In the table below, cold events are defined as a period of low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined advisory (typical value is -18°F or colder) conditions, and extreme cold events are defined as a period of extreme low temperatures or wind chill temperatures reaching or exceedingly locally/regionally defined warning criteria (typically around -35 °F or colder). Heat events are defined as a period of heat resulting from the combination of high temperatures (above normal) and relative humidity, and excessive heat events are defined as combination of high temperatures (well above normal) and high humidity. Both heat and excessive heath events are reported in Storm Data whenever heat index values meet or exceed locally/regionally established warning thresholds (DOC, NOAA, NWS, 2021).

The probabilities are calculated using the formula P = e / (e + y - 1) *100% where P is the probability of one or more of a given type of event occurring in a given year (e.g. the probability that there would be at least one excessive heat event in 2023), e is the total number of events over a given number of years (e.g. 1950-2023), and y is the number of years (e.g. 73 years between 1950 and 2023). In these probability calculations, the simplifying assumption has been made that these events are independent of each other – i.e. that the events are not related to one another. This assumption could be incorrect if, for example, a heat event occurred and then an excessive heat event occurred shortly afterwards, but they were both caused by the same warm spell.

Table 6-2. Probability of Future Occurrence of Extreme Temperature Events Given No Other Changes

Hazard Type	Number of Occurrences between 1950 and 2023	Rate of Occurrence or Annual Number of Events (average)	Recurrence Interval (in years) (# Years/Number of Events)	Probability of Event in Any Given Year (%)
Heat	47	.643	1.553	39.5%
Cold	31	.424	2.354	30.1%
Excessive Heat	7	.095	10.428	8.9%
Extreme Cold	1	.013	73	1.4%
ALL EXTREME TEMPERATURE EVENTS	86	1.178	0.848	54.4%

Probability listed is based on 1950-2023 data only. The actual probability may differ.

As mentioned, the table above displays the probability of future events if there are no other changes; it is solely based on historical probability. However, the County's future vulnerability to extreme temperature events can be impacted by several factors, including land use changes, population changes, mitigation actions and climate change. For example, if additional development (e.g. from increases in population) leads to areas with more pavement, those areas may see an increase in extreme heat events. Areas that experience an increase in tree cover (e.g. from changing land uses) may see a decrease in extreme heat events. Mitigation actions can also reduce the vulnerability of the County to extreme cold or extreme heat events; for example, creating warming or cooling centers, publicizing them, and offering transportation could reduce the health and safety impacts that many people feel from extreme heat and extreme cold events. Climate change is also expected to impact the frequency and severity of extreme temperature events, as described below.

Relation to Climate Change

Climate change is expected to increase the future vulnerability of the County to extreme heat events and decrease its vulnerability to extreme cold events.

Based on the U.S. Global Change Research Program's Climate Mapping For Resilience and Adaptation tool, it is predicted that Albany County will experience more extreme heat (U.S. Federal Government, 2022). The County may experience 19.1 to 25.3 days per year above 90 degrees Fahrenheit by mid-century (2035-2064), compared with 4.6 days per year in modeled history (1976-2005), according to mid-level projections. Additionally, it is predicted that Albany County will experience fewer cold days. The County may experience 28.3 to 32.2 days per year with maximum temperature below 32 degrees Fahrenheit by mid-century (2035-2064), compared with 48.1 days per year in modeled history (1976-2005), according to mid-level projections.

Additionally, Albany County is projected to see increases in winter maximum temperatures, which will drive increases in freeze-thaw cycles. By mid-century, Albany County is projected to experience a 4 degree increase in winter temperatures across the County (Duffy, Filante, & Guo, 2024). This would lead to a change in the types of precipitation in winter, namely more sleet and wintry mixes instead of pure snow.

Going forward, an increased use of air conditioning associated with the rise in extreme heat events will increase demands on local power grids, which should be taken into consideration by municipalities as well as utility providers regarding future planning efforts.

6.5 Landslide

6.5.1 Description

A landslide is a movement of rock, debris, or earth down a slope.

Landslides can flow rapidly, striking at avalanche speeds that can travel several miles and grow as they pick up trees, boulders, cars, and other materials. Other landslides move more slowly but are capable impacting large areas (several acres), causing severe damage to homes, infrastructure, and personal property. Some of the most damaging landslides are caused by water. This could be from natural sources, such as intense short-term rainfall or long-term saturation of a slope, or from human activities, such as irrigation, oversaturating the hillsides and creating an unstable environment.

A mudflow, also known as a mudslide, is a rapidly moving mass of water and fine-grained sediment down a slope. A debris flow is the same as a mudflow but contains larger materials: mudflows contain sediment the size of sand grains and smaller, debris flows can contain boulders, trees, and any other materials that can be swept up in the current. Debris flows may start on a sloped surface but can easily impact flat areas due to how fast they can travel and their fluid-like movement. Since debris flows are composed of water and loose material, they can move more rapidly than a typical landslide, at speeds up to and exceeding 35 mph.

The destruction of vegetation and destabilization of soil that results from wildfires make soil less able to retain water and creates favorable conditions for mudslides and debris flows. In some instances, it is possible for landslides to occur along stream and river channels as well, creating significant risk of flooding, because large landslides may act as an earthen dam and cause streams to pond and back up and flood property upstream of the earthen dam.

Landslides often occur with little or no warning and pose significant risks to the natural environment, human safety, property, infrastructure, utilities, and transportation, with impacts causing injuries or fatalities (DHSES and AVAIL, 2023).

6.5.2 Location

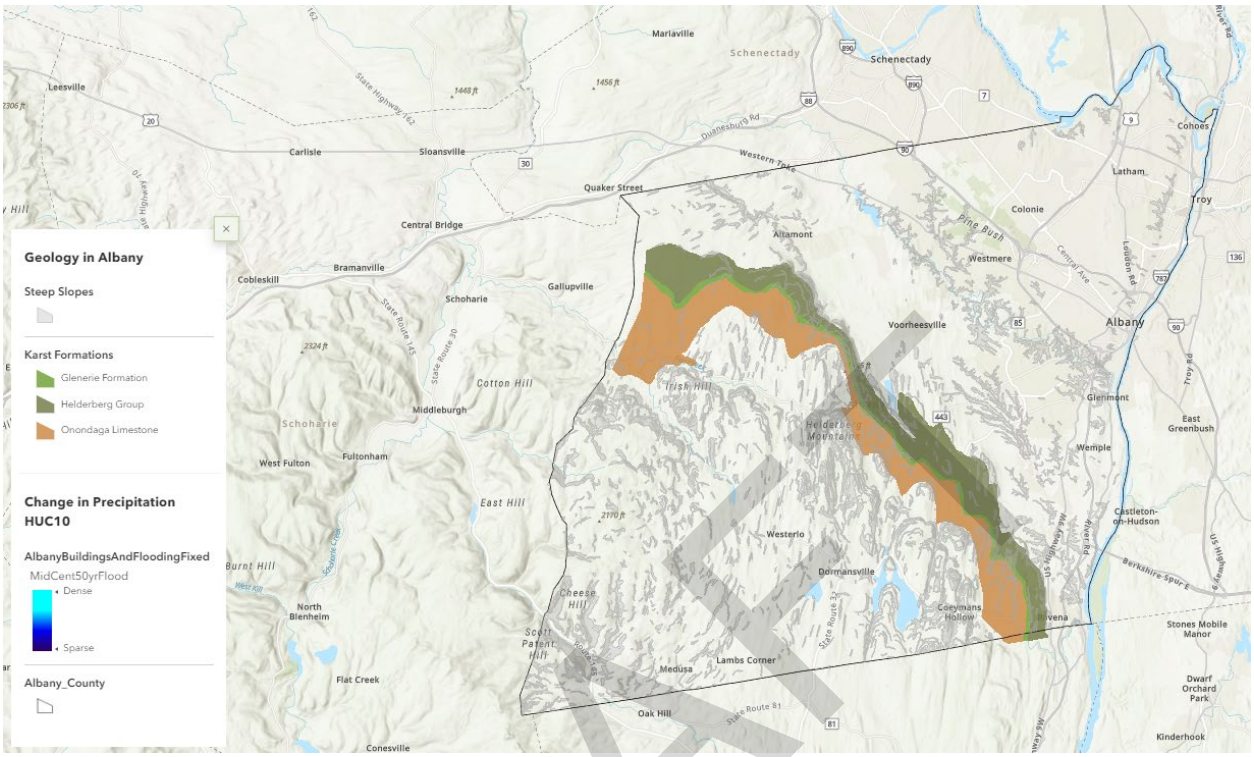
According to the New York State Hazard Mitigation Plan (2023 Update), areas of New York that were formerly occupied by glacial lakes, i.e. the Hudson, Mohawk River, and

Schoharie Valleys, are highly susceptible to erosion and landslides. Albany County contains parts of the Hudson River Valley, as well as parts of the Mohawk River Valley in the northeastern part of the County. Steep slopes carved in fine-grained glacial lake sediments especially are prone to slope failure and landslides (DHSES and AVAIL, 2023).

Areas that are commonly considered to be safe from landslides include areas that have not experienced landslides in the past, areas of minimal slope, and areas set back from the tops of slopes. Conversely, areas that are commonly considered to be more prone to landslides tend to be areas where a landslide has occurred in the past, bases of steep slopes or drainage channels, and developed hillsides where leach field septic systems are used.

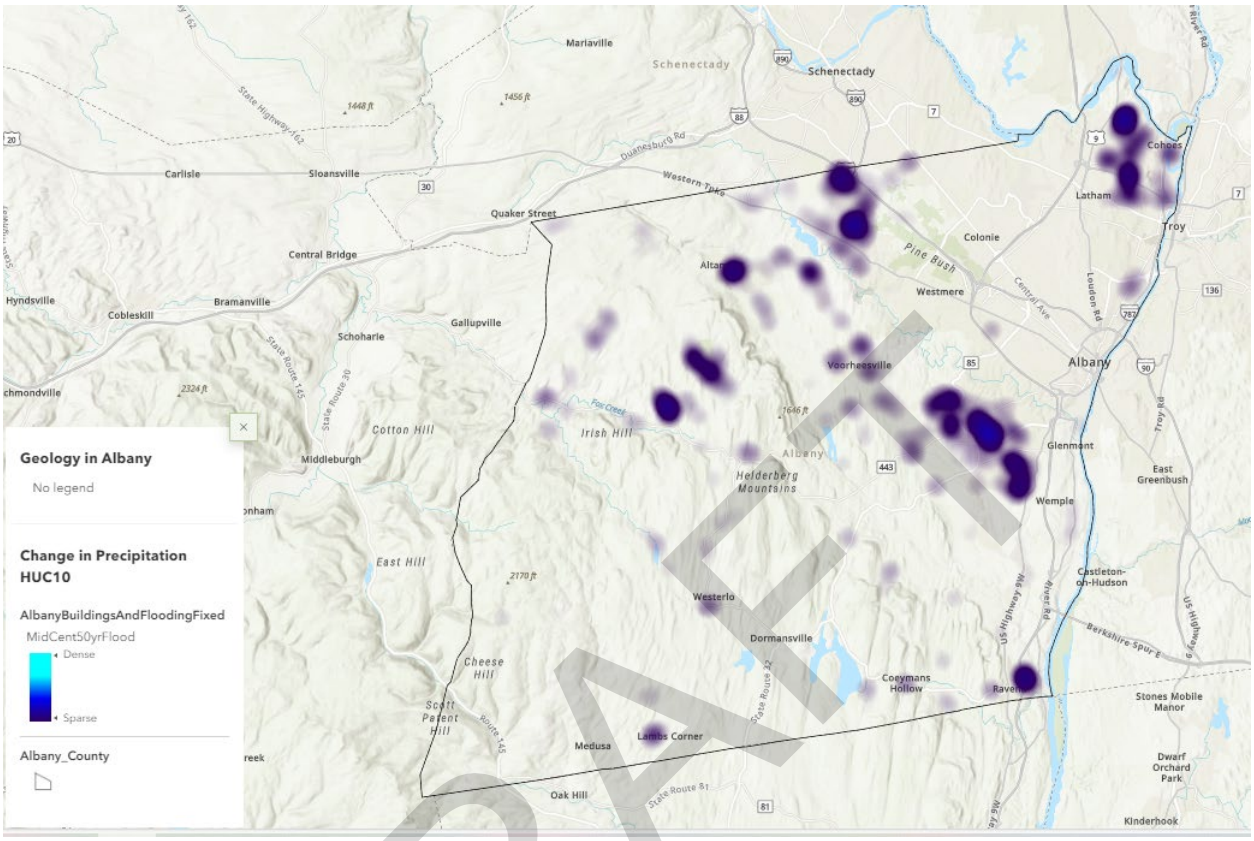
The Albany County Climate Analysis gives additional information on potential landslide locations (Guo, 2024). Areas at especially high risk of landslides include areas where Karst formations (characterized by soluble carbonate rocks like limestone) are combined with steep slopes and/or heavy precipitation. Steep slopes and Karst Formations are shown in Figure 6-12, while projected changes in precipitation are shown in Figure 6-13. The areas around Tarrytown and Callanans Corner may be at especially high risk of landslides. Steep slopes are also prevalent particularly in Southern and Central Albany County. Additionally, soils with high clay content (e.g. dark green areas in Figure 6-14) and low bulk density or low organic matter are more susceptible to landslides. These are more common in Northwest and Central Albany County, as well as in Central-Eastern Albany which is projected to see moderate increases in precipitation. More information is available in Appendix K. Figure 6-15 shows a map of landslide events in New York State, with Albany County circled in black.

