MULTI-JURISDICTIONAL
MULTI-HAZARD MITIGATION PLAN

IEM

2024
ORANGE COUNTY

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Executive Summary

Over the past two decades, hazard mitigation has gained increased national attention due to the large number of natural disasters that have occurred throughout the U.S. and the rapid rise in costs associated with those disaster recoveries. It has become apparent that money spent mitigating potential impacts of a disaster event can result in substantial savings of life and property. With these benefit-cost ratios extremely advantageous, the Disaster Mitigation Act of 2000 was developed as U.S. federal legislation, reinforcing the importance of pre-disaster mitigation planning by calling for local governments to develop mitigation plans (44 CFR 201).

A local hazard mitigation plan aims to identify the community's notable risks and specific vulnerabilities and then create and implement corresponding mitigation projects to address those areas of concern. This methodology helps reduce human, environmental, and economic costs from natural and man-made hazards through the creation of long-term mitigation initiatives.

The advantages of developing a local hazard mitigation plan are numerous and include improved post-disaster decision-making, education on mitigation approaches, and an organizational method for prioritizing mitigation projects. Communities with a mitigation plan receive larger amounts of federal and state funding opportunities to be used on mitigation projects and can receive these funds faster than communities without a plan.

This 2024 update of the Orange County Multi-Jurisdictional Multi-Hazard Mitigation Plan addresses Building Resilient Infrastructure and Communities (BRIC), Flood Mitigation Assistance (FMA), and Hazard Mitigation Grant Program (HMGP) requirements. ? jurisdictions participated in the planning update.

In reference to federal code title 44 CFR 201, the plan is required to be submitted to both New York State and the Federal Emergency Management Agency (FEMA) for review to be approved. When the plan is deemed "approval pending adoption" by FEMA (44 CFR 201.6(c)5), each of the participating jurisdictions will adopt the plan through a local resolution.

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Background

What Is a Hazard?

A hazard is defined as a situation that poses a level of threat to life, health, property, and/or the environment. A hazard can be natural, technological, or human-caused.

What Are the Phases of Emergency Management?

Mitigation is considered just one of four phases of emergency management. The other phases include preparedness, response, and recovery. Each of these phases relate to and rely upon each other. The overarching goal of all of these emergency management activities is the prevention or minimizing of loss of life and property in disaster situations. The Orange County Department of Emergency Services (OCDES) serves as the lead local agency in promoting this goal. The OCDES is composed of five divisions, each of which provides separate services to the public and to the emergency service agencies located within the county. The five divisions of the OCDES include Emergency Communications (911), Emergency Management, Fire Services, Police Liaison Services, and Emergency Medical Services. The Orange County Division of Emergency Management (OCDEM) leads Orange County in the preparation for, prevention of, response to, and recovery from disaster events. OCDEM's responsibilities include:

- Providing public preparedness information, including the sharing of such information with citizens, the private sector, municipalities, and nongovernmental organizations (NGOs)
- Participating in planning activities of many types and at many levels (keeper of the County's Comprehensive Emergency Plan) in partnership with other agencies involved in emergency responses, and authoring After-Action Reports/Improvement Plans that identify best practices and areas for improvement
- Working with local municipalities, private sector representatives, and volunteer organizations across the county to develop disaster preparedness plans and mitigation projects, and provide training and exercise activities
- Coordinating County agency response during emergencies or disaster events
- Assigning a liaison to state and federal resources in times of disasters
- Operating the County's Emergency Services Center during the time of a disaster/emergency
- Coordinating recovery efforts after a disaster and liaising with state and federal agencies involved in this process

What Is Hazard Mitigation?

Hazard mitigation is broadly defined as a method for reducing or alleviating property loss, reducing damage to the environment, and reducing the number and severity of injuries that occur from hazard events through long and short-term strategies. Responsibility for implementing mitigation measures runs community-wide from individuals to industries, private businesses, and all levels of government.

What Is a Hazard Mitigation Plan?

A hazard mitigation plan aims to identify, assess, and mitigate risk to better protect the people and property from the effects of natural, technological, and human-caused hazards. This plan documents the hazard mitigation planning process and identifies relevant hazards, vulnerabilities, and strategies the County and jurisdictions will use to decrease vulnerability and increase resiliency and sustainability. This plan demonstrates the participating communities' commitment to reducing risks from identified hazards and serves as a tool to help decision-makers direct mitigation activities and resources. Hazard mitigation plans primarily focus on mitigation; however, this plan also relates to all other phases of emergency management.

Authority

This Multi-Jurisdictional Multi-Hazard Mitigation Plan has been adopted by Orange County and all participating jurisdictions in accordance with the authority granted to local communities by the State of New York. This Plan was updated per state and federal rules and regulations governing local hazard mitigation plans. The Plan shall be reviewed annually and go through a complete update process every five years to remain eligible for hazard mitigation grants.

Federal Emergency Management Agency

FEMA plays a pivotal role in guiding hazard mitigation planning across the United States. Under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, FEMA provides financial and technical support to states, territories, tribes, and local governments to develop and maintain effective hazard mitigation plans. In 2023, FEMA introduced an updated State and Local Mitigation Planning Policy, which emphasizes climate resilience, equitable hazard mitigation, and the integration of mitigation strategies across planning efforts. FEMA sets the minimum requirements for these plans, reviews submissions to ensure compliance with current standards, and approves those that qualify for federal funding, enabling jurisdictions to better protect communities against future disasters.

The Disaster Mitigation Act of 2000 (DMA 2000) underscores the importance of proactive mitigation efforts by requiring local governments to have FEMA-approved plans in order to be eligible for mitigation funding. DMA 2000 promotes pre-disaster planning, sustainability, and conservation, strengthening hazard mitigation efforts across states and communities. Approved plans qualify jurisdictions for critical grants, including Building Resilient Infrastructure and Communities (BRIC), Hazard Mitigation Grant

Program (HMGP), Flood Mitigation Assistance (FMA), Pre-Disaster Mitigation (PDM), and High Hazard Potential Dam (HHPD) grants.

FEMA requires plans to be updated on a five-year cycle, and Orange County's current plan update aims to build on past efforts by improving risk and vulnerability assessments and enhancing local integration and technical assistance. This approach is designed to create a more actionable mitigation strategy that better safeguards the community.

New York State Division of Homeland Security and Emergency Services (NYS DHSES)

NYS DHSES developed additional hazard mitigation planning standards to augment those required by FEMA. The 2022 NYS Hazard Mitigation Planning Standards reduce the 2017 Hazard Mitigation Planning Standards. Orange County's 2024 plan update will be held only to these reduced standards.[1]

Planning Participants

The 2024 HMP update for Orange County includes participation from ? of the 43 jurisdictions located within, and including, Orange County. Participants include Orange County; ? towns, including Blooming Grove, Chester, Cornwall, Crawford, Deerpark, Goshen, Greenville, Hamptonburgh, Highlands, Minisink, Monroe, Montgomery, Mount Hope, Newburgh, New Windsor, Palm Tree, Tuxedo, Wallkill, Warwick, Wawayanda, Woodbury; ? villages, including Chester, Cornwall-on-Hudson, Florida, Goshen, Greenwood Lake, Harriman, Highland Falls, Kiryas Joel, Maybrook, Monroe, Montgomery, Otisville, South Blooming Grove, Tuxedo Park, Unionville, Walden, Warwick, Washingtonville, Woodbury; and 3 cities, including Middletown, Newburgh, and Port Jervis.

Each participating jurisdiction provided updated information about the hazards that have historically occurred within their boundaries, with a focus on post-2018 events. Repair costs and damage estimates associated with such hazard events were also provided. Participating jurisdictions reviewed the critical facilities within their boundaries and the risk assessment and vulnerability information provided within this HMP update. A wide variety of additional resources were utilized to gather information concerning historic and recent occurrences of hazard events within Orange County, vulnerabilities within the county related to future hazard events, and costs and damages likely to occur as a result of a hazard event.

Plan Organization

The 2024 Orange County Multi-Jurisdictional Multi-Hazard Mitigation Plan (hereafter referred to as the Orange County HMP) is organized into 12 sections that satisfy the mitigation requirements in 44 CFR Part 201.6, with two appendices providing the required supporting documentation.

[1] New York Division of Homeland Security and Emergency Services, Hazard Mitigation. https://www.dhses.ny.gov/hazard-mitigation.

Orange County Profile

This section details the existing environmental features, transportation networks, demographics, history, and available facilities within Orange County, New York.

Geographic Location

Orange County is located in Southeastern New York, northwest of New York City. To the east it is geographically bounded by the Hudson River, which also forms the western boundaries of Dutchess and Putnam counties; to the south, by New York's Rockland County as well as New Jersey's Sussex and Passaic counties; to the west, by the Delaware River and Pennsylvania's Pike County; and to the north, by New York's Sullivan and Ulster counties.

The Village of Goshen, located within the Town of Goshen, serves as the county seat for Orange County, which comprises 3 cities, ? towns, and ? villages. Orange County has a total area of 838.62 square miles, of which 812.32 square miles are land and 26.3 square miles are water.[2] In terms of total area, the Town of Warwick is the largest jurisdiction within Orange County, totaling 104.9 square miles, which amounts to 12.5% of the county's total area. The Town of Monroe is the smallest town by area at just 21.3 square miles, or 2.5% of the total for Orange County.

[2] U.S. Census Bureau. 2020. https://data.census.gov/profile/Orange_County,_New_York?g=050XX00US36071.

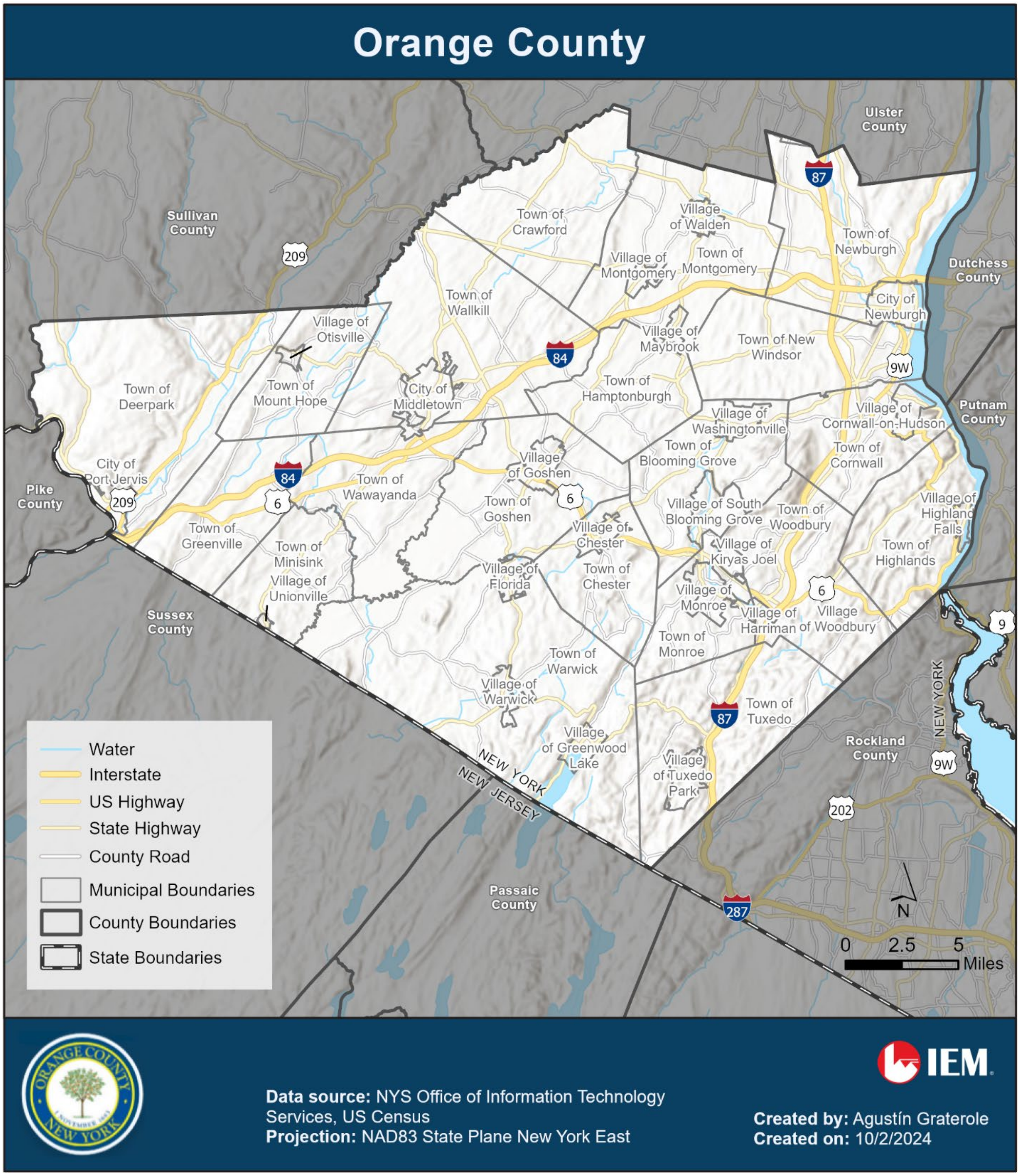

Figure 1: Orange County Jurisdictional Boundaries

The eastern and western edges of the county are more mountainous in nature than the center. To the east, the Hudson Highlands rise to higher elevation overlooking the Hudson River while the Shawangunk Ridge lines the county's west side, above the Delaware River. The Wallkill River Valley has a gentler terrain, crossing the center of the county from southwest to northeast.