Figure 6-12. Steep Slopes and Karst Formations in Albany County



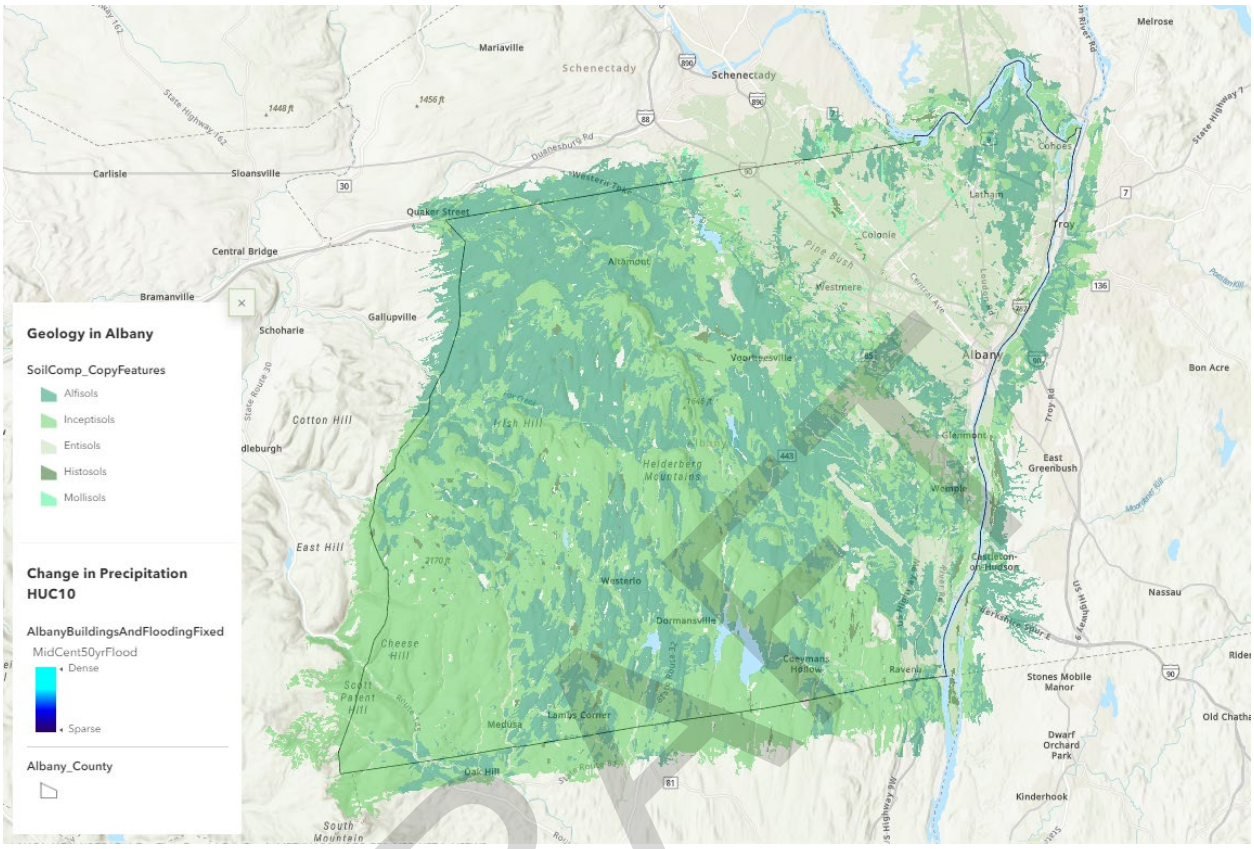
Source: (Duffy, Filante, & Guo, 2024)

Figure 6-13. Change in Precipitation Projected by Project IN-CORE



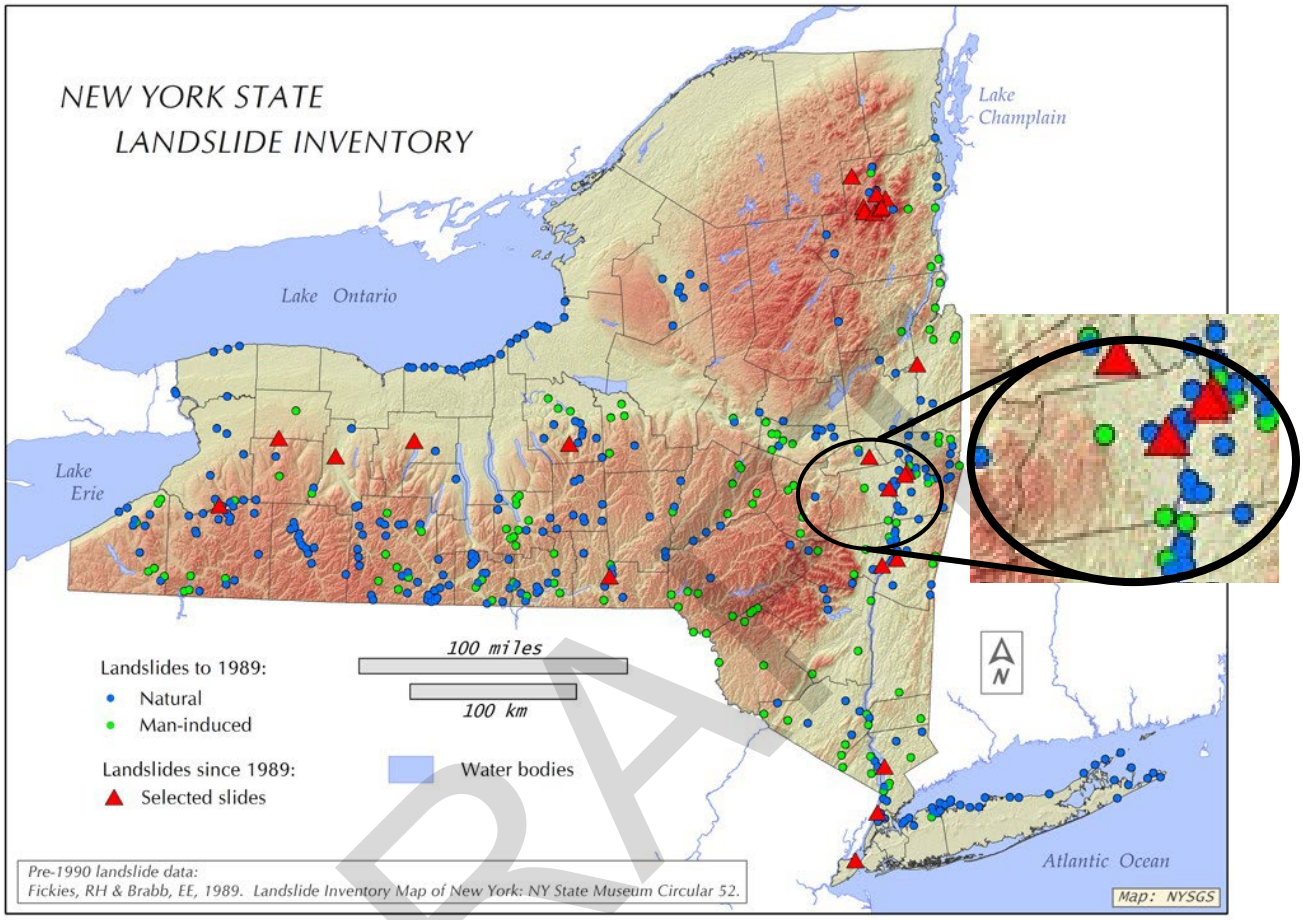
Source: (Duffy, Filante, & Guo, 2024)

Figure 6-14. Soil Composition and Landslides



Source: (Duffy, Filante, & Guo, 2024)

Figure 6-15. Landslide Events in New York State



Source: (DHSES and AVAIL, 2023). *Albany County is circled in black.*

6.5.3 Extent

The Landslide Risk Index Score and Landslide Expected Annual Loss Score are two measures of quantifying landslide risk and damage. According to the National Risk Index, "A Landslide Risk Index score and rating represent a community's relative risk for Landslides when compared to the rest of the United States. A Landslide Expected Annual Loss score and rating represent a community's relative level of expected building and population loss each year due to Landslides when compared to the rest of the United States" (FEMA, 2023). Albany County's Risk Index score for landslide is 90.9, which is classified as "Relatively Moderate." The County's Expected Annual Loss score for landslide is 92.4, which is also classified as "Relatively Moderate" (FEMA, 2023).

6.5.4 Impacts and Vulnerability

According to the updated hazard analysis in Section 5.4, Albany County has a low vulnerability to landslides based on this hazard's minor impact (minor potential for damage to property, crops and/or people), rare occurrence, small extent (affects one

or two problem areas within the jurisdiction), and moderate level of preparedness. This assessment is backed by additional information in Section 5 and Section 6.5.

Impacts to the County from landslide events include effects on buildings and infrastructure, people, the economy, and the natural environment. For example, landslides can damage plumbing lines, roads, manufactured homes, and buildings on slopes or hillsides in particular. They can also displace people, impact transportation, impact the provision of supplies, and cause injury and death. For the natural environment, landslides can destroy vegetation, degrade wildlife habitats, and pollute waterways.

The County's overall vulnerability to hazards in this Hazard Mitigation Plan Update is described in Section 0.

6.5.5 Historical Hazard Occurrences and Damage Estimates

Table 6-13 shows the landslide events that the County has experienced between 2018 and 2023, and their estimated damages.

Table 6-13. Landslide Event Records, 2018-2023

Location	Event Type	Date	Magnitude	Estimated Property Damage	Estimated Crop Damage
Bethlehem	Landslide	5/13/2021	-	Unknown	-

Source: (NOAA National Centers for Environmental Information, 2023).

According to the FEMA National Risk Index's Expected Annual Loss ($) Data, landslide events are expected to cause $178,905 in annual total losses (FEMA, 2023).

6.5.6 Future Potential Impacts and Relation to Climate Change

Probability of Future Events

Based on the Albany County CEPA Results, the National Risk Index, previous Presidential Disaster Declarations, Hazard Identification and Ranking, and Historical Hazard Occurrences, the County's overall vulnerability to a landslide remains low. According to the 2023 NY Hazard Mitigation Plan (MitigateNY) and local new reports, Albany County experienced 3 landslide events between 1950 and 2023. The table below shows these statistics, as well as the annual average number of events and the percent chance of these individual severe storm hazards occurring in Albany County in future years (Roberts, 2020; ABC News 10, 2021; All Over Albany, 2015).

The probabilities are calculated using the formula P = e / (e + y - 1) *100% where P is the probability of one or more of a given type of event occurring in a given year (e.g. the probability that there would be at least one hail event in 2023), e is the total number of events over a given number of years (e.g. 1950-2023), and y is the number of years (e.g. 73 years between 1950 and 2023). In these probability calculations, the simplifying assumption has been made that these events are independent of each other – i.e. that

the events are not related to one another. This assumption could be incorrect if, for example, a single event was counted as both a hail event and a strong wind event.

Table 6-2. Probability of Future Occurrence of Severe Storm Events Given No Other Changes

Hazard Type	Number of Occurrences between 1960 and 2023	Rate of Occurrence or Annual Number of Events (Average)	Recurrence Interval (in years) (# Years/Number of Events)	Probability of Event in Any Given Year (%)
Landslide	3	.041	24.333	4%

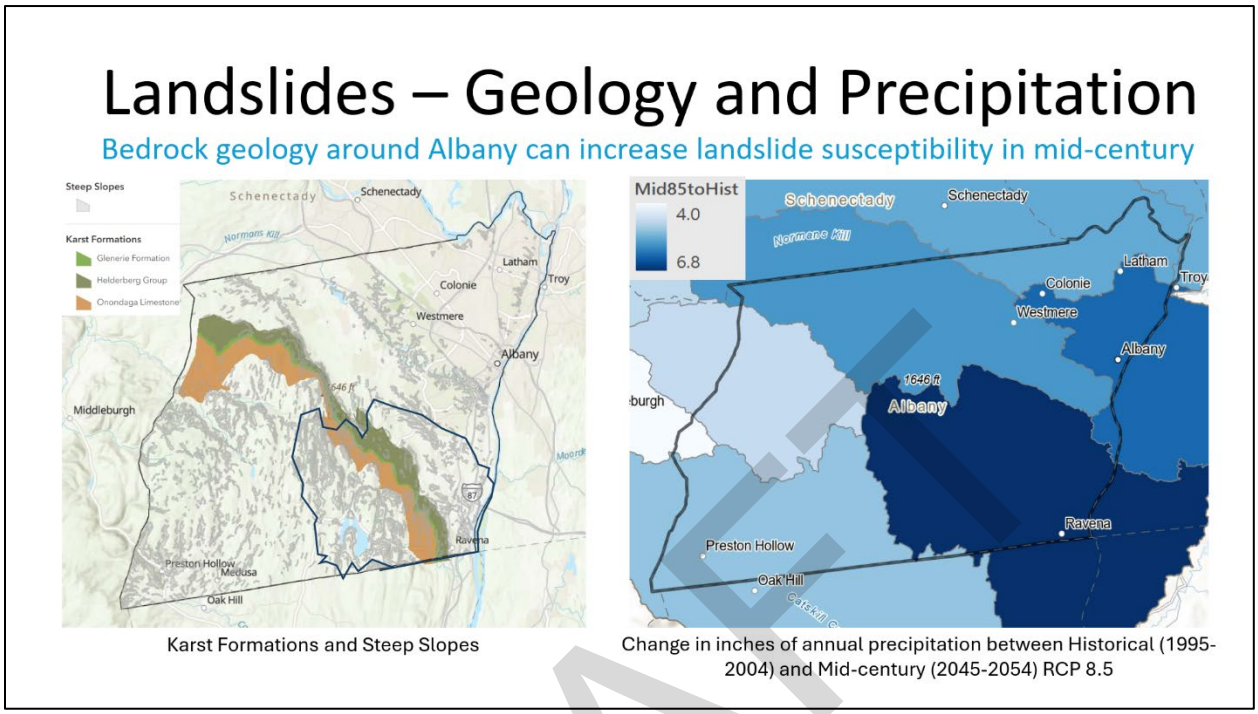
Probability listed is based on 1950-2023 data only. The actual probability may differ; for example, a hurricane has a greater than 0% probability, because there is some chance that it will occur in the future even if it has not occurred between 1950 and 2023.

As mentioned, the table above displays the probability of future events if there are no other changes; it is solely based on historical probability. However, the County's future vulnerability to landslide events can be primarily attributed to frequency of heavy precipitation events that impact the stability of steep slopes.

Relation to Climate Change

According to the Climate Impacts Group and MitigateNY, there currently is no research showing a direct link between climate change and landslide events. However, underlying conditions that impact landslides, such as bedrock stability and heavy rain events, are influenced by climate-related trends, such as temperature increases and extreme precipitation events (Mauger, et al., 2015; MitigateNY, 2023). The Albany County Climate Analysis, funded by AT&T, projected that by mid-century, the County's susceptibility to landslides could increase. This would be due to the anticipated increase in precipitation, combined with bedrock geology around Albany County, as shown in Figure 6-16. Some watersheds in Albany County are projected to experience a 7-inch increase in precipitation (Duffy, Filante, & Guo, 2024). Additionally, rising winter temperatures could increase the number of freeze-thaw cycles. This could displace rocks and potentially increase landslide susceptibility, according to the Climate Analysis (Guo, 2024).

Figure 6-16. Changing Landslide Risk Projected by Project IN-CORE



Source: (Duffy, Filante, & Guo, 2024)

7 ASSETS

7.1 People

People are Albany County's most important asset. Demographic characteristics of Albany County – including vulnerable populations and steps taken to consider such populations – are described in Section 2, the Community Engagement Plan (Appendix C), and in each jurisdictional annex (Appendix A).

7.2 Economic Assets

The County's largest sectors of the economy include 1) educational services, health care, and social assistance, 2) professional, scientific, and management, and administrative and waste management services, and 3) public administration. These and other sectors are described in more detail in Section 2.3.3.

7.3 Key Infrastructure

7.3.1 Overview

Notable infrastructure in the County includes a CSX Transportation switching yard and rail lines (carrying hazardous material), a National Grid power hub in Guilderland, dams, several large reservoirs, a gravity fed water system, and wastewater treatment plants, in addition to other infrastructure outlined below.

7.3.2 Transportation

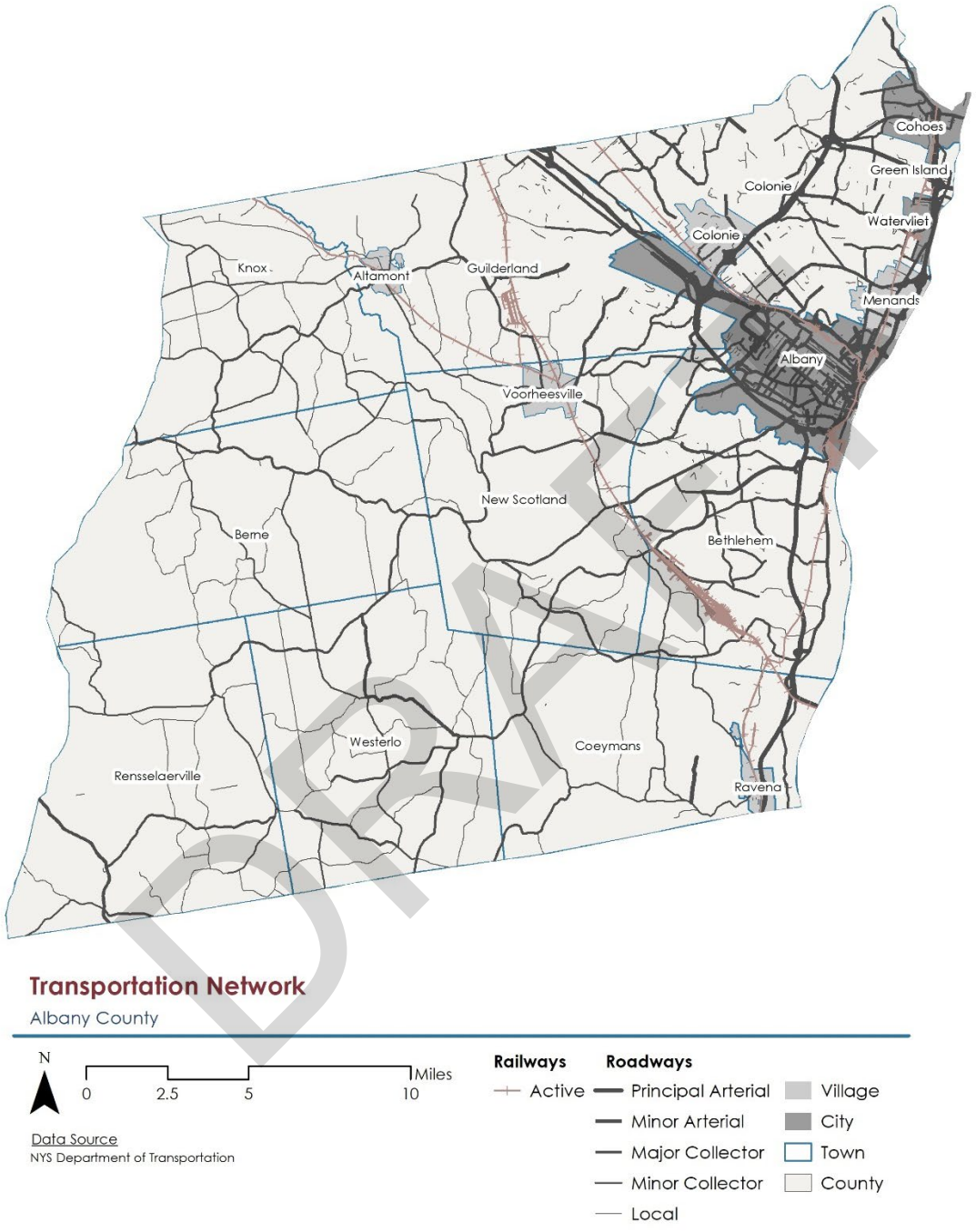
In Albany County, roadway, rail, and air transportation options are available. Albany County is serviced by Albany-Rensselaer Amtrak Station located across the Hudson River in the City of Rensselaer. The Albany-Rensselaer Station is the eighth busiest Amtrak Station in the nation (Bureau of Transportation Statistics, 2023). The station provides connections to New York City, Syracuse, Buffalo, Niagara Falls, Montreal, Toronto, Rutland, Boston, as well as minor destinations throughout the Amtrak network.

There is a Greyhound Bus Station located in the City of Albany. This bus terminal provides access to several nearby cities such as New York City, Boston, and more. Albany County has three (3) major roadways: Interstate 87, Interstate 90 and New York State Route/Interstate 787. Albany County is also serviced by an extensive regional bus transit system called the Capital District Transportation Authority (CDTA).

In terms of air transportation, Albany International Airport is the primary airport for domestic and international flights in the Capital Region. The airport facilitates commercial passengers, air freight, and private aviation. Located in the Town of Colonie, Albany International Airport is centrally located between the four (4) counties of the Capital District (Albany, Rensselaer, Saratoga, and Schenectady) and services the outlying rural areas as well.

Figure 7-1 shows the locations of the major transportation networks in Albany County.

Figure 7-1. Transportation Networks in Albany County



Data Source: NYS Department of Transportation

7.3.3 Utilities

Utilities, such as water and sewer systems, electricity and natural gas, telecommunications, and internet, can play an important role in mitigating risk to natural hazards while also serving as essential infrastructure during a hazard event. Select utilities are described below.

Potable Water

Albany County relies on water from both surface and groundwater sources within the six (6) watersheds that run through the County. The majority of the County's water supply is provided by twelve (12) community water supply systems which draw fresh water from the four (4) reservoirs located throughout the County. There are several water districts that serve the County, some of which cross municipal boundaries. There are water plants at several municipalities in the County, especially near the Hudson River.

Wastewater Facilities

The Albany County Water Purification District has two (2) wastewater treatment facilities, designated North and South. These facilitates provide secondary treatment to the wastewater of eight communities in Albany County. The North Plant is located in Menands and is designed to treat 35 MGD daily. The South Plant is located in the Port of Albany-Rensselaer and is permitted to treat 29 MGD daily. The North Plant has created an innovative waste recycling and energy producing system that allows for fewer emissions and lower costs. NYSERDA has identified this project as being the first of its kind (Benjamin, 2013).

Energy and Electricity

National Grid services a large portion of Albany County with natural gas service and/or electricity (National Grid, 2024). Central Hudson Gas and Electric is another major gas and electricity supplier. The Town/Village of Green Island also has a municipal utility run by the Green Island Power Authority, which services electric customers in the Village (Village of Green Island, 2022). Power is also generated at the Bethlehem Energy Center, located in the Town of Bethlehem.

Communications

Albany County is served by a variety of communications systems, including traditional land line, fiber optic, and cellular provided by multiple companies such as AT&T, Verizon, T-Mobile, DirecTV, Spectrum, Dish Network, Ooma, US Mobile, and VoIPo. Carriers have individual plans for emergency situations during hazard events and post disaster recovery efforts. Internet providers include Spectrum, EarthLink, Verizon, HughesNet, T-Mobile, Viasat, Starlink, Hudson Valley Wireless, and more. In addition, Albany County has an extensive radio communications network that is utilized by emergency services agencies, hospitals, law enforcement, public works, transportation and other supporting organizations.

The Albany County Sheriff's Office E911/Communications Center provides dispatch services to several entities within the County as well as other state and local law enforcement agencies as needed. It is the primary E911 answering point for six towns, three villages, and two cities. The Center also manages and administers the 911 system throughout Albany County (Albany County, 2017).

Albany County utilizes Reverse 911 and NY Alert as hazard warning systems. Reverse 911 allows the County to communicate with residents in a given geographic area via telephone in an emergency. NY Alert provides the opportunity for residents to sign up, for free, for emergency notifications via phone, email, text, or fax (New York State, 2018). Additionally, Albany County, the City of Cohoes, and the Town of Bethlehem are StormReady certified, which involves meeting several criteria related to storm preparedness, including multiple communications systems (National Weather Service, 2023).