Overall topography in the county ranges from the Hudson River at sea level to approximately 1,664 feet above mean sea level (msl) at the highest topographic point in the county, Schunemunk Mountain. This mountain is located in the Town of Blooming Grove with portions in the Towns of Cornwall and Woodbury as well.

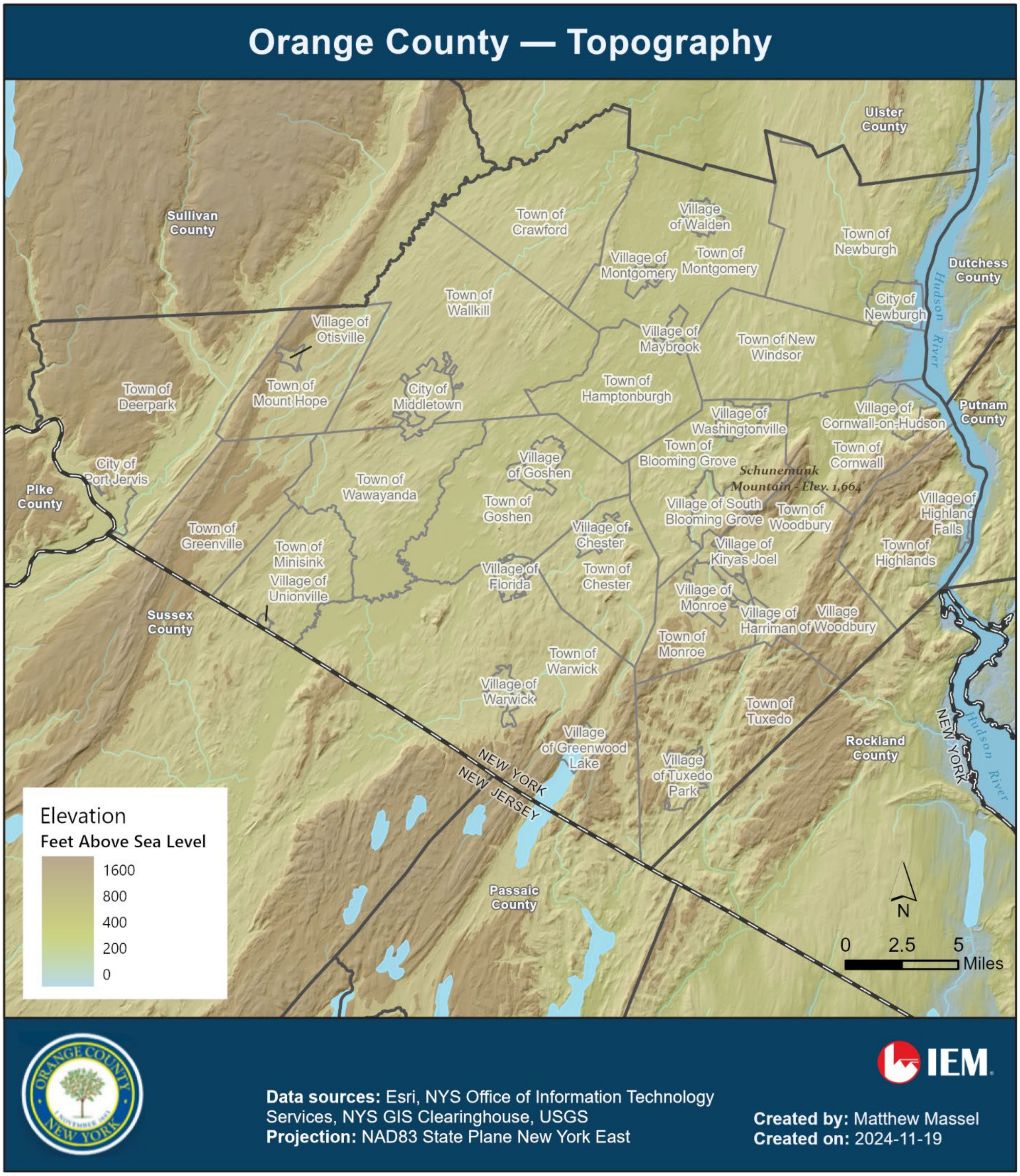

Figure 2: Orange County Topography Map

Historical Overview

The earliest inhabitants of Orange County were the Munsee, a subtribe of the Lenape residing in the upper Delaware River Valley and eastward to the west bank of the Hudson River. Settlement in the Orange County area began in 1685 under British rule, which largely consisted of a group of Scottish families settling an area of the Hudson Highlands in the present-day Town of New Windsor. Habitation followed in the Town of Newburgh by German Palatines. In 1798, Orange County was formally established through an act of the New York State Legislature.[3]

As the American Revolution was waged, the Continental Army occupied West Point, founding what would become the oldest continuously operating Army post in the United States. In 1802, Congress formally authorized the establishment and funding of the United States Military Academy at West Point. Since then, it has developed numerous military leaders and engineers, as well as providing vigor to the local economy.

Much of Orange County was developed as a result of the fertile Wallkill Valley, mining opportunities, and transportation and natural resources along the Hudson River, Delaware River, and Delaware and Hudson (D&H) Canal. Since the mid-20th century, the county has experienced continued suburban development as transportation technology and infrastructure has allowed workers to commute as far as New York City, located approximately 40 miles to the southeast.

Climate

The climate of Orange County is of the humid continental type, typical of the interior northeastern United States.[4] Humid continental climates are known for their 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. Lower portions of the Hudson Valley and other downstate portions of New York State experience a greater influence on climate from the Atlantic Ocean and, therefore, generally experience warmer and more humid summers, as well as more damp winters, than the rest of Upstate New York. In the City of Middletown—near the center of Orange County—high temperatures average over 84°F in July with average lows just above 61°F. In January, the county-wide average high temperature is 35°F with lows averaging 17°F. The year-round average high temperature is about 60°F and low temperature is about 39°F. The average monthly precipitation increases from January (2.72 inches) to June (4.45 inches). Rainfall averages 44 inches annually, while annual snowfall averages 41 inches and provides snow cover for the majority of winter.[5]

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[3] Orange County Website. Legislature. https://www.orangecountygov.com/903/Legislature.
[4] Best Places, “Orange County, NY Climate.” https://www.bestplaces.net/climate/county/ny/orange.
[5] Best Places, “Middletown, NY Weather.” https://www.bestplaces.net/weather/city/new_york/middletown.

Impact of Climate Change

The following climate impact matrix, sourced from the New York State Hazard Mitigation Plan, identifies the primary hazards of concern for the 2024 Orange County HMP. This matrix serves as a critical tool in understanding the specific climate-related risks facing Orange County, highlighting the natural hazards that are most likely to impact the community, its infrastructure, and its residents. By focusing on these prioritized hazards, the matrix aids in aligning local mitigation efforts with broader state-level resilience goals, ensuring that Orange County is well prepared to address the unique and evolving challenges posed by climate change. The matrix also provides a foundation for evaluating potential vulnerabilities and guiding resource allocation, helping planners and stakeholders develop targeted strategies to protect lives, property, and essential community services against the impacts of severe weather and climate-related events.

DROUGHT	**Geographic Specificity**	State/Regional
	Climate Effects	Yes
	Location	Droughts may become more common in the Northeast, but intra-NYS changes in location are not clear.
	Intensity	Climate change may increase the intensity of droughts in NYS, due in part to increased variability in precipitation.
	Frequency	Droughts may become more frequent.
	Duration	Late-summer, short-duration droughts may become more common due to climate change.
Overview: It is anticipated that climate change may increase the frequency and intensity of droughts in New York State. Warmer temperatures will increase evaporation and reduce surface water levels, leading to drier soil. Additionally, the variability of precipitation may increase, meaning there will be more periods of extreme precipitation, which may cause flooding, as well as more periods of little to no precipitation, which can bring drought. Some studies project that late-summer, short-duration droughts will become more common due to climate change. Currently, climate change has yet to meaningfully affect drought occurrence in New York; drought frequency in the Northeast has stayed relatively constant, decreasing only slightly. Models have shown that increases in temperature have been counteracted by increases in humidity, resulting in negligible impacts to drought trends in the Northeast between 1980 and 2020. It is unclear to what extent increases in humidity are caused by global climate change versus more localized environmental effects.		

EARTHQUAKE	**Geographic Specificity**	N/A
	Climate Effects	No
	Location	N/A
	Intensity	N/A
	Frequency	N/A
	Duration	N/A
Overview: Earthquakes are unlikely to be affected by climate change. The causes of earthquakes are largely unaffected by atmospheric changes brought on by climate change. There are some indications that earthquakes became more frequent as glaciers melted thousands of years ago, and more common earthquakes in Greenland may be tied to warming temperatures, but the links between these phenomena and anthropogenic climate change are uncertain at best and have not affected New York. Earthquakes are not discussed in local, regional, or national climate impact assessments, highlighting that climate change is not expected to impact their frequency or intensity in the United States.		

EXTREME COLD	**Geographic Specificity**	Local/State/Regional
	Climate Effects	Yes
	Location	Extreme cold waves are becoming less frequent and milder in the Northeast.
	Intensity	Warming temperatures have made extreme cold events less severe.
	Frequency	Extreme cold events will likely become less frequent due to warming temperatures.
	Duration	Uncertain
Overview: The Northeast is warming faster than many other U.S. regions. As a result, extreme cold events will likely become less frequent in the Northeast, and they have already become milder. Indeed, for much of North America, including the Northeast, extreme cold events have become less severe over time due to warming temperatures. High-profile severe cold events have still occurred in recent years, but this is likely due to natural variability. Between 1900 and 2017, New York City has seen a clear decline in "cold days," defined as days when the minimum temperature is equal to or below the 10th percentile of daily minimum temperature of a given year. At this time, impacts from climate change on the duration of individual extreme cold events remain uncertain.		

EXTREME HEAT	**Geographic Specificity**	Local/State/Regional
	Climate Effects	Yes
	Location	TBD
	Intensity	Climate change will likely make extreme heat events more intense. This poses a greater risk in the Northeast than elsewhere in the U.S., as the range of temperatures at which negative health effects occur has been shown to be lower in this region.
	Frequency	The number of days above 90°F, as well as the number of heat waves, are both projected to increase significantly.
	Duration	The duration of extreme heat events is expected to increase due to climate change.
Overview: Climate change will significantly increase the frequency, severity, and duration of extreme heat events in every region of the state, with an expected corresponding increase in impacts without adequate adaptation. By 2050, various regions of New York State are projected to experience between 11 and 30 additional days above 90°F per year above the 1981–2010 baseline. In some regions, the number of extreme heat events (periods of three or more days above 90°F) per year is expected to rise from a baseline of zero to two (0–2) per year (1981–2010) by an additional one to four (1–4) extreme heat events per year by the 2050s.		

FLOODING	**Geographic Specificity**	Local/State/Regional/Global/non-U.S.
	Climate Effects	Yes
	Location	Although all flooding is expected to become more common in NYS, localized increases in short-duration extreme rainfall may be heightened above and beyond what would be expected from temperature increase alone, possibly due to convective cloud feedback.
	Intensity	Precipitation has increased across all seasons, with extreme precipitation events increasing significantly over historical levels. The volume and peak rates of rainfall are expected to increase.
	Frequency	All precipitation types are expected to become more common, including extreme precipitation events. Short-duration, high-intensity rainfall that causes flash flooding is expected to occur more frequently.
	Duration	Precipitation events are projected to become longer in duration.
Overview: Climate change directly affects precipitation, and with it, flooding. Because warm air can hold more water than cold air, extreme precipitation events have become more common as temperatures have warmed. Precipitation has increased across the Northeast for all seasons, and the heaviest precipitation events have increased by 60% since 1958, bringing more frequent flood events.		

New York has already experienced a significant increase in two-inch extreme precipitation events over historical levels. Precipitation is generally expected to become more frequent, more intense, and longer in duration, while extreme precipitation events will also become more frequent. This will lead to more flooding across the state.