Individual jurisdictions utilize additional mechanisms for hazard warnings, such as fire station alarms, the Integrated Public Alert & Warning System (IPAWS), Norlite (for stormwater contamination and hazardous spills), and the National Weather Service forecast office in Albany. These differ between jurisdictions and are further described in the jurisdictional annexes.

7.3.4 Critical Facilities

Infrastructure and critical facilities are those that are crucial to the health and welfare of the population. These take on a greater significance after any hazard event. These critical facilities include community lifelines, such as fire departments, EMS services, police stations, water and wastewater services, and highway garages. They also include facilities such as County buildings, City, Town and Village halls, schools, and senior centers.

A list of the County's critical facilities was compiled based on the 2018 HMP, Albany County's Climate Resiliency Plan, the Albany County Open Source Data (GIS), internet research, and recommendations from the Executive Steering Committee. Additionally, each jurisdiction provided information about critical facilities within that particular jurisdiction, as well as their vulnerabilities and protection to 1% and 0.2% annual chance flood events, as detailed in each jurisdictional annex (Appendix A). The list of critical facilities for each jurisdiction was adapted from the 2018 HMP. Then, certain key facilities were added – such as Town/Village halls, highway garages, water and wastewater facilities, schools, fire departments, EMS facilities, and facilities that house vulnerable populations – depending what was present in each jurisdiction. This list was further refined based on jurisdictional input. Jurisdictions ultimately decided what they considered to be critical facilities.

A list of critical facilities is included in each jurisdictional annex, including the County's annex (Appendix A).

7.3.5 Dams

High Hazard Potential Dams (HHPDs)

According to the NYSDEC Division of Water Bureau and Flood Protection and Dam Safety, there are four hazard classifications of dams in New York State. The dams are classified in terms of potential for downstream damage if the dam were to fail. The hazard classifications are as follows:

- Low Hazard (Class A) is a dam located in an area where failure is likely to damage nothing more than isolated buildings, undeveloped lands, or township or county roads and/or will cause no significant economic loss or serious environmental damage. Failure or operation problems would result in no probable loss of human life. Losses are principally limited to the owner's property.
- Intermediate Hazard (Class B) is a dam located in an area where failure may damage isolated homes, main highways, and minor railroads, interrupt the use of relatively essential public utilities, and cause significant economic loss or serious environmental damage. Failure or operation problems would result in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. Class B dams are often located in predominantly rural or agricultural areas but may also be located in areas with population and significant infrastructure.
- High Hazard (Class C) is a dam located in an area where failure may cause loss of human life; serious damage to homes, industrial, or commercial buildings; essential public utilities; main highways or railroads; and will cause extensive economic loss. This is a downstream hazard classification for dams in which excessive economic loss (urban area including extensive community, industry, agriculture, or outstanding natural resources) would occur as a direct result of dam failure.
- Negligible or No Hazard (Class D) is a dam that has been breached or removed, or has failed or otherwise no longer materially impounds waters, or a dam that was planned but never constructed. Class "D" dams are considered to be defunct dams posing negligible or no hazard. The department may retain pertinent records regarding such dams. (NYSDEC Division of Water) (FEMA, 2004)

In Albany County, there are forty-one (41) dams according to the National Inventory of Dams *(U.S. Army Corps of Engineers, 2023)*. Of these, fourteen (14) are categorized as "low hazard," twelve (12) as "significant hazard", and fifteen (15) as "high hazard."

Table 7-1 displays the High Hazard Potential Dams in Albany County, and Figure 7-2 displays the dams in Albany County and their classifications. According to the U.S. Army Corps of Engineers website (accessed February 2024), all High Hazard Potential Dams in the County have an Emergency Action Plan.

Table 7-1. High Hazard Potential Dams in Albany County

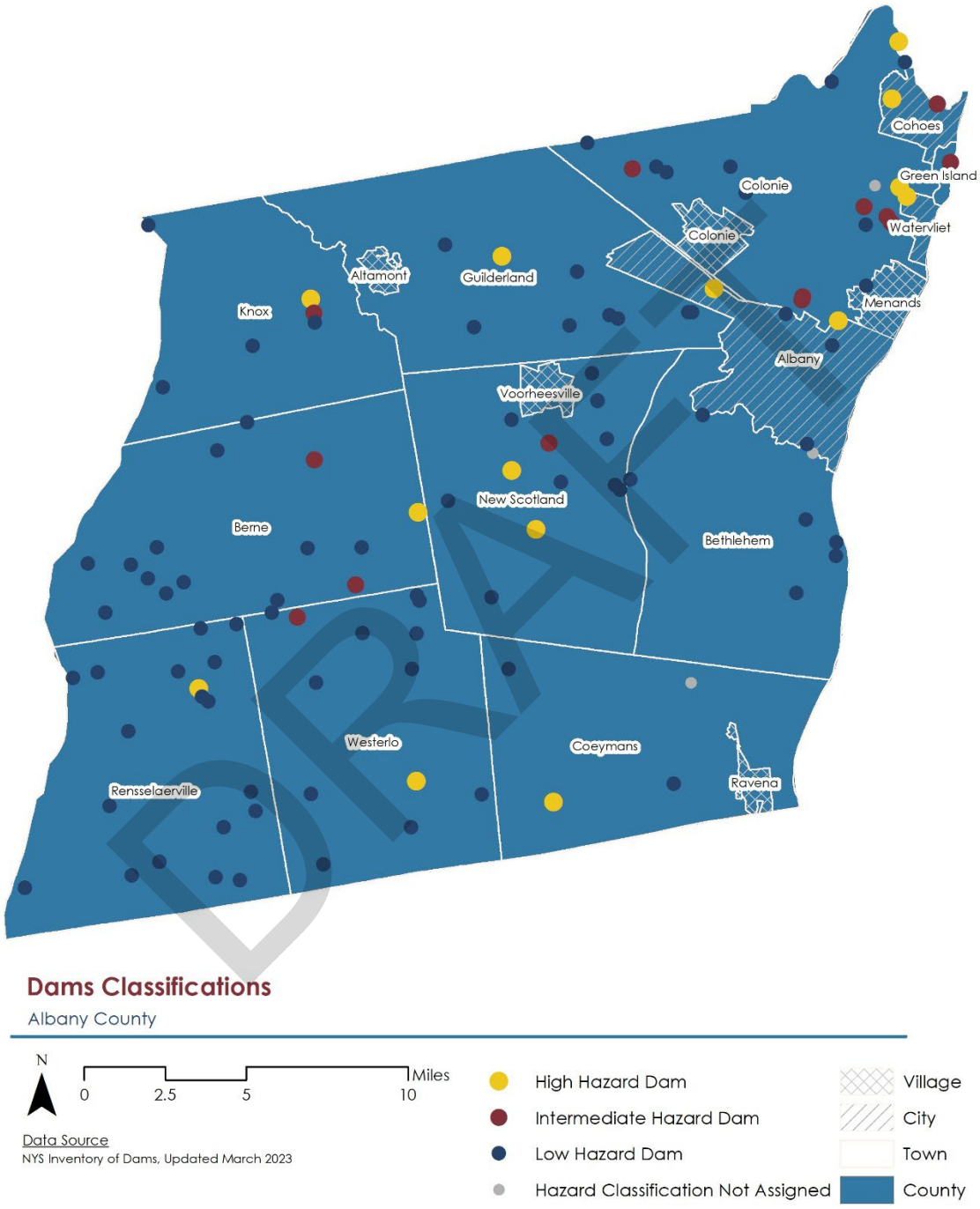
Dam Name	Federal ID	Jurisdiction	Latitude	Longitude	Owner	Year Completed	Construction Type	Primary Purpose	Date of Last EAP Revision
Loudonville Reservoir Dam	NY16092	City of Albany	42.68139	-73.7569	ALBANY WATER BOARD	1936	Earth	Water Supply	12/1/2021
Basic Creek Dam	NY00084	Town of Westerlo	42.47722	-74.0144	ALBANY WATER BOARD	1928	Earth	Water Supply	6/30/2023
Rensselaer Lake Dam (also known as Six Mile Waterworks)	NY01334	City of Albany	42.69611	-73.8322	ALBANY WATER BOARD	1850	Earth	Recreation	6/1/2023
Alcove Dam	NY00093	Town of Coeymans	42.4675	-73.9317	ALBANY WATER BOARD	1929	Earth	Water Supply	6/1/2023
Vly Creek Reservoir Dike (also known as Vly Reservoir)	NY00097	Town of New Scotland	42.61556	-73.9556	TOWN OF BETHLEHEM	1957	Earth	Water Supply	11/30/2023
Altamont Main Reservoir Dam	NY00126	Town of Knox	42.69278	-74.0769	VILLAGE OF ALTAMONT	1898	Earth	Water Supply is decommissioned but it still holds some water.	8/28/2020

Dam Name	Federal ID	Jurisdiction	Latitude	Longitude	Owner	Year Completed	Construction Type	Primary Purpose	Date of Last EAP Revision
Watervliet Upper Dam	NY01356	Town of Colonie	42.74083	-73.7192	CITY OF WATERVLIET	1912	Earth	Flood Control and Storm Water Management	1/31/2022
Myosotis Lake Dam	NY00670	Town of Rensselaerville	42.51889	-74.1458	EDMUND NILES HUYCK PRESERVE, INC.	1933	Rockfill, Earth	Recreation, Water Supply	1/10/2023
Vly Creek Reservoir Dam	NY00096	Town of New Scotland	42.58917	-73.9411	TOWN OF BETHLEHEM	1957	Earth	Water Supply	11/30/2023
Watervliet Lower Dam	NY01357	Town of Colonie	42.73658	-73.7148	CITY OF WATERVLIET	1912	Buttress	Flood Control and Storm Water Management	1/31/2022
Crescent - Dam A	NY00171	Town of Colonie	42.8057	-73.7188	New York State Department of Transportation	1912	Concrete	Hydroelectric	12/30/2020
Crescent - Dam B	NY00171S002	Town of Colonie	42.8065	-73.7222	New York State Department of Transportation	1912	Concrete	Hydroelectric	12/14/2017
Helderberg Lake Dam	NY00276	Town of Berne	42.59722	-74.0125	HELDERBERG LAKE ASSOCIATION	1944	Concrete Gravity, Earth	Recreation, Water Supply	2/13/2023

Dam Name	Federal ID	Jurisdiction	Latitude	Longitude	Owner	Year Completed	Construction Type	Primary Purpose	Date of Last EAP Revision
Cohoes Reservoir #3 Dam	NY01314	City of Cohoes	42.78028	-73.7233	CITY OF COHOES	1885	Earth	Water Supply	2/24/2023
Normanskill (Watervliet Reservoir Dam)	NY00088	Town of Guilderland	42.7113	-73.9607	City of Watervliet, NY	1916	Buttress	Hydroelectric, Water Supply	11/21/2022

Sources: National Inventory of Dams (U.S. Army Corps of Engineers, 2023), *NYSDEC Foil Request* (NYS Department of Environmental Conservation, 2024)

Figure 7-2. Hazard Classification of Dams in Albany County



Source: NYS Inventory of Dams (March 2023)

Dams Outside Albany County

Dams outside of Albany County also pose a flood concern. For example, there are high hazard potential dams located in all of the Counties surrounding Albany County, including Schoharie County, Schenectady County, Saratoga County, Rensselaer County, and Greene County (U.S. Army Corps of Engineers, 2020).

7.3.6 Emergency Shelters

Emergency shelters are another type of asset. Appendix I of the 2018 HMP identified potential sites that could be used as emergency shelters, including, but not limited to, fire stations, schools, churches and town halls (see https://www.albanycounty.com/home/showpublisheddocument/1180). While a formal list of emergency shelters is not included as part of the 2024 HMP update, many jurisdictions took sheltering capacity into account while identifying critical facilities.

Additionally, several facilities in the County act as cooling and warming centers during times of extreme heat and extreme cold. A list of cooling centers can be found on the Department of Health's website at: https://www.health.ny.gov/environmental/weather/cooling/. Lists of warming centers and homeless shelters are released by the County, municipalities, and/or local media. In the City of Albany, the Capital District Transportation Authority offers free rides to homeless individuals going to shelters on a Code Blue night, if individuals identify which shelter they want to go to (Mitchell, 2023). Code Blue nights occur when sub-freezing temperatures or heavy snowfalls are expected. Shelter organizations in the City have also had shuttles that drive around searching for individuals who may need shelter during extreme cold (Starr, 2024). Residents should stay tuned for updates from the County and their local jurisdictions, as these locations are subject to change.

7.3.7 Social Infrastructure

Nonprofits, schools, faith communities, state and County agencies, and others provide needed services to vulnerable populations and others. For example, there are approximately 50 food pantries across the County, according to The Food Pantries Food Connect Map (The Food Pantries, 2021). Homeless shelters also provide refuge to individuals experiencing homelessness in the County, both during natural hazards and on a regular basis. The Department of Social Services provides assistance with purchasing food, heating, and many other benefits. Albany County – NY Connects provides services for older adults, people with disabilities, and others who might need long term care services. These are a few examples of the many organizations and agencies providing social services to residents in the County.

7.3.8 Additional Infrastructure

While they may be considered assets, high hazard potential dams and dams outside Albany County pose threats to the County. These are described in Section 6.1.1.

Additionally, recent and proposed developments are described in Section 2.4 and in the jurisdictional annexes.

Albany County also has numerous government facilities including municipal offices, department of public works (DPW) properties, post offices, and courthouses. Several of these are identified in the critical facilities lists in each jurisdiction's annex (Appendix A).

7.4 Historic and Cultural Resources

Albany County is home to many historic and cultural resources. A few of these are described below.

7.4.1 Governor Nelson A. Rockefeller Empire State Plaza

Empire State Plaza is a massive complex of several state government buildings. The Plaza is located in the City of Albany's downtown region, occupying ninety-eight (98) acres of land. The plaza is a substantial local employer and a significant visitor attraction, and contains approximately fifteen (15) buildings. Other uses of the Plaza include a modern art collection, the New York State Museum, Library and Archives, various memorials, an observation deck, a performing arts center, and a convention center (NYS Office of General Services, 2024).

7.4.2 New York State Capitol Building

The New York State Capitol Building is located in the heart of the City of Albany next to the Empire State Plaza. The building was built by hand using solid masonry and was completed in 1899. The building has experienced a fire that destroyed much of the western side of the Capitol. Since its restoration it has been declared a National Historic Landmark. The building is a key part of the State Government, an important historic landmark, and a visitor attraction.

7.4.3 Port of Albany-Rensselaer

The Port of Albany-Rensselaer is a transportation hub located on the Upper Hudson River and lies within the City of Albany, with facilities in Albany, Rensselaer, and Bethlehem. This port was established over three hundred (300) years ago, since the city was founded. The port facilitates access from the Hudson River to the canal system, as well as major interstate highways, cargo rail line, and Albany International Airport.

The port has several large-scale facilities including 4,200 feet of wharf length on the Albany side, 20 acres of open storage, and 20 miles of standard gauge switching railroad. The Port is in the process of becoming the first offshore wind tower manufacturing facility in the U.S. While wind turbines and towers will not be erected at the Port itself, towers will be manufactured and temporarily stored at the Port until they are ready for shipment. In addition, by around 2016 more than 1,600 windmill blades had passed through Port en route to other destinations (Port of Albany, 2024).

The facilities and products passing through the port can be seen as a potential risk to the waterfront area. The area is also somewhat prone to natural hazards such as

flooding, landslides, extreme temperatures, severe thunderstorm events, and earthquakes.

7.4.4 Historical Resources

Albany County is home to several other historical sites, including the Cedar Hill Schoolhouse (listed on the National Register of Historic Places), the Ravena-Coeymans Historical Society's Exhibit Space and archives, the Exhibit Spaces for the Berne Historical Society, the Exhibit Spaces of the New Scotland Historical Society, King's Place, the M.B. Earl Store, the Mynderse-Frederick House, the Saddlemire Homestead, and Ten Broeck Mansion (Albany County History Collaborative, 2016). The Albany County Historical Association and historical societies in several locations within the County focus on historical preservation, promotion, and education. Other historical and cultural resources within Albany County include the Shaker Heritage Society, the USS Slater, the Van Schaick Mansion, and the U.S. Army Watervliet Arsenal (Albany County, 2024).

7.5 Natural Environment

Water resources are described in Section 2.1.3. The river basins that intersect Albany County – and the associated ponds, lakes, creeks, rivers, and aquifers – provide a significant asset to the County in the form of drinking water, recreation, and other uses. Some of these water resources have measures to protect them, such as wellhead protection areas or legislation about watercourses, as described in Section 4.3 and in each jurisdictional annex. The County also has numerous parks and natural areas that increase the value of life in the County.

7.6 Additional Assets

Additional Jurisdiction/Public Identified Vulnerabilities are included in the jurisdictional annexes (Appendix A). These include essential businesses, large employment centers, senior living facilities, historic and cultural resources, natural resources, and other assets that are deemed important to be protected from natural hazards, but not classified as critical facilities. Each jurisdiction ultimately decided what assets were important enough to include in their lists of additional assets and vulnerabilities.

8 IMPACTS AND OVERALL HAZARD VULNERABILITY

8.1 Background

Albany County's vulnerability to each hazard (flood, severe storm, extreme temperatures, drought, and landslide) is detailed in Section 6. This section contains information about the County's vulnerability to these hazards overall, including damage estimates from historical hazards. Vulnerability of each jurisdiction to each hazard profiled is described in Section 4.1 of each jurisdictional annex (Appendix A), with damage estimates from historical hazards described in Section 4.2 of the annexes. The assets that are particularly important to each jurisdiction, their vulnerabilities to hazards, and the impacts on assets from these hazards are described in Section 5 and Section 6 of each jurisdictional annex.

8.2 Vulnerability Summary

8.2.1 Summary of Vulnerability and Impacts

As addressed in Sections 5 and 6, Albany County is highly vulnerable to floods, moderately vulnerable to drought, highly vulnerable to severe storms, and highly vulnerable to extreme temperatures, and somewhat vulnerable to landslides. In the future, the County's level of vulnerability to each of these hazards may be affected by climate change, land use, and population changes, as described in Section 6. Climate change is expected to increase the County's future vulnerability to flood events, change the types of severe storm events that the County is vulnerable to, increase the County's future vulnerability to drought events, and increase the County's future vulnerability to extreme heat events while decreasing its vulnerability to extreme cold events. Climate-related trends, such as temperature increases and precipitation events, also affect the underlying conditions that impact landslides, potentially making the County more vulnerable to landslides.

The current level of vulnerability to each hazard varies depending on the jurisdiction, and is further addressed in Section 6 of each jurisdictional annex (Appendix A). Each jurisdiction's ranking of vulnerability to each hazard is detailed in Table 8-1.

Table 8-1. Vulnerability of Jurisdictions to Hazards Profiled (Self-Described)*

Jurisdiction	Flood	Drought	Severe Storm	Extreme Temperatures	Landslide	Other
Albany, City of	Moderate	Moderate	High	High	Low	N/A
Altamont, Village of	Moderate	Low	High	Moderate	N/A	N/A
Berne, Town of	Moderate	Moderate	High	Moderate	Moderate	N/A

Jurisdiction	Flood	Drought	Severe Storm	Extreme Temperatures	Landslide	Other
Bethlehem, Town of**	Moderate	Low	High	High	High	N/A
Coeymans, Town of	Moderate	Moderate	High	Moderate	N/A	N/A
Cohoes, City of	Moderate	N/A	Moderate	N/A	N/A	N/A
Colonie, Town of	Moderate	Moderate	High	High	Moderate	Wildfire: Low
Colonie, Village of	Moderate	Moderate	High	High	Moderate	N/A
Green Island, Village of	Low	N/A	Moderate	Moderate	N/A	N/A
Guilderland, Town of	High	High	High	Low	Moderate	Erosion: High
Knox, Township of	Moderate	High	High	High	Low	N/A
Menands, Village of	Moderate	Moderate	High	Moderate	Low	N/A
New Scotland, Town of	High	Moderate	Moderate	Moderate	Low	N/A
Ravena, Village of	High	N/A	High	Moderate	N/A	N/A
Rensselaerville, Town of	High	Low	High	Moderate	Moderate	Wildfire – Moderate
Voorheesville, Village of	Moderate	Moderate	Moderate	Moderate	Low	N/A
Watervliet, City of	Moderate	High	High	High	Moderate	N/A
Westerlo, Town of	Low	Low	Moderate	Moderate	Low	Wildfire – Low
Albany County Overall	**High**	**Moderate**	**High**	**High**	**Low**	**N/A**

**N/A signifies a hazard that was not profiled by that particular jurisdiction. See the jurisdictional annexes for further details.*

*** Signifies jurisdictions where representatives ranked the hazards slightly differently than listed here. The results listed in the table are the result of a vulnerability assessment completed by each jurisdiction (see Section 5.4).*

Impacts of these hazards on the County are described in Sections 6, 0, and 8. Key impacts of flooding on the County include damages to homes, businesses, and possessions; utility disruptions; transportation hazards and delays; losses in income; debris; relocation; and displacement. Key impacts of drought on the County include a lesser quality and quantity of drinking water, disruptions to farming, and lost time and resources from disruptions to the water supply. Key impacts of severe storms on the County include power outages, damages to infrastructure and property, transportation delays, safety hazards, water pollution, disruptions to communication systems, and lost time and income. Key impacts of extreme temperatures on the County include health effects for vulnerable populations (such as older adults, young children, people with health problems, and low-income residents), an increase in EMS calls during extreme heat events, and degradation of infrastructure from warmer winters and the freeze-thaw cycle. Key impacts of landslide on the County include potential damages to the structural integrity of buildings and other infrastructure, potential transportation disruptions, environmental degradation, and the potential of injury and death. Some jurisdictions cited other hazards of concern, such as wildfire or erosion, which can impact public safety, natural resources, and property. The public and jurisdictions were particularly concerned with the impact of hazards on older adults, as well as other vulnerable populations such as residents in low-lying areas or next to creeks, low-income residents, people with disabilities and health issues, and families with young children.

8.2.2 County Priorities

Taking into account the identified natural hazards, potential impacts, assets, and vulnerabilities identified above, the County has identified the following as priority areas and key vulnerabilities that it would like to address:

- Flooding and severe storms (especially the provision of shelters for individuals whose homes flood)
- Extreme temperatures (especially the effects on vulnerable populations such as homeless residents, and the provision of warming/cooling centers)
- Ensuring the adequacy of hazard warning systems

The County has not identified any changes in priorities since the 2018 HMP Update.

8.2.3 Municipal Priorities

Key vulnerabilities and priorities for each jurisdiction are identified in Section 6 of each jurisdictional annex (Appendix A). Common themes among jurisdictions include the following:

- Concern about older adults, as well as other vulnerable residents such as low-income residents and people with disabilities
- Concern about geographic areas affected by flooding, such as low-lying areas and areas near creeks
- Infrastructure maintenance related to flooding, and a desire for funding sources
- Concern about the electrical grid and downed power lines

- Concern about dam failure

While a few jurisdictions identified changes in priorities since the last HMP update, many jurisdictions did not. See Section 6 of each jurisdictional annex for further details.

8.2.4 Public Priorities

Public feedback about hazard mitigation is summarized in Section 3.4, and more information is provided in Appendix A. Common themes identified by the public include the following:

- A desire for better communication and public education about how to prepare for hazards. There was a particular desire for knowing where to go in the event of an evacuation. Other topics included how to evacuate, what to do in the event of different hazards, what resources are available, and how to prepare.
- Concern about impacts of hazards on older adults
- Concern about power outages
- Desire for additional resources and coordination for emergency services.
- Desire for additional updates to infrastructure such as drainage infrastructure, roads, and power lines

9 MITIGATION STRATEGY

9.1 Mission, Goals, and Objectives

9.1.1 Mission

The mission statement for the HMP update is:

The Hazard Mitigation Plan for Albany County forms the foundation of the County's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repetitive damage.

9.1.2 Goals

Albany County developed mitigation planning goals based on the risk assessment results, general vulnerabilities, and overall capabilities of the County and jurisdictions. These goals address the County's vulnerabilities to the hazards profiled in this Hazard Mitigation Plan, while providing additional benefits to the County such as protecting natural resources. Goals are broad, long-term policy and vision statements that explain what the mitigation strategy aims to achieve. They are visions for reducing or avoiding losses from the identified hazards (FEMA, 2023).

The goals and objectives stated below represent what the County hopes to achieve through the implementation of this HMP. These goals were developed based on goals identified in the 2018 HMP, and revised based on the risk assessment results and input from the Executive Steering Committee. The establishment of goals assists jurisdictions in focusing on effective and meaningful mitigation actions. Specific mitigation strategies were identified that support the goals and objectives of this plan. Strategies were adjusted based on hazard research, input from Albany County, feedback from jurisdiction representatives, and comments received during the public and stakeholder review process.