HAIL	**Geographic Specificity**	Regional/National
	Climate Effects	Yes - limited study
	Location	Specific locational changes in hailstorms within New York are unclear, but they are expected to become less frequent overall in this region, although large hailstone events will become more common.
	Intensity	Climate change may make hailstones bigger and hailstorms more intense.
	Frequency	The number of hail days is expected to decrease in the Northeast.
	Duration	Uncertain

Overview: Climate change may make hailstones bigger and hailstorms more intense (but less frequent) in North America. This holds true in the Northeast, where the overall number of hail days is projected to drop, along with small- and medium-sized hail events. However, in the Northeast, models show that very large hailstones will become more common. Ultimately, although hail is projected to become less frequent but more severe, the reliability of these models remains uncertain. At this time, the effects of climate change on the duration of hail events, if any, remain uncertain.

HURRICANE	**Geographic Specificity**	Regional/National/Global
	Climate Effects	Yes
	Location	Some studies have suggested that as the world warms, a greater percentage of tropical storms in the Atlantic will form closer to the coast than before—and that as a result, more tropical storms will make landfall, particularly along the East Coast. A more granular study reported similar findings, and also asserted that tropical cyclones may travel closer to Boston, MA, and Norfolk, VA, than to New York City.
	Intensity	Climate change will make hurricanes intensify more rapidly, cause heavier rainfall, and result in more severe storm surges. The most powerful hurricanes will also become more common.
	Frequency	Hurricane frequency is projected to decrease overall, but the proportion of Category 4 and 5 hurricanes may increase. On average, hurricane season has been starting earlier each year in the North Atlantic.
	Duration	Hurricane intensity decay is expected to slow, meaning that hurricanes will maintain more of their strength after making landfall than has

		previously been typical. Hurricane movement has also slowed, leading to more rainfall and wind damage after landfall.

Overview: Climate change will make hurricanes intensify more rapidly, cause heavier rainfall, and result in more severe storm surges. Hurricane intensity decay is also anticipated to continue slowing. Models suggest that hurricane frequency will decrease, but also that the proportion of Category 4 and 5 hurricanes will increase. However, this finding has mixed to low certainty. Some studies have suggested that as the world warms, a greater percentage of tropical storms in the Atlantic will form closer to the coast than before—and that as a result, more will make landfall, particularly along the East Coast. A more granular study reported similar findings, and also asserted that tropical cyclones may travel closer to Boston, MA, and Norfolk, VA, than to New York City. However, there is not yet a scientific consensus on this finding, and most papers on potential climate-induced geographic shifts in tropical cyclones include significant caveats and low-confidence findings.

Hurricane intensity typically lessens, or "decays," as hurricanes move inland. This is because hurricanes gain intensity from ocean moisture. However, studies have shown that the decay in intensity has lessened proportionally with increased sea surface temperatures, meaning that hurricanes are maintaining more of their destructiveness as they move further inland compared to historic levels. Hurricanes have also slowed, causing more rainfall, wind damage, and other impacts. Moreover, trends in data gathered since 1979 suggest that the hurricane season in the North Atlantic is beginning earlier each year.

ICE STORM	**Geographic Specificity**	N/A
	Climate Effects	Uncertain
	Location	Uncertain
	Intensity	Uncertain
	Frequency	Uncertain
	Duration	Uncertain

Overview: Climate change does not appear to have had an impact on ice storms in New York as of 2023. There is limited evidence on the potential for climate change to affect the frequency and intensity of ice storms. Although some studies suggest modest increases in ice storm frequency, it remains within the range of historic variability.

LANDSLIDE	**Geographic Specificity**	N/A
	Climate Effects	No - Indirect
	Location	N/A
	Intensity	N/A
	Frequency	N/A
	Duration	N/A

Overview: As of spring 2023, no research has shown a direct link between climate change and current or historic landslide events in New York State. However, landslides may be impacted by climate change in the future. The underlying conditions and causes of landslides, such as bedrock stability and heavy rain events, are influenced by climate-related trends like temperature increases, sea-level rise, and extreme precipitation events. Unseasonably warm days leading to rapid snowmelt, as well as extreme precipitation events, can make the ground overly saturated. This, in turn, creates an unstable environment on steep slopes, which can cause landslides. Warming trends and increasingly frequent and intense extreme precipitation events will only continue to become more common due to climate change.

As climate change continues, the existing equilibrium between landscape development and climate that New York has experienced since the end of the last Ice Age will change. Increased precipitation amounts and more frequent extreme precipitation events will lead to the development of a new equilibrium. This adjustment in equilibrium will likely increase incidence of landslide events.

The location of climate-influenced landslide events remains difficult to model. However, modern, detailed geological mapping at the quadrangle or county scales over a LiDAR terrain base map may be the best predictive tool to identify areas susceptible to future landslide hazards.

LIGHTNING	**Geographic Specificity**	Regional/National/Global/non-U.S.
	Climate Effects	Yes - limited study
	Location	Largely uncertain, but certain types of lightning flashes may become more common in the Northeast.
	Intensity	Uncertain
	Frequency	Climate change may make lightning more common because it occurs more frequently in warmer temperatures.
	Duration	Long-continuing-current lightning flashes (intense lightning flashes that are longer in duration and more likely to spark fires than other types of lightning) may become more common, although not significantly so in the Northeast.

Overview: Research on how climate change may affect lightning is limited. One model projected that the number of lightning strikes in the U.S. will increase 12% for every degree increase of global average air temperatures. A more recent study in Europe projected the impacts of climate change on lightning would be location-specific, with some areas experiencing more lightning strikes and some experiencing less, largely based on latitude. Although projections of changes to intensity and duration remain limited, one study suggested that long-continuing-current lightning flashes (intense lightning flashes that are longer in duration and more likely to spark fires than other types of lightning) may become more common, though not significantly so in the Northeast. Ultimately, although specific impacts to lightning remain uncertain, lightning occurs more frequently in warmer temperatures, so it may be reasonable to see some level of increased lightning occurrence with projected climate change.

As of early 2023, there is no clear change in lightning frequency or intensity in the U.S. Although there have been an increasing number of lightning-caused fires in the western U.S., this is due largely to dry conditions, rather than a change in the frequency or intensity of lightning itself.

SNOWSTORM	**Geographic Specificity**	Regional
	Climate Effects	Yes
	Location	The Northeast as a whole can expect fewer snowstorms due to climate change.
	Intensity	Extreme snowstorms, including lake-effect snowstorms, may become more frequent relative to historic levels. However, this trend may not hold toward the end of the 21st century as temperatures continue to increase. In the future, snowstorms—albeit rarer—may produce more snow than has historically been the case.
	Frequency	Overall, snowstorms are expected to become less frequent due to warming temperatures.
	Duration	Snow season is projected to become shorter, but changes to snowstorm duration are uncertain.

Overview: In the Northeast, although snow events may become less common and snow season may be shorter due to higher average temperatures, extreme snowstorms (including lake-effect snowstorms) may increase in frequency relative to historical levels. However, this trend may not hold toward the end of the century as warming continues to increase. One study suggested that, although snowstorms will likely become less common due to atmospheric warming, when temperatures are cold enough, they will produce more snow than has historically been the case. Climate-linked changes to snowstorm duration are unclear at this time.

Many areas in the Northeast have experienced record snowstorm events in recent years. The relative increase in extreme snowstorm events over recent decades has been linked to climate change.

TORNADO	**Geographic Specificity**	Regional
	Climate Effects	Yes - limited study
	Location	Tornadoes may become more common in New York.
	Intensity	Tornadoes may become more intense in New York due to climate change.
	Frequency	Tornadoes may become more common in New York.
	Duration	Uncertain
Overview: The connection between climate change and tornadoes is unclear. Because tornadoes are short-term events, lack reliable historical data, and have a localized nature that is difficult to integrate into climate models, projecting the effects of climate change on them is difficult. However, a recent study used models to project that supercells (the thunderstorms that produce most tornadoes) will become more frequent and intense, more common in the late winter and early spring, may be more likely to produce tornadoes, and become somewhat more common in New York. The researchers hypothesized that because of this, tornadoes would become increasingly frequent and intense. Changes in tornado duration due to climate change, if any, remain uncertain.		

WILDFIRE	**Geographic Specificity**	State/Regional/National
	Climate Effects	Yes
	Location	Uncertain
	Intensity	Uncertain
	Frequency	Wildfire occurrence is projected to increase in New York, but baseline occurrence levels are so low that this increase is not expected to have a meaningful effect.
	Duration	Uncertain
Overview: Wildfires are directly impacted by climate change. Climate change will lead to warmer temperatures and drought conditions, which create an environment ripe for fires, particularly in the western U.S. Information on the impacts of climate change on wildfire frequency, intensity, duration, and location in New York State is currently limited. Generally, it is not expected that climate change will make wildfires a significant hazard of concern in New York. Climate change has already exacerbated wildfires in the western U.S., with roughly half of the increase in burned area in that region between 1984 and 2015 attributable to anthropogenic climate change. Though the duration of wildfires is to some extent determined by fire suppression efforts, the duration of wildfire season, particularly in the western U.S, has increased due to warmer temperatures. Wildfire occurrence is projected to increase in New York, but baseline occurrence levels are so low that this increase is not expected to have a meaningful effect. Impacts on the duration and intensity of wildfire in New York are currently unclear.		

WIND	**Geographic Specificity**	Global
	Climate Effects	Uncertain
	Location	Uncertain
	Intensity	Generally, the Intergovernmental Panel on Climate Change (IPCC) projects that surface winds will weaken over time in the Northeast due to climate change.
	Frequency	Uncertain
	Duration	Uncertain
Overview: The understanding of the relationship between climate change and wind is still emerging. The impacts climate change may have on wind location, frequency, and duration appear to be uncertain. Nonetheless, the IPCC projects that surface winds will weaken over time in the Northeast due to climate change. Despite this projection, wind speeds have strengthened over the past decade, reversing a roughly 30-year stilling trend. However, it is unclear whether this is linked to climate change.		

Overall, the county will continue to become warmer and wetter with end-of-century annual average temperatures projected to be 58.1°F and annual total precipitation to be 52.5 inches. Based on the average across several climate models, all seasons are projected to see a rise in both temperatures and precipitation.

The climate science indicates a future of increased temperatures and shifting precipitation patterns for Orange County and New York State. The 2011 ClimAID report and its 2014 supplement highlight the need for Orange County to prepare for the following climate change projections and predications:

- 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.
- Summer drought is projected to increase, affecting water supply, agriculture, ecosystems, and energy production.
- Rate of occurrence for heating and cooling days (respectively, days warmer than 90°F and cooler than 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. These can lead to flooding and related impacts on water quality, infrastructure, and agriculture.
- Major changes to ecosystems—including species range shifts, 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 as a result of sea-level rise. Rising sea levels have the potential to impact the Hudson River and adjacent communities.

Growth and Development Trends

According to the 2020 U.S. Census,[7] the population of Orange County was 401,310 in 2020, reflecting a growth of 28,497 people compared to the 2010 U.S. Census data (372,813 people). By July 1, 2023, the population was estimated at 407,470. This increase in population over the past decade reflects steady growth within the county. Between 2000 and 2020, Orange County grew by 1.5% overall. The Village of Kiryas Joel grew by more than 27% over that 20-year period (the most significant increase within the county), whereas the City of Port Jervis experienced a decrease of 2.3% (the largest population reduction observed within Orange County between 2020 and 2023). The county's current rate of growth is now again above both the national (7.2%) and state (3.9%) rates of growth since 2010. Orange County is the 7th most populous county in New York State outside of New York City and the 12th most populous county in the state. As the COVID-19 pandemic unfolded, many residents from New York City relocated to Orange County, attracted to the county's quality of life, relatively lower housing cost, and access to highspeed internet that enabled parents to work from home and their children to participate in remote schooling. The pandemic also showed the value of the county's open space as many people sought outdoor activities in Orange County's parks as well as its Heritage Trail, which attracted residents and hundreds of visitors from the surrounding region.[6]

Since 2019, the county has experienced a significant increase in the siting and construction of warehouse distribution and manufacturing facilities. National companies, including Amy's Kitchen, Amazon, Tesla, and Medline, have chosen to establish facilities in Orange County due to its strategic location in the northeastern United States. The New York State Thruway, Interstate 84, and NYS Route 17 (future I-86) traversing Orange County offers unparalleled access to markets. Orange County is also home to Stewart International Airport, a significant hub for air freight, as well as to a growing domestic and international commercial airline business.

The county has experienced an unprecedented period of growth. In 2021, a total of 574 mandatory Geography Markup Language (GML) 239 referrals were sent to County Planning by municipalities. A total of 1,848 dwelling units and 9.3 million square feet of mixed nonresidential development were proposed that year. In 2022, there were a total of 567 mandatory GML 239 referrals sent to County Planning. Residentially, 3,603 building lots and multifamily dwelling units were proposed. Commercially, 17.7 million square feet of building area was proposed countywide, of which 16.6 million square feet of that total being proposed warehouse space, in addition to 568 hotel rooms or other temporary lodgings as well as solar installations generating more than 73 MW of power. Of the 35 notable projects, 31 are located within or partially within the designated Priority Growth Areas as defined in the Orange County Comprehensive Plan.