The goals for the 2024 Albany County HMP Update are as follows:

1. Minimize injury and loss of life from hazards.
2. Minimize losses to existing and future structures within hazard areas.
3. Protect natural resources, such as open space, drinking water, and recreation areas from hazards.
4. Protect cultural resources such as historic structures and museums from hazards.
5. Provide for Continuity of Government (COG) and Continuity of Operations Program (COOP) during and in the aftermath of disasters in order to ensure that the government continues to function and to minimize negative impacts from events.
6. Reduce economic impacts from hazards.

9.1.3 Objectives

To further elaborate on these goals, the County also has reviewed and either approved or modified the "objectives" from the 2018 HMP. For the purpose of this plan, "objectives" are more details and specific efforts that the County and participating jurisdictions will take to achieve the goals listed above. The 2024 Hazard Mitigation Plan Update has identified the following objectives, which are grouped under the corresponding goal:

Table 9-1. Goals and Objectives

Goal	Corresponding Objectives
Goal 1: Minimize injury and loss of life from hazards, especially vulnerable communities.	Increase public awareness of hazards in order to gain participation from the public for hazard mitigation.
	Reduce the impact on the public safety from storms that cause flooding, damaging winds, and ice.
	Reduce the risk of extreme temperatures to the public.
	Reduce the risk of transportation accidents.
Goal 2: Minimize losses to existing and future structures within hazard areas.	Reduce the impact on public and private buildings from storms that cause flooding, damaging winds, and ice.
	Reduce the risk of utility failure.
	Reduce the risk of structural collapse.
	Reduce the vulnerabilities to and from high hazard potential dams (HHPDs).
Goal 3: Protect natural resources, such as open space, drinking water and recreation areas from hazards.	Conserve and protect aquatic systems from water quality issues that arise from natural hazards, such as flooding.
	Protect and restore natural systems (such as wetlands, floodplains, hillsides, ridges and stream corridors) that mitigate losses from flooding.
	Protect recreational areas from the effects of hazards.
Goal 4: Protect cultural resources such as historic structures and museums from hazards.	Protect historical resources from the effects of hazards.
	Protect cultural resources from the effects of hazards.

Goal	Corresponding Objectives
Goal 5: Provide for Continuity of Government (COG) and Continuity of Operations Program (COOP) during and in the aftermath of disasters in order to ensure that the government continues to function and to minimize negative impacts from events.	Increase awareness in participating jurisdictions for hazards that may occur within the County and put in place the measures that will enable the County to continue to operate during and in the aftermath of disasters, while reducing long-term risk from hazards.
	Retain data on past damage from hazards
	Maintain up-to-date data regarding critical facilities and infrastructure systems for internal County use.
Goal 6: Reduce economic impacts from hazards.	Reduce the damage from drought.
	Reduce the impact of hazards on businesses.

9.2 Status of 2018 Actions

The County has implemented many actions that were identified in their 2018 HMP. Details regarding the status of the County's mitigation actions from their 2018 HMP are listed in the County's jurisdictional annex (Appendix A). 5 out of 22 actions from the County's 2018 mitigation actions were re-included in the 2024 HMP Update because they are either incomplete or on-going. The status of mitigation actions identified by individual jurisdictions in the County's 2018 HMP are summarized in each jurisdictional annex (Appendix A).

9.3 New Mitigation Actions

9.3.1 Range of Mitigation Actions Considered

County Actions Considered

In addition to actions carried over from the 2018 HMP, the County considered a comprehensive range of new mitigation actions through multiple meetings and iterations of the list of actions. First, a list of actions was developed based on the Recommended Projects section of the Albany County Climate Resiliency Plan (Albany County, 2023), as well as recommended actions to address the protection of critical facilities to the 0.2% chance (500-year) flood event or previous worst case flood event. The list includes actions to reduce the risk from hazards to existing buildings, structures and infrastructure (e.g. Vulnerability Assessment and Flood Protection for Critical Facilities), actions to limit risk to new development and redevelopment (e.g. Purchase First Street Foundation's Flood Factor Data) actions to benefit underserved communities and socially vulnerable populations (e.g. Climate Justice Corps Network), actions for alleviating data deficiencies or building up capabilities related to mitigation implementation (Build out the County's Network of Rain and Stream Gauges) and

actions spanning various types of mitigation solutions (see list below). These actions included the following:

1. Energy Resiliency Study
2. Communications and Broadband Resiliency Study
3. Increase County Capacity to Support Resilience Efforts
4. Climate Justice Corps Network
5. Purchase First Street Foundation's Flood Factor Data
6. Support Municipal Participation in FEMA's CRS Program
7. Create a Resilient Homes Program
8. Build out the County's Network of Rain and Stream Gauges
9. County-wide Culvert Analysis
10. County-wide Transportation Vulnerability Assessment
11. Increase Resilience at Municipal Facilities
12. Sea Level Rise Resilience Planning
13. Increase Resilience to Extreme Temperature Events
14. Prepare for Long-term and Large-scale Displacements
15. Expand the County-wide Trail Network
16. Create a "Green Streets Initiative"
17. Develop a County-wide Open Space Plan
18. Create a Business Resiliency Program
19. Develop a "Sustainable Albany" Campaign
20. Create a Network of Demonstration Projects
21. Advance the Resiliency Recommendations in the County Agricultural and Farmland Protection Plan.
22. Create an Agricultural Resiliency Program
23. Vulnerability Assessment and Flood Protection for Critical Facilities

These actions were then reviewed with County officials at a County Roundtable on March 26, 2024 and April 23, 2024, and a subset of them were selected for inclusion. These actions were further prioritized through a prioritization survey, as described in Section 9.3.3. Meanwhile, the County solicited feedback from stakeholders and the public on their priorities for hazard mitigation and draft mitigation actions, through various engagement activities (Appendix C). As a result, three additional mitigation actions were added to address the feedback considered. A summary of the input received and its inclusion in the plan where appropriate is described in Section 3.5.

More details on these meetings can be found in Section 3 and Appendices C through E.

Municipal Actions Considered

To develop a comprehensive range of actions for jurisdictional consideration, the project team used FEMA's Mitigation Ideas guide (FEMA, 2013), the Albany County Climate Resiliency Plan, past experience, and feedback that had been attained from the Executive Steering Committee up to that point. From this knowledge, the project team created a list of actions to suggest to jurisdictions; examples of these actions are provided in Table 9-2. The list includes actions to reduce the risk from hazards to existing buildings, structures and infrastructure (e.g. vulnerability assessment and flood protection for critical facilities), actions to limit risk to new development and redevelopment (e.g. update/enforce regulations to control floodplain development) actions to benefit underserved communities and socially vulnerable populations (e.g. installing generators), actions for alleviating data deficiencies or building up capabilities related to mitigation implementation (e.g. analyze past utility failure data) and actions spanning various types of solutions (e.g. local plans and regulations, structure and infrastructure projects, natural systems protection, and education and awareness programs).

Table 9-2. List of Mitigation Actions (Examples)

Hazard	Mitigation Action
Multiple Hazards	Increase resilience at municipal facilities and key assets, in accordance with the Albany County Climate Resiliency Plan
Flooding	Vulnerability assessment and flood protection for critical facilities
	Update/enforce local ordinances or zoning regulations to control development within floodplains
	Relocate junkyards out of floodplains so that items do not become floating projectiles during a flood
	Conduct outreach to property owners regarding buyouts
	Preliminary engineering study to identify flooding/erosion problem areas
	Upgrade undersized culverts with larger ones
	Preliminary engineering study for dam improvements
Severe Storms	Acquire a generator for critical facilities that do not have a source of backup power
	Install snow fencing or vegetative barriers along roads with snow drift/high wind impacts

Hazard	Mitigation Action
	Incorporate the regular inspection and management of hazardous trees into existing maintenance procedures
	Plan for and maintain adequate road and debris-clearing capabilities
	Update local codes to require underground wiring/utilities for new development
	Educate the public about improved planting practices near utility lines
	Analyze past utility failure data to measure the number of home and critical infrastructure impacted and create a plan to reduce impacts
Extreme Temperatures	Work with partners to implement and promote a tree planting program in areas that have fewer trees
	Improve viability of emergency shelter to provide a cooling or warming station
	Expand capabilities to transport people to shelters, heating centers, or cooling centers when needed
	Add air conditioning to school buildings
Drought	Raise awareness of strategies, assistance, and funding resources for reducing agricultural operations' risk to drought
	Develop and publicize resources for water conservation measures
	Plant drought-resistant vegetation
	Implement/improve water conservation measures in public water system (metering, leak detection/repair, etc.)
Landslide	Plant vegetation or install armoring on steep/eroding slopes
	Develop an open space preservation plan
	Control development in landslide areas and create setback requirements
	Encourage the use of erosion control and stormwater management best management practices (BMPs) for construction projects
	Direct stormwater away from potential landslide location(s)

During the jurisdictional interviews, jurisdictional representatives identified risks to their jurisdictions from natural hazards; critical facilities and particularly vulnerable populations that may be at risk; top priorities that they wanted to address in the HMP; current capabilities and opportunities to expand and improve capabilities to achieve hazard mitigation; and status updates for actions identified in the previous (2018) HMP. Then, with the help of the project team, jurisdictions brainstormed actions to address the vulnerabilities and opportunities for expansion identified. This brainstorming process included consideration of the example mitigation actions in Table 9-2, as needed, with guidance from the project team. Finally, actions that tied in most closely with the vulnerabilities identified by each jurisdiction were selected for inclusion in the plan. If

included as new mitigation actions, the example actions were expanded upon and tailored to each jurisdiction based on the jurisdiction's unique context, challenges, and opportunities.

Based on the comprehensive range of actions identified through these processes, and the prioritization strategies identified in Section 9.3.3 (including a cost-benefit review), jurisdictions were given the opportunity to review the suggested list of mitigation actions and determine which ones to keep, revise, discard, or add.

9.3.2 *Proposed Mitigation Actions for HMP Update*

The proposed new mitigation actions for the County and each municipality are listed in the jurisdictional annexes (Appendix A).

9.3.3 *Mitigation Action Prioritization*

Both County and municipal mitigation actions were prioritized using a tool adapted from the US Climate Resilience Toolkit's Steps to Resilience Framework, found at https://toolkit.climate.gov/image/1694. The criteria for analysis included: Ability to Increase Resilience, Economic Feasibility, Low Environmental Impact, and Ability to Implement.

Table 9-3 illustrates the process used to prioritize actions in the mitigation strategy. This process was followed for each action in each jurisdiction, in order to assign a priority to each action. After each action was assigned a priority, jurisdictions were given the opportunity to review the priorities listed and adjust them if desired.

Table 9-3. New Mitigation Action Prioritization Process

Mitigation Action ID	Mitigation Action Name	Ability to Increase Resilience	Economic Feasibility	Low Environmental Impact	Ability to Implement	Total Score	Priority
S1 (Example)	Additional Generators	3	2	2	2	9	Medium

Note: Feasibility/effectiveness is rated as follows: 1 = Poor, 2 = Moderate, 3 = Good. Priority is determined as follows based on total score: 4-6 = Low, 7-9 = Medium, 10-12 = High.

This analysis constitutes a benefit-cost review, as Ability to Increase Resilience, Low Environmental Impact, and Ability to Implement were considered benefits of the actions, while Economic Feasibility took into account the costs of the actions. Additionally, for each new mitigation action, a narrative form of estimated benefits and a more detailed measure of the cost was included. The estimated benefits took into account factors such as structures and infrastructure protected by the action, people protected from injury and loss of life, ecosystem benefits, and quality of life benefits. The costs of each action were estimated using three categories: Low: <$10,000, Medium: $10,000-$100,000, and High: >$100,000. Jurisdictions assessed whether the costs are reasonable compared to the proposed benefits and excluded actions if the costs did not seem reasonable.

For County actions, in addition to the above evaluation to prioritize the proposed mitigation actions, County departments were invited to participate in a survey to rank mitigation actions, as described in Section 7.3 of the County annex. The results are show in the County's annex.

10 PLAN IMPLEMENTATION AND MAINTENANCE

10.1 Background

As outlined by FEMA, the Hazard Mitigation Plan will need to change to stay up to date as conditions change, new details become available, or actions progress over time. Key components of the plan maintenance process include:

- Monitoring: Tracking implementation of the plan over time.
- Evaluating: Assessing how well the plan meets its stated purpose and goals.
- Updating: Reviewing and revising the plan at least once every 5 years (FEMA, 2023).

10.2 Plan Implementation, Monitoring, Evaluation, and Updates

The Office of the County Executive will take the lead on implementing, monitoring, evaluating, and updating the plan. The Sustainability Policy Analyst in the Office of the County Executive will be the main contact for the plan. Support will be provided by the Albany County Department of Economic Development, Conservation, and Planning; Albany County Department of Public Works, Albany County Department of General Services, and organizations such as Pine Bush Preserve, Albany County Stormwater Coalition, and the Albany County Soil and Water Conservation District. The following is a general strategy and will be continuously developed as needed throughout the 5 years until the next plan update.

10.2.1 Plan Monitoring and Implementation

Each jurisdiction's new mitigation actions will be implemented and administered in accordance with each jurisdictional annex (Appendix A), as well as the New Mitigation Actions Spreadsheet (Appendix I). The New Mitigation Actions Spreadsheet includes information about the office, department, or agency responsible for implementing and administering each of the identified mitigation actions. It also includes potential funding sources and the expected time frame for completion upon project initiation. Additional potential funding sources are listed in Section 10.5 as a reference to the County and individual municipalities. Carryover actions from the 2018 Hazard Mitigation Plan Update will be implemented in accordance with each jurisdiction's Status of 2018 Actions table as detailed in each jurisdictional annex.

Additionally, Albany County will engage in regular coordination and communication with County departments and municipalities about the actions identified in each jurisdictional annex. The Office of the County Executive will put together an internal action committee with County departments, which will meet on an as-needed basis. This can include County entities such as the Department of Economic Development, Conservation and Planning; DPW; and DGS. It may also include external partners such

as the Pine Bush Preserve, SWCD, and Stormwater Coalition. Additionally, the Office of the County Executive will maintain a list of jurisdictional contacts, hold quarterly meetings with jurisdictions, and have a shared spreadsheet where municipalities can update the status of their actions. The Sustainability Policy Analyst in the Office of the County Executive, along with two grant administrators at the County, will monitor potential funding sources related to the actions in the Hazard Mitigation Plan and communicate them to County departments and municipalities as they become available. Furthermore, the plan will be referenced when related County policies are created and updated. The County may also assist municipalities with creating intermunicipal agreements for hazard mitigation.

10.2.2 Plan Evaluation

The Office of the County Executive or aforementioned internal action committee plans to put out a survey to municipal representatives every 6 months to evaluate the effectiveness of the plan in mitigating hazards and addressing the plan's goals. As mentioned, this evaluation strategy may be modified throughout the course of the plan evaluation period.

Criteria for evaluating the effectiveness of the plan may include:

- Where are you in terms of reaching your mitigation goals?
- Are the goals and objectives of the plan still relevant?
- Has the level of risk or impacts changed since the last update?
- What is the status of your previous mitigation plan? When does the plan expire? Did your jurisdiction adopt the plan?
- Are there enough resources (funds, people, or programs) to carry out the plan?
- What outcomes can you reference to show progress? Were any of them different from what you expected?

These criteria are subject to modification, for example, if the Executive Steering Committee or jurisdictions feel that these criteria should be changed as more insights are gained during plan evaluation.

10.2.3 Plan Updates

In addition to the potential updates that may occur within the 5-year period, through the monitoring and evaluation process as discussed above, the County will update the Hazard Mitigation plan at least once every 5 years in accordance with FEMA guidelines. These plan updates will follow the entire planning process, as outlined by FEMA (FEMA, 2023):

- Convene a planning team and complete stakeholder and public outreach.
- Identify new plans, studies, reports and technical information that pertain to the County's vulnerabilities.
- Validate or update the hazard list.
- Update hazard profiles to include events that occurred since the last plan.

- Validate or update community capabilities.
- Validate or update community assets.
- Update the risk assessment based on the above.
- Update the mitigation strategy based on the new risk assessment.
- Address changes in development and changes in priorities.
- Document and describe the plan update process.

The Policy Analyst or Sustainability Coordinator, within the Office of the County Executive, will take the lead in the update process. These individuals will reach out to County departments and municipalities as needed, for input and coordination. If the County decides to utilize an external consultant, the Office of the County Executive will put together an RFP about 18-24 months before the plan expires.

If a major disaster event occurs, the Office of the County Executive will reconvene the Executive Steering Committee and/or internal action committee, and work with the Sheriff's Office and Emergency Management, to assess if and how the plan should be revised.

Questions to consider during the update period may include:

- How has the planning area changed since the last update, including assets?
- What worked well for the planning process last time?
- What might need to change?
- Are there other stakeholders or members of the public you can engage?
- What new data would be most helpful to inform the plan update?
- Have there been any recent major disaster events? (FEMA, 2023)

10.3 Incorporation into Planning Mechanisms

There is not currently documentation of ways that the previous HMP Update was incorporated into planning mechanisms at the County level. However, there has been consistent communication and collaboration between the County and jurisdictions relating to hazard mitigation and emergency management, especially relating to funding opportunities. This occurs through the County Executive's Office and through the County Sheriff's Office. Additionally, many mitigation actions in the County's Hazard Mitigation Plan were inspired by recommendations of the Albany County Climate Resiliency Plan (Albany County, 2023).

Going forward, elements of the HMP will be considered as the County and municipalities undertake future development, comprehensive planning, and emergency preparedness efforts. The approved HMP will also serve as an important resource for developing and/or updating emergency operations plans and procedures throughout Albany County. Table 10-1 summarizes methods for incorporating the HMP update into existing and future planning mechanisms and opportunities at the County level, and at the municipal level where relevant. Additional detail is given in Section 3 of each jurisdiction's annex (including the County's annex), which lists individual

jurisdiction's existing capabilities related to hazard mitigation, opportunities to integrate the mitigation plan into other planning mechanisms for each jurisdiction, the process that will be followed to do so, and opportunities for each jurisdiction to expand and improve the identified capabilities to achieve mitigation. All of these actions will help expand and improve upon these existing capabilities so that they reduce risk and better support hazard mitigation.

Table 10-1. Planning Mechanism Incorporation

Mechanism	How the HMP Will be Incorporated
Emergency Planning	Hazard risk assessment, vulnerability data, and mitigation actions included in the HMP will be reviewed during emergency planning. The County will work with the Sheriff's office on developing a general emergency management plan or disaster mitigation plan.
Annual Budget	Mitigation actions will be considered when setting the annual budgets for the County and all participating jurisdictions. Policy staff from the County Executive's Office and staff from the Division of Management and Budget will collaborate on this.
Legislative Review	Mitigation actions that have significant costs or relate to general County improvements will pass through the legislative process for approval before being implemented.
Climate Action Plan	Mitigation actions from Hazard Mitigation Plan will be assessed during the development of the County's forthcoming Climate Action Plan, and incorporated into the plan as appropriate.
Grant Applications and Other Funding Opportunities	The County regularly reviews potential funding sources to apply for. The County Executive Office will keep a lookout for funding opportunities for both County mitigation actions and municipal mitigation actions. They will email funding resources to municipal leaders, emergency management groups, and County departments when these funding sources arise. Data and maps from the HMP will be used as supporting documentation in grant applications. Mitigation actions included in the Plan will be heavily considered during application submission and fund allocation.
Capital Improvement Planning	The County Executive Office will collaborate with the Division of Management and Budget to review the availability of funding for mitigation actions, review current and future projects for hazard vulnerability, and incorporate hazard resistant construction standards into the design and location of potential projects as appropriate.
Site Plan Review	The County Executive Office will share the HMP with the County Planning Board and relevant organizations. Additionally, the County will evaluate whether to add a line to the 239 review process related to compliance and consideration of the HMP. If implemented, this change will be included in any resources related to site plan review (e.g. online resources) and communicated with jurisdictions.

Mechanism	How the HMP Will be Incorporated
Land Use Regulations	The County Executive Office will coordinate with local, county, state, and federal agencies regarding land use regulations that may relate to Hazard Mitigation Planning. The County has a general mailing list of organizations, and can share the HMP with these organizations and send updates and information as needed.
Other County Policies	The County Executive Office will evaluate potential policy language updates that may be completed in order to emphasize HMP efforts. Additionally, the County Executive Office will provide the Hazard Mitigation Plan as a resource to the County Legislature when policies that relate to hazard mitigation are being developed or updated. If applicable, the Executive Office will mention what specific part of the HMP could apply to the draft law or policy.
County Capacity	As resources permit, County departments will implement items in the County's mitigation action titled "Increase County Capacity to Support Resilience Efforts." This includes increases in staff capacity, County processes, and more to increase resilience to natural hazards.
Intermunicipal Agreements	The County Executive Office will encourage jurisdictions to create Intermunicipal Agreements (IMAs) to implement mitigation actions as necessary. The County may develop a list of resources for jurisdictions in creating these IMAs.
Jurisdictional Planning Mechanisms	The County Executive Office will remind jurisdictions of the HMP and encourage them to comply and align with the HMP when they are updating zoning ordinances, comprehensive plans, economic development plans, site plan review, and emergency management plans. Jurisdictions will incorporate the HMP into planning mechanisms as described in the jurisdictional annexes.

10.4 Public Involvement

The Executive Steering Committee will keep the public informed about hazard mitigation planning efforts, actions, and projects that occur within the County. Multiple opportunities for public involvement were incorporated into the completion and review of this HMP Update (as described in Section 3 and the Community Engagement Plan in Appendix C). In addition, the County will continue to seek future public participation after the plan has been approved, through a general interactive website that would provide information about the plan. This may be a County website or an individual website about the hazard mitigation plan. The website may have an interactive component such as a story map with the profiled hazards, and/or a place for the public to submit feedback. Additional information will be communicated through the County's media team, including social media updates. The County will seek out ways to further facilitate the participation of vulnerable populations in public engagement activities, gathering ideas as needed from Appendix C (Community Engagement Plan: sections 1.4 and 1.5), the Local Emergency Managers' Meeting Feedback Summary

(Appendix E, page 51), and Sections 2.3.2 and 8.2 of this HMP. Public outreach efforts will be documented in future plan updates.

Section 8 of each jurisdictional annex details each participating jurisdiction's plans to continue to seek future public participation after the plan has been approved.

10.5 Potential Funding Sources

The Disaster Mitigation Act of 2000 requires that state, local, tribal, and territorial governments prepare natural hazard mitigation plans as a condition of future funding. With a FEMA approved Hazard Mitigation Plan, communities will be eligible to apply for funding through FEMA Hazard Mitigation Assistance and Resilience Grant programs, identified below.

10.5.1 FEMA Hazard Mitigation Assistance and Resilience Grant Programs

A list of some key Hazard Mitigation Assistance and Resilience Grant Programs established by FEMA is included below.

- Building Resilient Infrastructure and Communities (BRIC) Program – supports a broad array of hazard mitigation projects to reduce risks from disasters and natural hazards. Examples of project types include construction projects, plan creation and updates, project scoping, education and awareness, gathering feedback from community members, management costs, and many more.
- Flood Mitigation Assistance (FMA) Program – provides funding to reduce or eliminate the risk of repetitive flood damage to buildings insured under the National Flood Insurance Program (NFIP).
- Hazard Mitigation Grant Program (HMGP) – provides funding to communities to rebuild in a way that reduces, or mitigates, future natural disaster losses in their communities. Supports a broad array of hazard mitigation projects.
- Hazard Mitigation Grant Program Post Fire (HMGP Post Fire) – provides funding to help communities implement hazard mitigation measures focused on reducing the risk of harm from wildfire.

Additional FEMA HMA programs include the Pre-Disaster Mitigation Program (PDM), which was largely replaced by BRIC, and Safeguarding Tomorrow Revolving Loan Fund Program, which is administered through individual states. For a summary of eligibility activities by program type for HMGP, HMGP Post Fire, BRIC, and FMA, see page 72 of the Hazard Mitigation Assistance Program and Policy Guide: https://www.fema.gov/sites/default/files/documents/fema_hma-program-policy-guide_032023.pdf (FEMA, 2023).

In addition, several other funding sources may potentially be utilized for mitigation actions in this plan, in addition to municipal and county budgets. Other possible funding sources are outlined below. This is not an exhaustive list but is a starting place for sources that may fit the mitigation actions identified in the plan. These funding sources will not

be appropriate for all the mitigation actions identified. For each mitigation action, municipalities should select potential sources from this list, visit the associated website and/or other materials to determine suitability, and look for additional sources if desired. Additional lists of funding sources are identified below.