[6] Orange County 2023 Comprehensive Plan.

Land Use

Land use within Orange County is mixed, with the majority of tax parcel use reflected in the following land use categories: agriculture, residential, commercial, and vacant land. Figure 3 displays the portion of land assigned to each land use classification in Orange County.

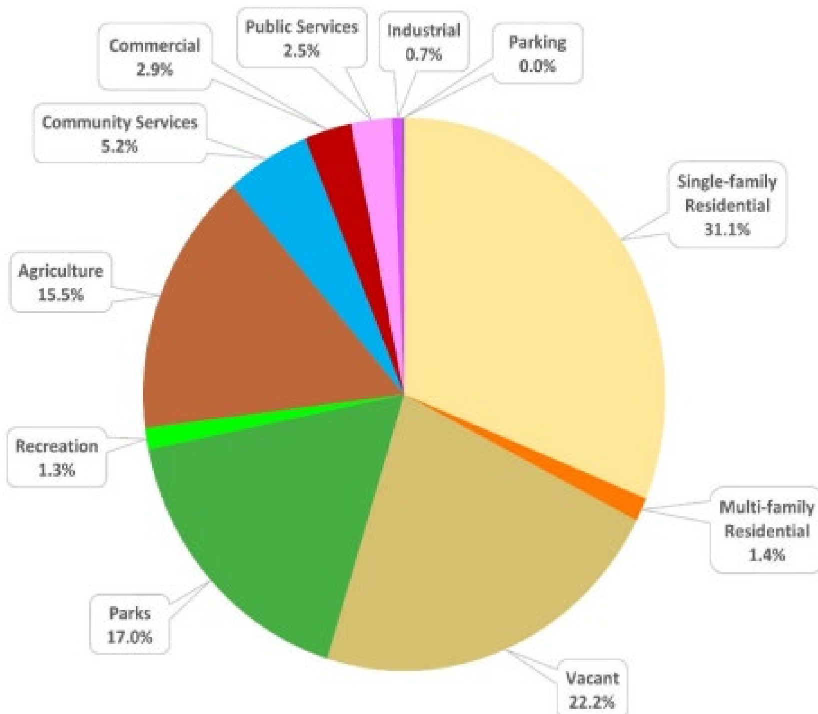

Figure 3: Orange County Land Use Classification

Agriculture

In Orange County, there have historically been two agricultural districts: District No. 1 and District No. 2. New York State Route 17 was used as the dividing line between the two districts. These districts were established in 1972 and were reviewed in 1980, 1988, 1996, 2005, and 2012. As of 2019, there were 68,176 acres in District No. 1 and 94,683 acres in District No. 2. The 2020 review process resulted in modifications that propose a 13% decrease in the acreage of agricultural districts, as demonstrated in Figure 4.

			Modifications to 2019 district parcels									
	2019 District Statistics		Add		Remove		Keep		Proposed District in 2020		Change from 2019	
Municipality	# Parcels	Acreage	# Parcels	Acreage	# Parcels	Acreage	# Parcels	Acreage	# Parcels	Acreage	Acreage Change	Percent Change
Blooming Grove (T)	546	6,677	6	186	396	1,296	150	5,382	156	5,568	-1,110	-17%
Chester (T)	668	5,659	5	46	423	1,314	245	4,346	250	4,392	-1,267	-22%
Cornwall (T)	166	2,365	9	1,059	90	372	76	1,994	85	3,052	687	29%
Crawford (T)	1,112	14,994	4	61	556	1,380	556	13,613	560	13,675	-1,319	-9%
Deerpark (T)	145	3,188	5	191	74	225	71	2,962	76	3,154	-34	-1%
Goshen (T)	1,984	19,158	8	697	1,027	4,122	1,066	15,036	1,074	15,733	-3,425	-18%
Greenville(T)	282	5,729	8	345	74	454	208	5,274	216	5,619	-109	-2%
Hamptonburgh(T)	681	9,132	6	64	404	1,383	277	7,750	283	7,813	-1,319	-14%
Minisink(T)	1,003	11,924	0	0	590	1,778	413	10,146	413	10,146	-1,778	-15%
Monroe(T)	12	132	0	0	0	0	12	132	12	132	0	0%
Montgomery(T)	1,075	15,763	5	171	596	2,393	479	13,369	484	13,541	-2,222	-14%
Mount Hope(T)	362	6,341	9	284	203	1,452	159	4,889	168	5,173	-1,168	-18%
Newburgh(T)	304	3,401	5	123	152	530	152	2,871	157	2,994	-407	-12%
New Windsor(T)	272	3,174	12	251	173	313	99	2,860	111	3,112	-62	-2%
Palm Tree(T)	1	21	0	0	1	21	0	0	0	0	-21	-100%
Wallkill(T)	999	11,662	3	86	554	1,398	445	10,264	448	10,350	-1,312	-11%
Warwick(T)	2,905	29,715	38	840	1,215	3,556	1,690	26,159	1,728	27,000	-2,715	-9%
Wawayanda(T)	1,473	16,077	5	103	797	2,524	676	13,553	681	13,656	-2,420	-15%
Woodbury(T)	3	152	0	0	0	0	3	152	3	152	0	0%
Chester(V)	193	279	2	17	101	50	92	230	94	247	-33	-12%
Florida(V)	164	299	0	0	0	0	164	299	164	299	0	0%
Goshen(V)	1	7	0	0	0	0	1	7	1	7	0	0%
Maybrook(V)	1	4	0	0	0	0	1	4	1	4	0	0%
Montgomery(V)	5	52	0	0	0	0	5	52	5	52	0	0%
S. Blooming Grove(V	6	152	0	0	1	3	5	150	5	150	-3	-2%
Warwick(V)	238	283	0	0	236	270	2	13	2	13	-270	-95%
Washintonville(V)	3	49	3	155	0	0	3	49	6	205	155	315%
COUNTYWIDE TOTALS:	**14,604**	**166,389**	**133**	**4,680**	**7,663**	**24,832**	**7,050**	**141,557**	**7,183**	**146,237**	**-20,152**	**-12%**

Figure 4: Proposed Modifications to Orange County's Agricultural Districts

Although the amount of land used for agriculture in Orange County has been decreasing in recent decades, it should be noted that the noticeable decrease in district acreage is also due to the extensive mapping process undertaken in 2020, which enabled the county to remove a significant number of parcels that were not being used for agricultural production. These removals were predominantly small residential lots but also included industrial, commercial, and other non-agricultural parcels. Despite these removals, the proposed modifications in 2020 retain just under 27% of the county within the district.

In 2023, the county proposed to combine the two districts into one district called "Orange County Agricultural District No. 1." This consolidation will simplify administrative procedures such as completion of agricultural data statements (a requirement for certain land use proposals at the municipal level) and would especially benefit those municipalities that have been divided by Route 17 into two districts; in some cases, parcels themselves have been divided into two districts. The County proposes this consolidation because having two districts provides no clear benefit.

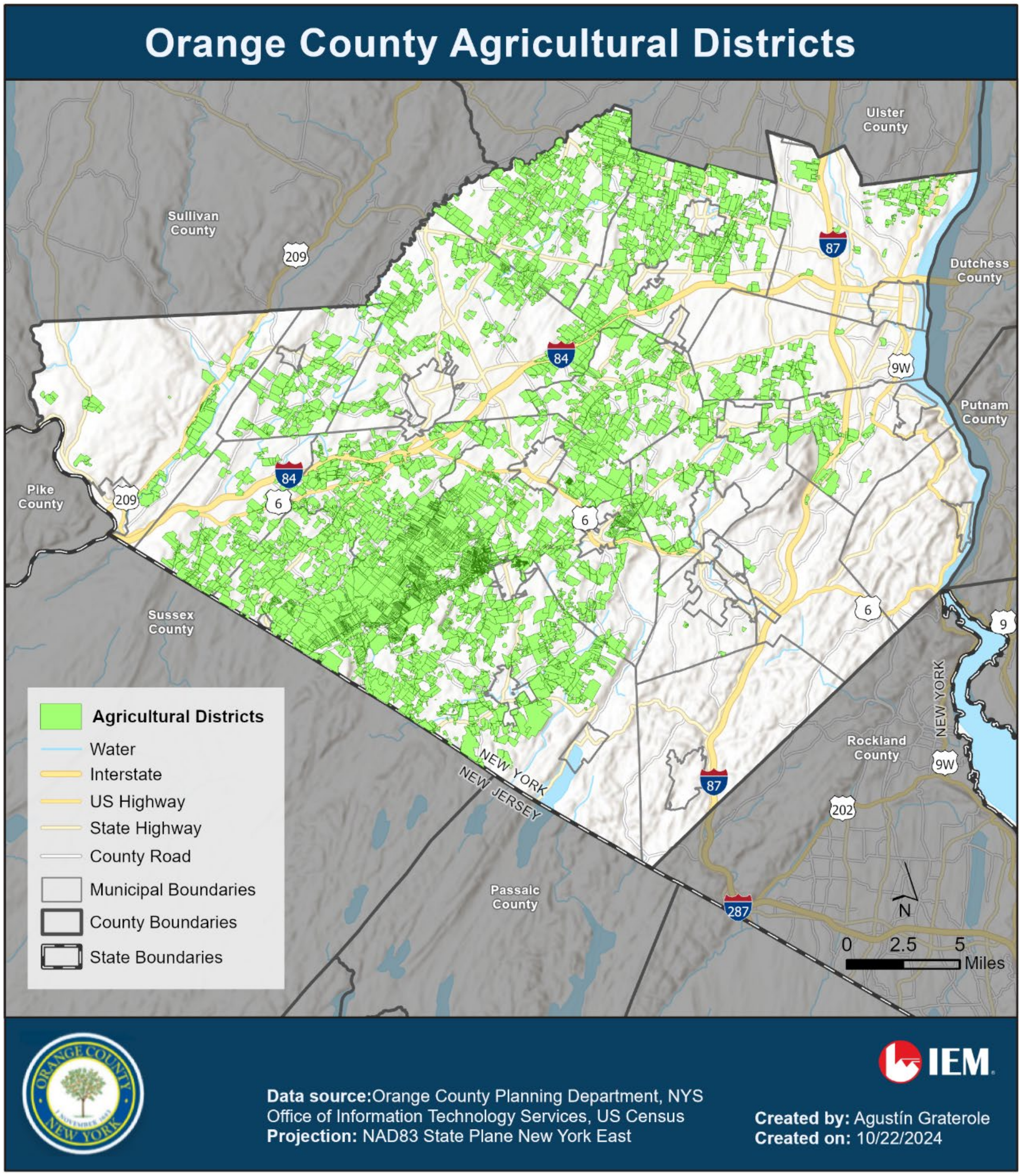

Figure 5: Orange County Agricultural Map

Most areas of high residential intensity are concentrated in the eastern half of the county within the Villages, especially the Village of Kiryas Joel, and around the Cities of Middletown, Newburgh, and Port Jervis. A total of 158,218 acres are classified as residential use, representing 29.5% of lands within the county. Although commercial use is scattered throughout the county, large tracts are centered around the Town and City of Newburgh, the Town of Blooming Grove, and the Town of Wallkill, just east of the City of Middletown. This accounts for 3% of land use within the county, representing 16,275 acres of land.

Orange County created an open space fund soon after that Open Space Plan's completion in recognition of the need The County's highest priority for rural areas is the protection of open space, which includes both working landscapes and natural resources to help preserve precious natural resources.[7] Since 2005, the county has helped to protect 2,995 acres of significant natural areas and working landscapes in the form of conservation easements and acquisitions, all in partnership with municipalities, New York State, and/or non-profit conservation organizations. Because maintaining active farmland is one of the most critical objectives in the Open Space Plan, and because the positive response from farmers was so strong, 18 of the 23 projects awarded Orange County open space funds are active farms, totaling 2,687 acres of productive agricultural land. Figure 6 shows the open space located throughout Orange County.

[7] Orange County Open Space Plan. https://www.orangecountygov.com/301/Open-Space-Plan.