10.5.2 Additional Federal Resources

A list of some key additional federal resources is included below. For additional resources, see FEMA's Mitigation Resource Guide: https://www.fema.gov/sites/default/files/documents/fema_mitigation-resource-guide.pdf

- FEMA Rehabilitation of High Hazard Potential Dam (HHPD) Grant Program – provides grants for the rehabilitation of eligible high hazard potential dams, in the form of technical, planning, design, and construction assistance. High Hazard Potential Dams are classified in the National Inventory of Dams, and refer to any dam whose failure or mis-operation will cause loss of human life and significant property destruction.
- FEMA Fire Management Assistance Grant – provides funding for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands that threaten to cause a major disaster.
- FEMA Emergency Management Performance Grant (EMPG) – provides federal funds to states to assist state, local, territorial, and tribal governments in preparing for all hazards.
- EPA Environmental Justice Small Grants (EJSG) **–** awards grants that support community-driven projects designed to engage, educate, and empower communities to better understand local environmental and public health issues and develop strategies for addressing those issues, building consensus in the community, and setting community priorities. The grants can be used for education and outreach about hazard mitigation efforts.
- USDA/NRCS Emergency Watershed Protection Program **–** offers technical and financial assistance to help local communities mitigate imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences that impair a watershed. Example activities include removing debris from stream channels, road culverts, and bridges; reshaping and protecting eroded streambanks; correcting damaged or destroyed drainage facilities; establishing vegetative cover on critically eroding lands; repairing levees and structures; repairing conservation practices; and purchasing floodplain easements.
- USDA Housing Preservation Grant Program – provides grants to sponsoring organizations for the repair or rehabilitation of low-income and very low-income housing.
- USDA Rural Development Water and Environmental Programs (WEP) – provide technical assistance, loans, grants, and loan guarantees for drinking water,

sanitary sewer, solid waste, and storm drainage facilities in rural areas and cities and towns of 10,000 or less. Often, these projects meet flood mitigation goals.

- USDA Rural Development Community Facilities Loan/Grant Program – Funding to develop essential community facilities in rural areas
- USDA Rural Development Water & Waste Disposal Loan/Grant Program – Funding for drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and stormwater drainage in eligible rural areas.
- Economic Development Administration Disaster Recovery – facilitates the delivery of federal economic development assistance to support long-term community economic recovery planning and project implementation, redevelopment and resiliency. Examples include updating critical water infrastructure needed to protect local businesses from flooding.
- USACE Continuing Authorities Program* – technical assistance that allows the USACE to plan, design, and implement certain types of water resources projects, such as streambank and shoreline protection, hurricane and storm damage reduction projects, and flood damage reduction projects.
- USACE Floodplain Management Services (FPMS) Program* – range of technical services and planning guidance needed to support effective floodplain management.
- USACE Small Flood Control* – technical assistance to plan, design and construct certain small flood control projects that have not already been specifically authorized by Congress. Both structural (levees, channels, or dams, for instance) and nonstructural (floodproofing or evacuation, for example) solutions are considered.
- EPA Smart Growth Support – grant funding and technical assistance to help local governments make their communities more attractive, economically stronger, socially diverse, and more resilient to climate change.
- EPA Clean Water State Revolving Fund (CWSRF) – provides a permanent source of low-cost financing for a wide range of water quality infrastructure projects.
- EPA Greening America's Communities* – helps cities and towns develop an implementable vision of environmentally friendly neighborhoods that incorporate innovative green infrastructure, hazard mitigation, and other sustainable/resilient design strategies.
- NRCS Watershed and Flood Prevention Operations (WFPO) Program – helps governments protect and restore watersheds. This includes watershed projects for the purpose of flood prevention and other goals. Funding supports watershed projects ≤ 250,000 acres. Agricultural benefits, including rural communities, must be ≥ 20% of the total benefits for the project. Projects must have a local sponsor.
- NRCS Watershed Rehabilitation Program (REHAB) – helps project sponsors rehabilitate aging dams that are reaching the end of their design life and/or no

longer meet federal or state safety criteria or performance standards. Since 1948, NRCS has assisted local sponsors in constructing over 11,850 dams.

- USFWS National Coastal Wetlands Conservation Grants (NCWCG) - provides grants of up to $1 million to coastal and Great Lakes states, as well as U.S. territories to protect, restore and enhance coastal wetland ecosystems and associated uplands. Eligible projects include the acquisition of real property interest in coastal lands or waters and the restoration, enhancement, or management of coastal wetlands ecosystems.
- NFWF National Coastal Resilience Fund (NCRF) -- Restores, increases and strengthens natural infrastructure to protect coastal communities while also enhancing habitats for fish and wildlife. Invests in conservation projects that restore or expand natural features such as coastal marshes and wetlands, dune and beach systems, oyster and coral reefs, forests, coastal rivers and floodplains, and barrier islands that minimize the impacts of storms and other naturally occurring events on nearby communities.
- Congressional Earmark Funds -- Funding requested through the federal government for specific congressional district, locality, or state.
- DOT Bipartisan Infrastructure Law (BIL) Funding - Provides a variety of grant funding programs for infrastructure investment, including in roads, bridges, mass transit, water infrastructure, resilience, safety, broadband, and more.
- US Bureau of Reclamation WaterSMART Drought Response Program - Provides assistance to water managers to develop and update comprehensive drought plans, and to implement projects that will build long-term resiliency to drought.
- USGS Landslides Hazards Program - Provides grant assistance to local governments to support communication, planning, coordination, mapping, assessments, and data collection of landslide hazards.
- NRCS Conservation Innovation Grants (CIG) - supports the development of new tools, approaches, practices, and technologies to further natural resource conservation on private lands.
- NOAA Coastal and Marine Habitat Restoration Grants | NOAA Fisheries - supports restoration projects that use a habitat-based approach to rebuild productive and sustainable fisheries, contribute to the recovery and conservation of protected resources, promote healthy ecosystems, and yield community and economic benefits.
- FEMA Emergency Operations Center (EOC) Grant Program - Supports flexible, sustainable, secure, strategically located, and fully interoperable EOCs with a focus on addressing identified deficiencies and needs.
- DOT Safe Streets and Roads for All (SS4A) Grant Program - Provides funding to prevent roadway deaths and serious injuries.
- DOT Highway Safety Improvement Program (HSIP) - Federal-aid program with the purpose to achieve a significant reduction in traffic fatalities and serious injuries on all public roads.

** Denotes a technical assistance program rather than straight funding.*

10.5.3 New York State Funding Resources

A list of some key funding resources administered by New York State is included below. There may be additional resources not on this list that jurisdictions may wish to pursue.

- CDBG Public Infrastructure and Community Planning – Eligible projects for NYS CDBG Public Infrastructure may include the repair or replacement of existing systems, construction of new systems, or expansion of existing systems into areas previously unserved. Funding categories include Public Infrastructure, Public Facilities, and Community Planning. This includes CDBG-MIT for declared disaster areas.
- DEC Water Quality Improvement Project (WQIP) Program – There are eight project types under the WQIP Program. These include Wastewater Treatment Improvement, Non-Agricultural Nonpoint Source Abatement and Control, Vacuum Trucks in Municipal Separate Storm Sewer System (MS4) Areas, Land Acquisition for Source Water Protection, Salt Storage, Dam Safety Repair/Rehabilitation, Aquatic Connectivity Restoration, and Marine District Habitat Restoration. See the project website for funding/match/eligibility/and attachment requirements.
- NYS EFC Water Infrastructure Improvements Grant (WIIA) - projects include water quality infrastructure projects at municipally-owned sewage treatment works OR municipally-owned public water systems for construction, replacement or repair of infrastructure; or compliance with environmental and public health laws and regulations related to water quality.
- NYS EFC Wastewater Infrastructure Engineering Planning Grant (EPG) - planning activities to determine the scope of water quality issues, evaluation of alternatives, and the recommendation of a capital improvement project. In addition, the costs to conduct an environmental review for the recommended alternative are eligible. Design and construction costs are not eligible. Requires a 20% local match.
- NYS EFC Intermunicipal Grants Program (IMG) – funds drinking water and wastewater projects that serve multiple municipalities. Examples include a shared water quality infrastructure project or the interconnection of multiple municipal water systems.
- NYS EFC Green Innovation Grant Program – funds projects that improve water quality and mitigate the effects of climate change through the implementation of one or more of the following green practices: Green Stormwater Infrastructure, Energy Efficiency, Water Efficiency and Environmental Innovation. See website for details of funding/matching/requirements for each category.
- NYS Hazard Mitigation Revolving Loan Fund (NYS HM RLF) – provide hazard mitigation assistance for local governments to reduce risks from natural hazards and disasters. Priorities for the first year of the program include disadvantaged, underserved, and socially vulnerable areas; cost-share for existing hazard

mitigation projects; flood risk reduction; social stabilization; infrastructure retrofit; generators; and projects that are not eligible under other HMA grants due to not passing a benefit cost analysis.

- DOS Smart Growth Comprehensive Planning Grant Program – This program advances the preparation of municipal comprehensive plans, new or updated zoning regulations, or area plans (e.g. transit-oriented development plans or downtown/hamlet area plans) that support smart growth principles. Smart growth principles include development in areas with adequate infrastructure, protection of historic and natural resources, planning for equity, development of clean energy, and more.
- NYS Climate Smart Communities Program – helps local governments take action to reduce greenhouse gas emissions and adapt to a changing climate. Includes funding for various actions incorporating mitigation and climate resiliency into existing local policies, comprehensive planning with sustainability elements, certain transportation infrastructure upgrades, creating a heat emergency plan, and more. The list of actions eligible for competitive funding can be found at https://climatesmart.ny.gov/actions-certification/actions/
- DASNY State and Municipal Facilities Program – Funding for projects that support community and economic development
- NYSDEC Urban and Community Forestry Grants – Funding for improving urban and community forest health and increasing the sustainability of forestry programs. Eligible projects include: tree inventories, management plans, tree planting, maintenance, and education programming.
- NYSDOT Bridge NY – Funding for bridge/culvert rehabilitation or replacement
- NYSDOT Consolidated Local Street and Highway Improvement Program (CHIPS) – Funding for municipalities to support the construction and repair of highways, bridges, highway-railroad crossings, and other facilities that are not on the State highway system.
- NYSEFC Clean Water State Revolving Fund – provides interest-free or low-interest rate financing for wastewater and sewer infrastructure projects to municipalities throughout New York State. Eligible projects include: construction or restoration of sewers and wastewater treatment facilities, stormwater management, landfill closures, and habitat restoration and protection projects.
- NYSEFC Drinking Water State Revolving Fund (DWSRF) – Financing for drinking water projects. Eligible projects include treatment plants, distribution mains, and storage facilities. May also apply to dam improvements, if the dam impoundment holds water that is then used for drinking water purposes (after treatment).
- NYSOCR Community Development Block Grant (CDBG) Program – Financial assistance to eligible cities, towns, and villages with populations under 50,000 and counties with an area population under 200,000 to develop viable

communities by providing affordable housing and suitable living environments, as well as expanding economic opportunities, principally for persons of low and moderate income.

- NYS Environmental Protection Fund (EPF) - awards funds for open space; parks, recreation, and historic preservation; and solid waste.
- NYSDEC Trees for Tribs Program - Provides funding to plant trees and shrubs along tributaries (small creeks and streams that flow into larger rivers and lakes) in New York State. These plantings have the goal of decreasing erosion, reducing flooding damage, improving wildlife and stream habitat, and protecting water quality.

10.6 Additional State and Federal Resources

The following are examples of additional resources available to jurisdictions to assist with hazard mitigation. Some of these resources relate primarily to emergency preparedness and response, rather than hazard mitigation.

- Emergency Warnings – NY Alert is available to all residents. Residents need to set up an account and sign-in to set up their preferences to receive messages.
- Emergency Plans – In addition to County assistance, the NYS OEM provides direct technical assistance to the municipalities with writing their emergency plans and annexes. Municipalities have worked with Dave Alder from the NYS OEM in the past.
- Intermunicipal Agreements – The Office of the State Comptroller has published guidance on shared service agreements, with related resources (Division of Local Government and School Accountability, 2009). The NYS Office of Emergency Services and DHSES may also be able to assist municipalities with creating intermunicipal shared service agreements or provide further direction.
- Army Reserve Resources – The Army Reserve can provide resources during and after emergencies, including transporting people to safety, clearing roads and debris, pumping floodwater, and more. Municipalities are encouraged to meet with their local Army Reserve centers before a disaster strikes. A nearby Army Reserves office is located in Horseheads NY. More information can be found on the Army Reserve Website (U.S. Army Reserve, 2022) (U.S. Army Reserve, 2023).

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