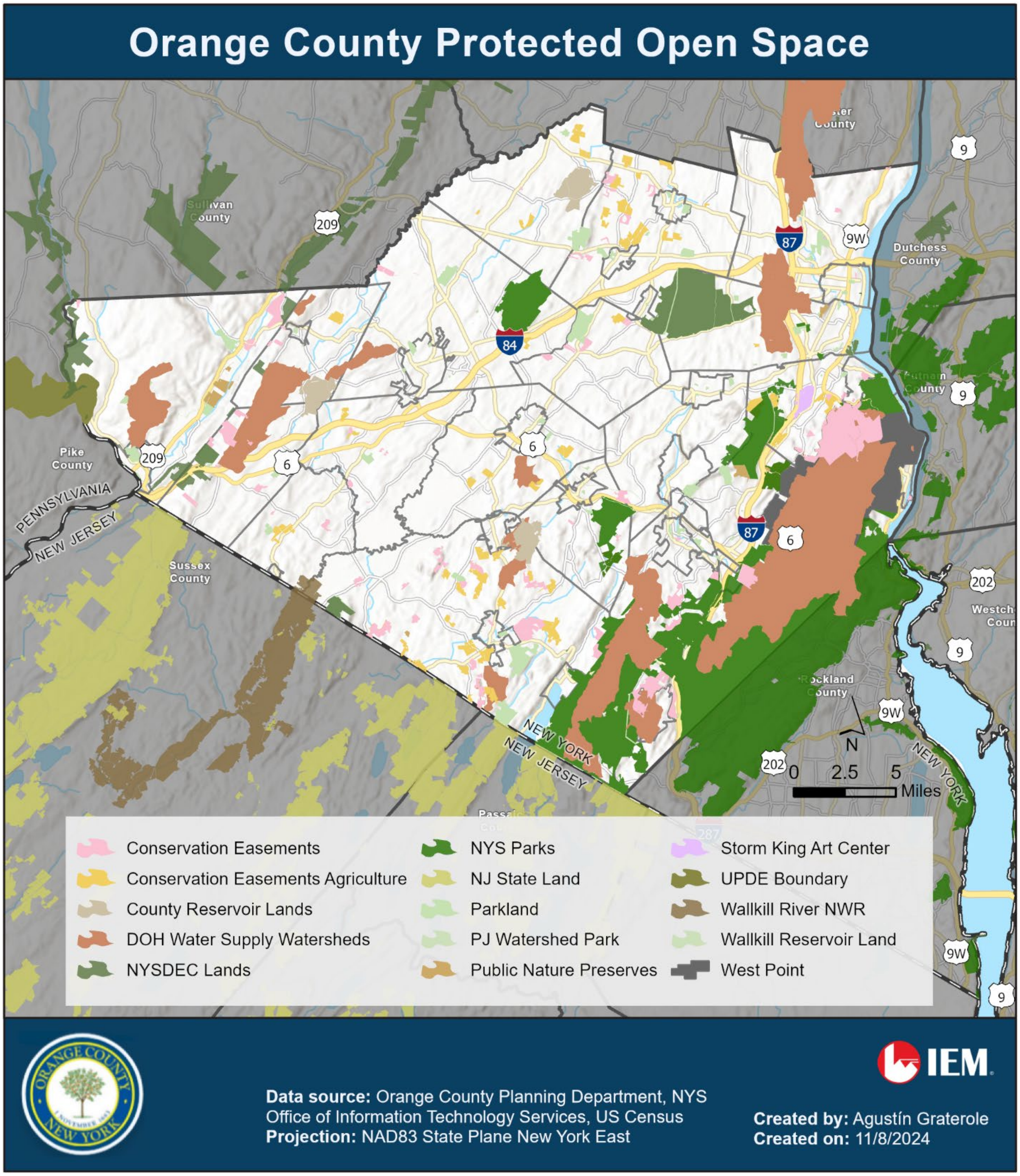

Figure 6: Orange County Open Space Map

Transportation

PORT

A passenger ferry runs across the Hudson River between Newburgh and Beacon. It mostly serves commuters using the Beacon Station on Metro North Railroad's Hudson Line, which, in turn, provides direct service to Grand Central Terminal in New York City. Privately operated marine terminals south of Newburgh load and unload cargo from barges and ships, including petroleum products and chemicals (via pipelines and tanker trucks) as well as construction materials (transported by truck).

RAIL

Over time, rail lines running through the county connecting New York City to points north and west continued expansion of Newburgh and helped develop Orange County's second-largest city, Middletown. Middletown grew at the junction of several rail lines, including the Erie Railroad's Main Line and the New York, Ontario and Western Railway. The Erie Railroad's Main Line, which connected the Hudson River at Piermont, New Jersey with Lake Erie at Dunkirk, New York, also spurred development of several villages in central Orange County, including Harriman, Monroe, Chester, and Goshen. Maybrook was formerly the site of a major rail yard and a west-bound switching point between railroads in New England. Railroads also helped Montgomery, Walden, and Warwick prosper by giving industries their lower-cost access to seaports along the Hudson River and consumer markets along the East Coast.

ROADS AND BRIDGES

A third form of development in Orange County followed the construction of the New York State Thruway, the Governor Mario M. Cuomo Bridge (formally known as the Tappan Zee Bridge), and a network of interregional and interstate highways that provided fast connections for people (in cars and buses) and freight (on trucks) between Orange County and the rest of North America. Car ownership allowed people to live in more spread-out, suburban-style residential developments that were separated from offices, schools, shopping centers, restaurants, services, and recreation, but still linked to them by a network of county roads. Bus companies began to offer one-seat rides from villages (and, later, park-and-ride lots) in Orange County to the Port Authority Bus Terminal in Manhattan. Orange County residents also drove themselves to jobs at companies who were relocating from Manhattan to suburban areas like Bergen County, New Jersey, and Westchester County, New York.

Trucking companies and wholesale traders built warehouses and distribution centers on relatively cheap land in Orange County near major interregional highways. In many ways, Orange County is increasingly being integrated into the larger New York metropolitan region. This larger multi-state metropolitan region is the largest such area in the nation in terms of population and one of the largest in the world, as approximated by the U.S. Census Bureau's New York Metropolitan Statistical Area (MSA). The New York MSA is home to more than 20 million people (2015 estimate) and covers 25 counties. The transportation system of the multi-state metropolitan region is large, complex, and aging, tied together by a network of highways, rail lines, bridges, tunnels, and other infrastructure. In terms of daily trips made between the subareas, the majority of these inter-area trips are made between New York City and northern and central

New Jersey, between New York City and suburban Long Island, and between New York City and the Lower Hudson Valley. These three sets of inter-area trips also feature significant proportions of transit trips. Although highways—as well as the cars, buses, and trucks that use them—have transformed Orange County and the broader region, the county has been able to maintain a healthy mix of communities, open space, agriculture, and industry. Aside from limited areas of suburban-style development around Newburgh, Middletown, Woodbury, Monroe, as well as near major highway interchanges, Orange County has largely retained its rural and small town character, with agricultural areas, natural features, and open space dotted with villages, hamlets, and rural crossroad communities.

Finally, there are several significant bridges at key connections points in Orange County. The Newburgh-Beacon Bridge carries I-84 over the Hudson River connecting Orange County with Dutchess County. A portion of the Bear Mountain Bridge is in the Town of Highlands and connections Orange County/Rockland County, on the western banks of the Hudson, with Dutchess County/Putnam County to the east. The I-84 Bridge crosses the Delaware River into Pennsylvania. The Mid-Delaware Bridge carries US-6/US-209 over the Delaware River as well, connecting the City of Port Jervis, NY, with the Borough of Matamoros, PA.

AIRPORTS

Orange County has four airports. The largest is Stewart International Airport, which serves both the county and the region by facilitating the movement of both freight and people. Stewart International Airport (identification SWF) is operated by the Port Authority of New York and New Jersey. The county's three smaller airports consist of the Orange County Airport (identification MGJ) in the Town of Montgomery, Randall Airport (identification 06N) in the City of Middletown, and Warwick Airport (identification N72) in the Town of Warwick. In addition, there are numerous private airports in Orange County, although such facilities are smaller and do not experience high traffic volumes. Figure 7 provides the locations of Orange County transportation facilities.

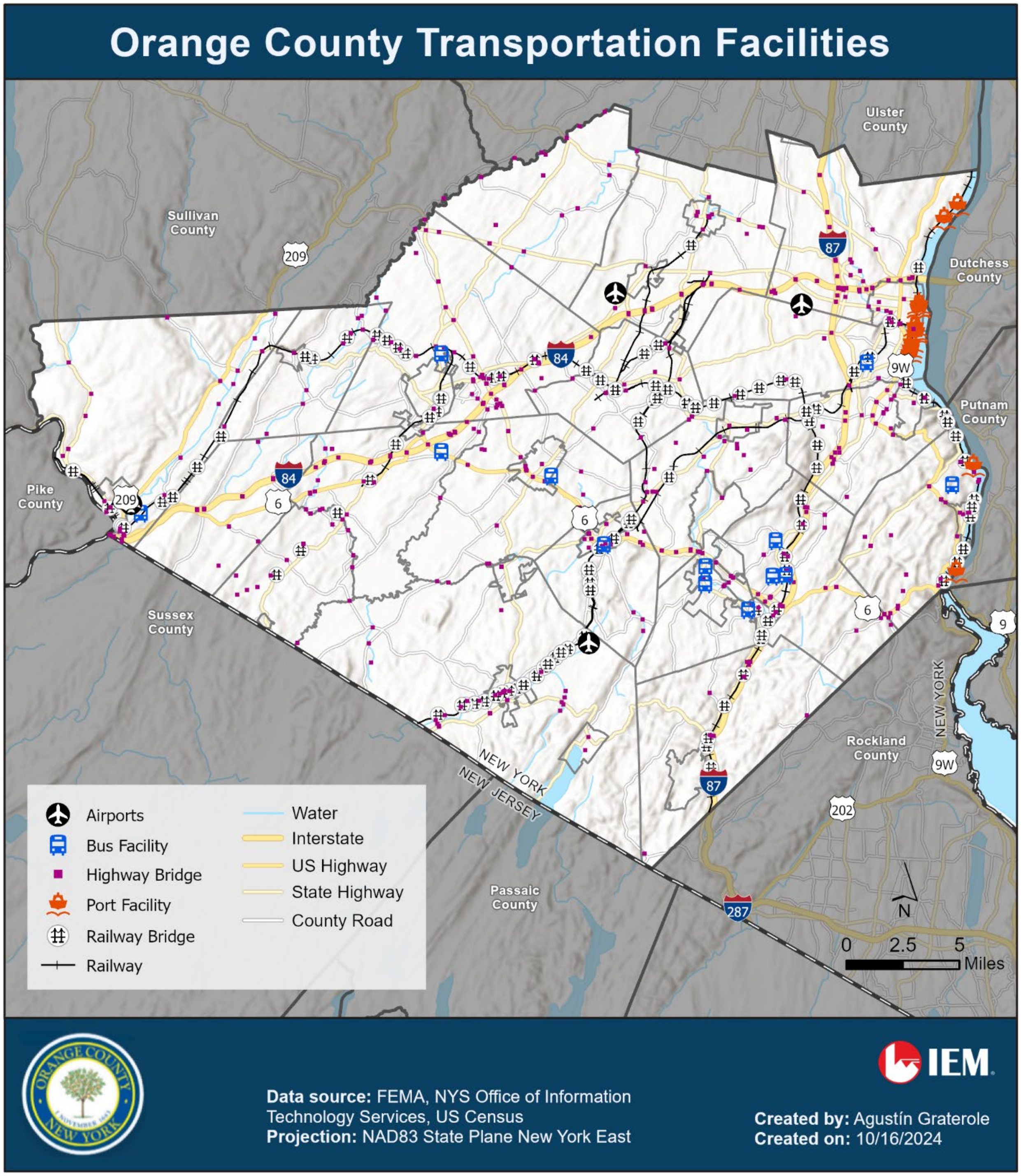

Figure 7: Orange County Transportation Facilities

Economic Characteristics and Employment

The unemployment rate in Orange County has decreased from 4.74% in 2015 to approximately 3.1% in 2024.[8] It remains lower than the average New York State unemployment rate of 4.0%. The largest industries in Orange County, NY, are Health Care & Social Assistance (29,009 people), Retail Trade (23,397 people), and Educational Services (21,651 people), and the highest paying industries are Management of Companies & Enterprises ($142,750), Utilities ($114,648), and Mining, Quarrying, & Oil & Gas Extraction ($96,587). Males in New York have an average income that is 1.27 times higher than the average income of females, which is $77,694. The income inequality in New York (measured using the Gini index) is 0.494, which is higher than the national average.[9]

Community Lifelines

FEMA's Community Lifelines are a framework for identifying and organizing critical services that are essential to the health, safety, and economic stability of communities before, during, and after a disaster. These lifelines include categories such as Safety and Security, Food, Hydration, Shelter, Health and Medical, Water Systems, Energy, Communications, Transportation, and Hazardous Materials. By focusing on these lifelines, FEMA aims to help communities prioritize the restoration of services that are vital to community resilience and recovery efforts. When a Community Lifeline is disrupted, it can create cascading impacts across other sectors, intensifying the effects of a disaster and prolonging recovery. The Community Lifelines framework, therefore, provides a structured approach for communities to safeguard essential services and better withstand and recover from emergencies.[10]

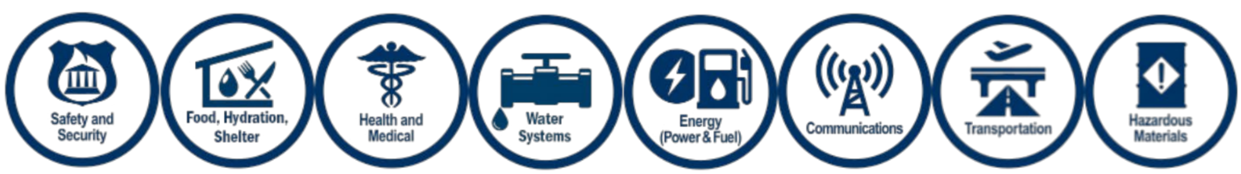

Figure 8: Community Lifelines

In updating the Orange County HMP, an important focus will be analyzing the vulnerability of each Community Lifeline to the hazards of prime concern identified in the plan. For each hazard—whether it's severe winter weather, flooding, or earthquake—the plan will assess which lifelines are at the greatest risk of disruption and what the potential impacts on the community could be. This assessment will enable Orange County to identify critical areas for mitigation actions and preparedness planning, thereby ensuring that the most vulnerable lifelines are bolstered against disruption.

[8] New York State Department of Labor, 2024. https://fred.stlouisfed.org/series/NYORAN1URN.
[9] Data USA. https://datausa.io/profile/geo/orange-county-ny/.
[10] FEMA. Community Lifelines. https://www.fema.gov/emergency-managers/practitioners/lifelines.

Critical Assets

Critical assets are facilities that provide important components to the quality of life of a municipality. These assets are necessary for the health, safety, well-being, and stability of communities. Many of the critical assets—including hospitals, medical facilities, and educational facilities—identified for each participating jurisdiction are clustered around the Cities of Newburgh, Middletown, and Port Jervis, as well as the villages and hamlets identified within the county. Large-scale critical facilities include Orange County Emergency Operations Center; Interstate Routes 87, 84, and 86; Metro-North commuter rail line; CSX Hudson River freight rail line and fuel storage facilities; Stewart International Airport with USDA reception center and Air National Guard barracks; two aqueducts for the New York City water supply system; Newburgh-Beacon ferry; Newburgh Beacon Bridge and Bear Mountain Bridge; West Point Military Academy; and Woodbury Commons Outlets Center.

Other, more ubiquitous—yet still critical—facilities include utility infrastructure (e.g., water tanks, electric substations, cell towers), banks, senior housing, mobile home complexes, boatyards, bus terminals, municipal buildings, community centers, correctional facilities, courthouses, dams, day care centers, schools, emergency operations, fire and police departments, highway facilities, human services, major industrial locations, medical facilities and hospitals, post offices, and sports complexes and facilities. The locations of critical facilities were considered during the risk assessment and hazard vulnerability components of this HMP process. Critical facilities identified on the local level are detailed in each participating jurisdiction's respective municipal section. Critical facilities are important to monitor and protect when considering measures to curb the effects of natural hazards, because any impacts to such facilities will likely cascade to other facilities, affecting exponentially larger numbers of people.

EMERGENCY FACILITIES

The Orange County Department of Emergency Services is responsible for county-wide emergency response, communications, planning, training, and recovery. The Orange County Emergency Operations Center is a facility designed to bring together representatives from numerous agencies and organizations to coordinate the many tasks associated with disasters and other major emergencies. This response is often graduated and tailored to meet the needs of the situation. This facility is located in Goshen. All of the jurisdictions participating in the 2024 HMP update are covered by local fire departments, police enforcement, and emergency medical services. There are 80 firehouses, 41 police barracks, and 26 EMS facilities located across Orange County.

HOSPITALS AND MEDICAL CENTERS

Hospitals and medical centers are scattered across Orange County. Most facilities are concentrated in areas of greater population density in the east and south. These facilities range in size and specialty with smaller medical establishments offer niche diagnoses, evaluations, and treatments. The Orange County Regional Medical Center is located in the center of the county in Town of Wallkill. In total, there are nine hospitals and 36 medical centers in Orange County.

SCHOOLS, COLLEGES, AND UNIVERSITIES

Primary educational facilities (elementary, middle, and high school) are scattered across Orange County and—much like medical centers—they are most concentrated in the more populated areas to the east and south. Secondary educational facilities (e.g., colleges, universities, technical training institutions) are located primarily in the City of Middletown (Orange County Community College) and the City of Newburgh (Mount Saint Mary's College). Both primary and secondary educational facilities can function as emergency shelters during major outages or disasters, due to their abilities to accommodate large numbers of people with basic services. In total, there are 115 educational facilities in Orange County.

RELIGIOUS SERVICES FACILITIES

Churches, synagogues, mosques, and other religious services facilities are important considerations for hazard mitigation efforts because of their capacity to accommodate many people at once. Just as with educational institutions and elder and childcare facilities, religious services facilities may also serve as local shelters and disaster preparation and response local management centers. There are 141 religious services facilities in Orange County.

POTABLE WATER

According to the 2010 Orange County Water Master Plan supplement to the county's Comprehensive Plan, the county relies on water from both surface and groundwater sources within the county's 11 watersheds. Most of the county's water supply is provided by 160 community water supply systems that draw fresh water from County reservoirs and aquifers; 131 of these rely on groundwater and 29 use surface water. There are 63 water districts that serve the county, some of which cross municipal boundaries. Eighty percent (80%) of the county's land area is serviced by individually owned wells that provide the only available fresh water, mostly to single-family residences. Eleven percent (11%) of the potable water in Orange County is from the New York City Aqueduct System, 56% comes from groundwater sources, and 33% comes from surface waters.

The Orange County Water Authority operates out of the Village of Goshen at the Orange County Government Center. There are also water plants in Newburgh and Warwick. There are 14 reservoirs across the county as well. Participating jurisdictions may discuss public water resources in their respective annexes. Although it is assumed that most municipal water systems facilities are not located within the floodplain, these jurisdictions will explore hardening/relocation opportunities for those that are located within the floodplain should such actions become necessary due to the incidence of flooding impacts.

WASTEWATER FACILITIES

The Orange County Sewer District #1 (OCSD No. 1) has a sewer treatment plant in Harriman. The Harriman STP is a 6 million-gallon-per-day facility that serves OCSD No. 1 and the Moodna Basin Southern Region (MBSR) in Orange County, New York. The treatment plant operations and maintenance are administered by the Orange County Department of Public Works – Division of Environmental Facilities and Services. Member communities in OCSD No. 1 include the Villages of Monroe, Kiryas Joel and Harriman and a portion of the Town of Monroe. The satellite municipal communities in the MBSR include the Town of Chester, the Villages of South Blooming Grove, Chester, and Woodbury, and a portion of the Town of Monroe. By necessity, critical wastewater facilities are located within the 500-year floodplain due to discharge requirements and gravity-fed systems optimization. Although relocation is neither desired nor feasible, participating municipalities will seek to harden these facilities where feasibly and fiscally possible.

ENERGY AND ELECTRICITY

Power in Orange County is transmitted and distributed by three investor-owned utilities: Central Hudson, Orange & Rockland and New York State Electric and Gas (NYSEG). Homes in the county are heated by many different sources, with a majority using fuel oil, utility-provided natural gas, propane and electric. There are nine electrical sub-stations, owned by Central Hudson, one sub-station owned by NYSEG, and 15 sub-stations owned by Orange & Rockland. In the Town of Newburgh, there is the Roseton natural gas facility and the Danskammer coal facility. In the Town of Wawayanda, a natural gas plant came online in 2018. The Indian Point Energy Center located across the Hudson River from Orange County in Westchester County permanently closed in April 2021.

COMMUNICATION

Orange County is served by a variety of communications systems, including traditional landline, fiber-optic, and cellular, provided by multiple companies such as Verizon, Direct TV, Cablevision, Time Warner Cable, AT&T, Dish Network, T-Mobile, Sprint, Warwick Valley Phone, Frontier, and Optimum Online. Each carrier has individual plans for emergency situations during hazard events and post-disaster recovery efforts. In addition to landline, fiber-optic, and cellular communications systems, Orange County has an extensive radio communications network that is utilized by emergency services agencies, hospitals, law enforcement, public works, transportation and other supporting organizations. Emergency and disaster information is also broadcast from three (3) local radio stations: WHUD, 100.7 FM, WFAS 1230 AM, and WJGK 103.1 FM. Additionally, there is a large and active amateur radio network within the county. This volunteer network serves to augment official government emergency services and related agencies during disaster events.

UNITED STATES MILITARY ACADEMY AT WEST POINT

The West Point Military Academy is in Orange County, which welcomes up to 40,000 visitors in a single day for football games, graduations, and high-profile visits—including Presidential visits, during which Stewart International Airport receives the President, who then travels through the county to West Point.[11] West Point is a 25.1-square-mile, census-designated place located within Orange County. Its population was 7,341 as of the 2020 U.S. Census.[12] The Village of Highland Falls and the Town of Highlands are adjacent to West Point. Originally a small fort built during the revolutionary war to control shipping on the Hudson River, West Point Academy was formally established by Congress in 1802. Since then, the

[11] Orange County CEPA, 2022.
[12] U.S. Census Bureau. 2020. https://data.census.gov/profile/West_Point_CDP,_New_York?g=160XX00US3680747.

Academy has grown to cover almost 16,000 acres (including training areas) and has become a substantial local employer as well as a significant visitor attraction.

As one of the most well-known features in Orange County, the U.S. Military Academy at West Point has long been a high-profile facility on both the local and national stages. The area is also somewhat prone to natural hazards such as flooding and rockslides, specifically near NYS Route 18, due to its terrain and proximity to the Hudson River. Wildfires have also posed a threat to the West Point area as recently as 1999.

INDIAN POINT ENERGY CENTER

The Indian Point Energy Center (Indian Point) is a retired nuclear facility located in the Town of Buchanan, New York (Westchester County), on the east bank of the Hudson River. Indian Point permanently stopped generating electricity on April 30, 2021, when it retired its last operating nuclear reactor, Unit 3, earlier than originally planned. Indian Point began operations in 1962 and produced over 565 terawatt hours (TWh) of electricity during the 59 years it was open. The retirement of Unit 3 subtracts almost 1,040 megawatts (MWs) of nuclear generating capacity from New York State, leaving about 3,200 MW of remaining nuclear capacity at three plants in Upstate New York.[13]

DAMS

A number of sources were used to identify the quantities and conditions of dams in Orange County. According to the U.S. Army Corps of Engineers National Inventory of Dams (NID), there are 114 dams located within Orange County, with 33 classified as "high hazard potential."

GOVERNMENT FACILITIES

Orange County also identified numerous government facilities as critical assets, including municipal offices, departments of public works (DPWs) properties, post offices, and courthouses. According to Geographic Information System (GIS) data, there are 97 municipal buildings, 54 post offices, 1 emergency operations center, 40 courthouses, 33 DPW facilities, and 2 NYS Department of Transportation facilities in Orange County.

ORANGE COUNTY DEPARTMENT OF EMERGENCY SERVICES

The Department of Emergency Services is composed of five divisions: Emergency Communications (911), Emergency Management, Fire Services, Police Liaison Services, and Emergency Medical Services. Each Division provides separate and unique services both to the public and to all emergency service agencies located within the county.[14] The OCDES Commissioner, who oversees the five divisions listed above, reports to the County Executive. The Department has 66 full-time employees, 56 of whom are assigned to the Division of Emergency Communications.

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[13] U.S. Energy Information Administration. "New York's Indian Point nuclear power plant closes after 59 years of operation." https://www.eia.gov/todayinenergy/detail.php?id=47776.

[14] Orange County Government. https://www.orangecountygov.com/303/About-Us.

The Orange County Department of Emergency Services is responsible for the following county-wide services:

- Oversees emergency dispatch and communications system that allows residents to dial 911 to receive emergency medical, fire, police, or other emergency help from any phone in the county
- Implements County Mutual Aid and Disaster Plans, which provide fire, emergency medical, and other agency assistance when local services have exceeded their local equipment and personnel resources
- Provides emergency medical personnel training in coordination with fire training with the NYS Office of Fire Prevention and Control

Vulnerable Populations

Orange County has a responsibility and commitment to ensure that its hazard mitigation plan helps achieve equitable outcomes through the mitigation planning process for all communities, including underserved communities and socially vulnerable populations. At-risk populations require special attention in emergency management because they are disproportionately affected by hazard events and natural disasters. These inequities must be addressed through mitigation actions.

Social vulnerability to hazards can be measured using FEMA's National Risk Index's Expected Annual Loss (NRI EAL) and the Centers for Disease Control and Prevention's Social Vulnerability Index (CDC SVI). These metrics identify variables associated with community risk and quantify them for comparison. The shape of these indices results in some limitations of how they can be used—particularly together. These data sets do have some limitations that need to be considered first. NRI and SVI use different methodologies to arrive at a risk score and, subsequently, the final scores differ: NRI scores range from 0 to 100 while SVI scores range from 0 to 15. To compare these values, the scores must be normalized. NRI and SVI are presented as percentile scores at the census-tract and county levels, which normalize highly variant data against other census tracts or counties to obtain a comparative sense of the measure. Some relatively high-ranked census tracts may exist in counties that are ranked relatively low compared to other counties in the state.

National Risk Index

The National Risk Index (NRI) is a dataset and online tool that illustrates the U.S. communities most at risk for 18 natural hazards. The NRI leverages available source data for natural hazard and community risk factors to develop a baseline relative risk measurement for each U.S. county and Census tract. The NRI defines risk as the potential for negative impacts as a result of a natural hazard. The risk equation comprises three components: a natural hazard component (Expected Annual Loss), a consequence enhancing component (Social Vulnerability), and a consequence-reduction component (Community Resilience). Using these components, a Composite Risk Index score and Hazard-Type Risk Index scores are calculated for each community (county and census tract) included in the Index.

Social Vulnerability Index

The CDC SVI is a tool designed to assess and measure the social vulnerability of communities. The SVI considers household characteristics, transportation, racial and ethnic minority status, and socioeconomic status because each factor plays a critical role in determining a community's ability to withstand and recover from disasters. By examining household characteristics, the SVI identifies populations that may have specific needs, such as elderly residents or single-parent households. Transportation access is crucial because limited mobility can hinder evacuation or access to essential services. Racial and ethnic minority status, along with socioeconomic factors, further highlight communities that may face barriers to resources, healthcare, or economic stability. Together, these factors provide a comprehensive picture of social vulnerability in Orange County, helping ensure that preparedness and response efforts are inclusive and equitable.[15] Figure 9 shows the overall SVI vulnerability of Orange County, New York.

[15] Agency for Toxic Substances and Disease Registry. SVI Overview. https://svi.cdc.gov/Documents/Publications/CDC_ATSDR_SVI_Materials/SVI_Poster_07032014_FINAL.pdf.

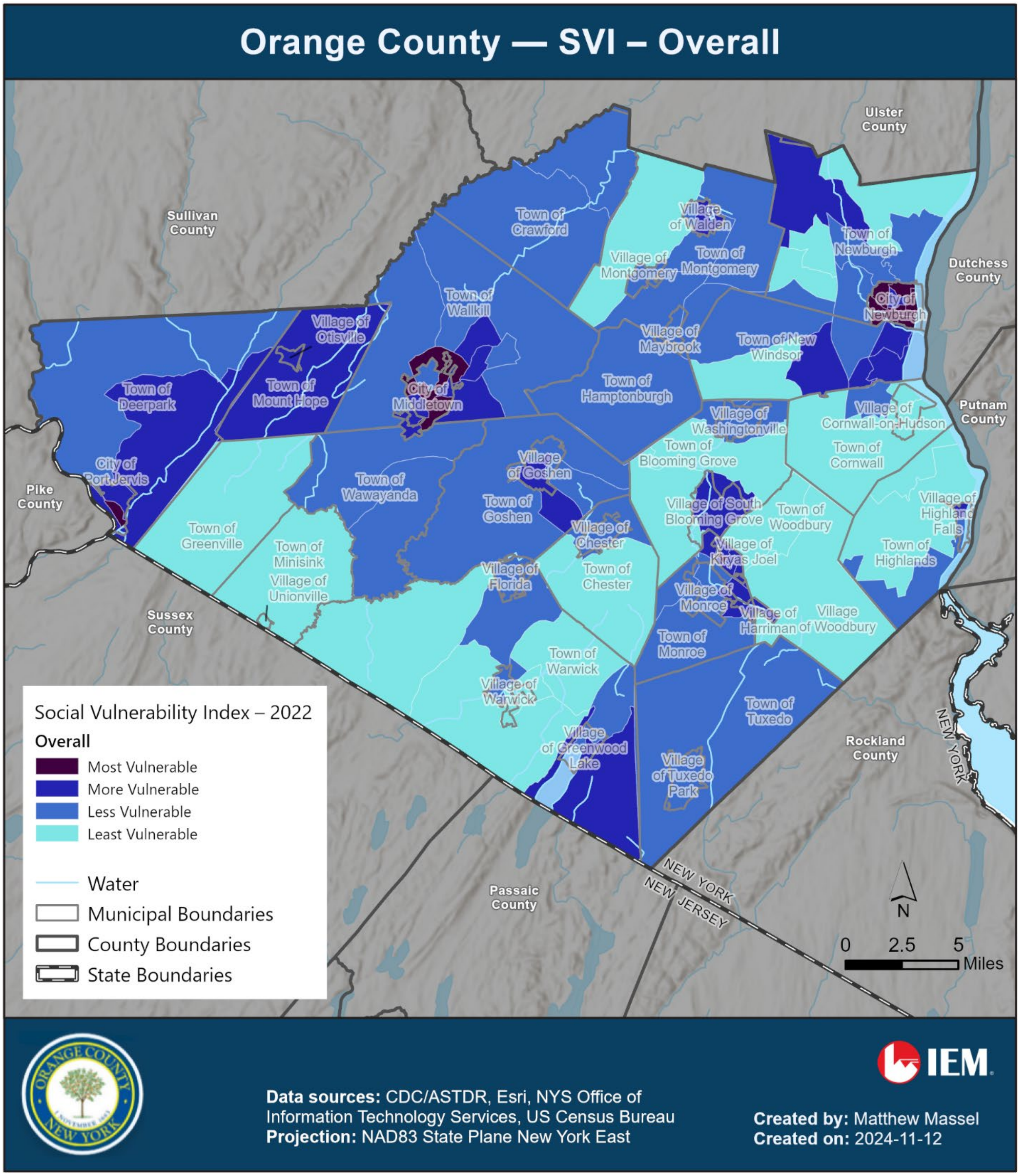

Figure 9: Orange County Overall Social Vulnerability Index

Household characteristics encompass various factors, including the presence of individuals living alone, single-parent households, and households with individuals over 65 or under 18. These groups may require additional support in emergencies due to physical, financial, or logistical limitations. Figure 10 illustrates the household characteristics in Orange County.

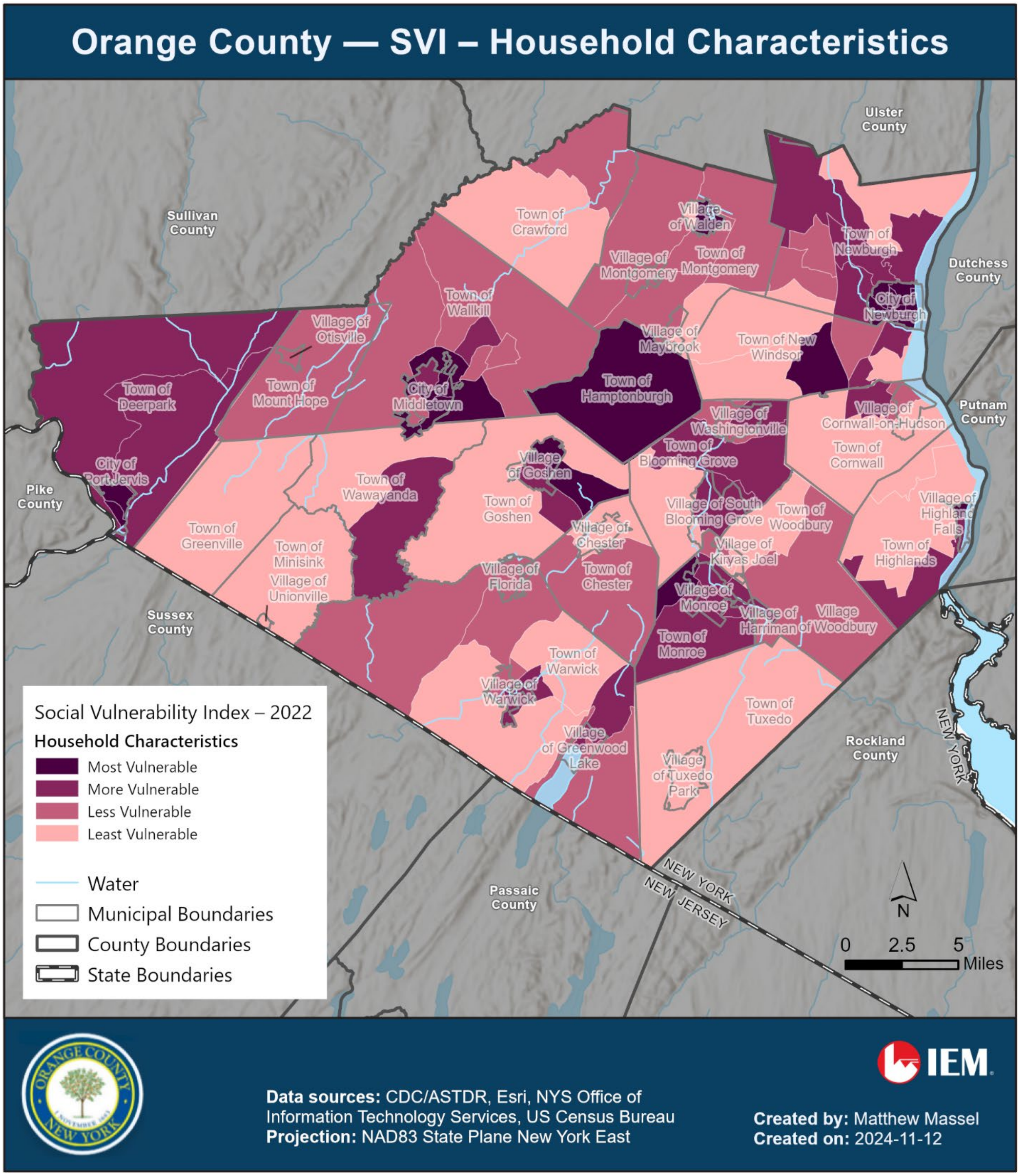

Figure 10: Orange County Social Vulnerability Index I Household Characteristics

Access to reliable transportation is essential for safety and mobility, especially during emergencies. The SVI assesses the number of households without a vehicle and those relying on public transportation, because lack of transportation can limit access to healthcare, jobs, and essential services. In Orange County, transportation limitations could impact evacuation and resource access, particularly in rural or lower-income areas. Figure 11 illustrates the housing type and transportation vulnerability for Orange County.

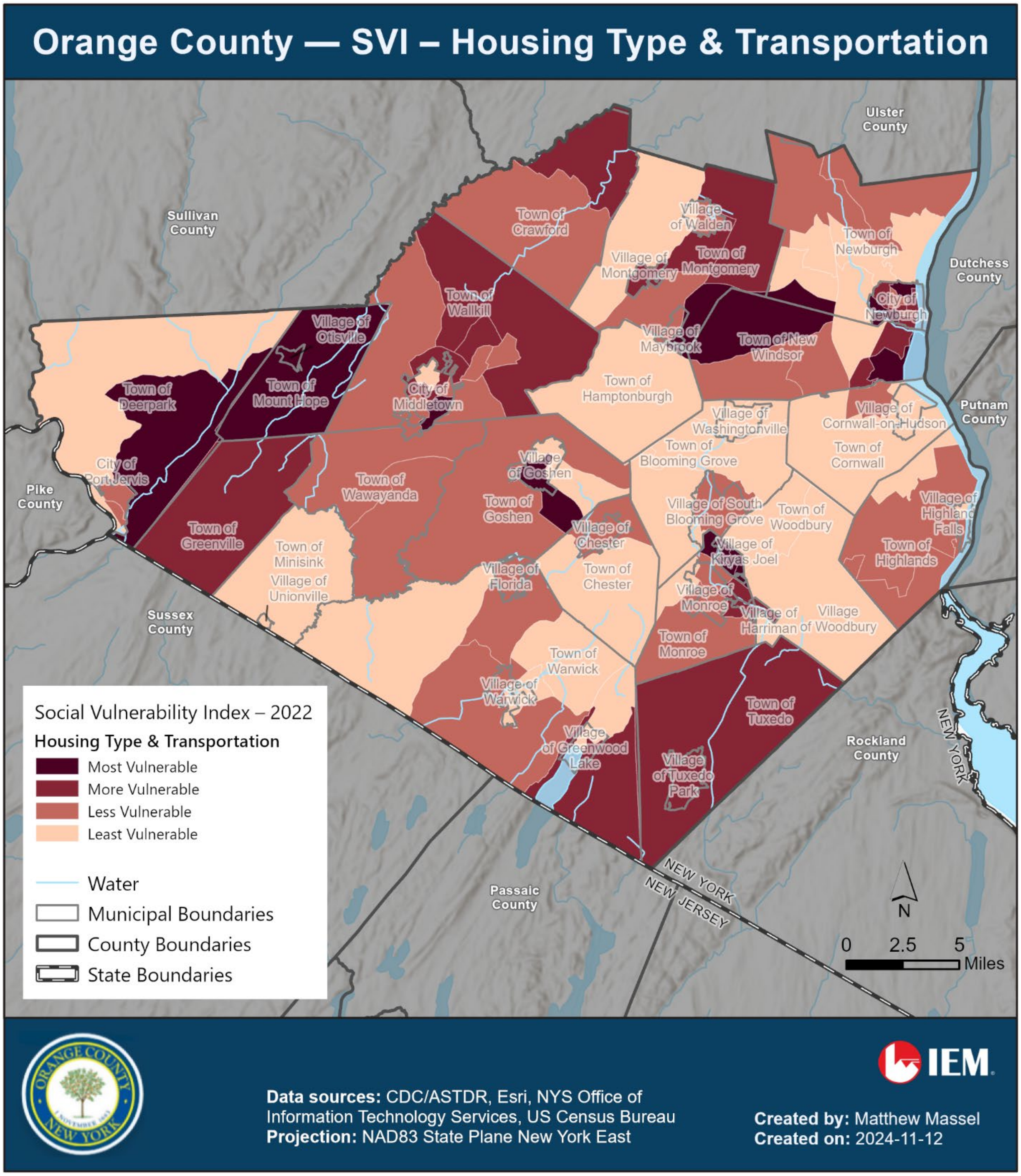

Figure 11: Orange County Social Vulnerability Index Housing Type and Transportation

The SVI also examines racial and ethnic minority populations, as these groups can face unique social, economic, and health disparities. Minority communities in Orange County may experience language barriers, historical underinvestment, and reduced access to healthcare, all of which can increase vulnerability during disasters or public health events. Figure 12 illustrates the racial and ethnic minority vulnerability in Orange County.

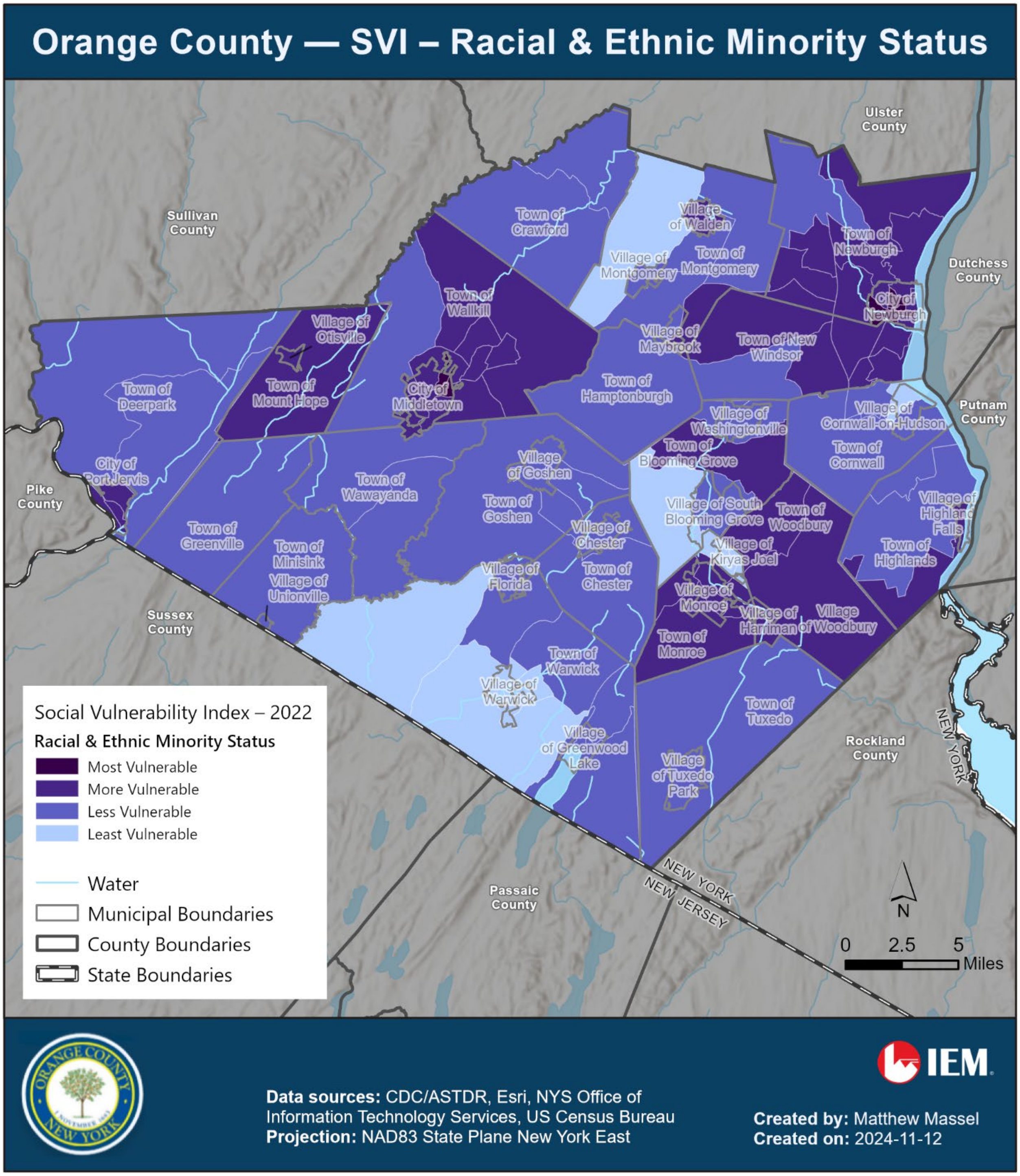

Figure 12: Orange County Social Vulnerability Index Racial and Ethnic Minority Status

Socioeconomic factors like income level, employment status, and educational attainment are strong determinants of vulnerability. Lower-income households in Orange County may have limited access to healthcare, lower-quality housing, and fewer resources to prepare for or recover from disasters. By identifying areas with high socioeconomic vulnerability, the SVI helps focus on communities. Figure 13 illustrates the socioeconomic statuses of various areas in Orange County.

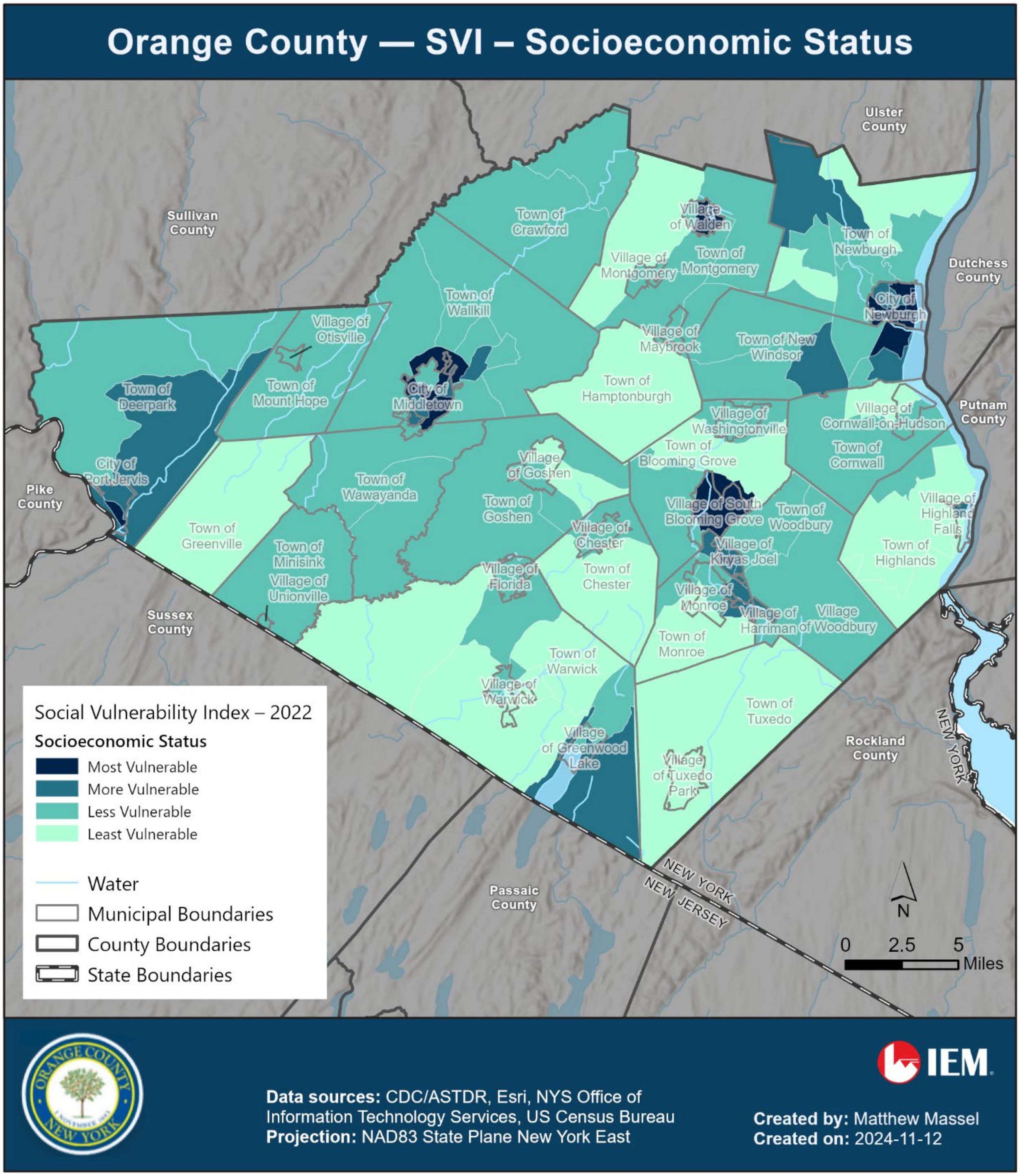

Figure 13: Orange County Social Vulnerability Index Socioeconomic Status

Social Vulnerability Index and National Risk Index

Figure 14 depicts the most at-risk counties based on two scoring methodologies: FEMA's NRI and CDC's SVI. Counties with a high NRI EAL (high risk) are brighter red, whereas counties with a high SVI score (high vulnerability) are brighter blue. If a county has a high score in both indicators, then the county will be a darker purple. Orange County ranks 10th among New York's most socially vulnerable counties.[16]

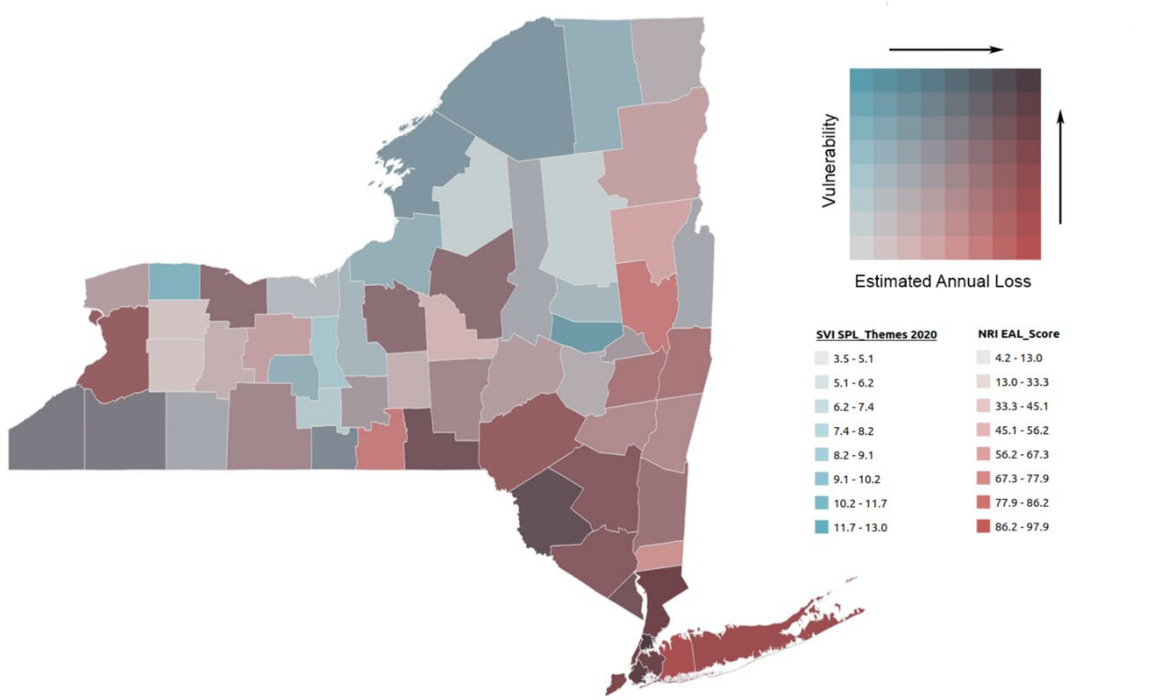

Figure 14: Statewide National Risk Index and Social Vulnerability Index Score Bivariate County Map

[16] New York State Hazard Mitigation Plan. 2023. https://mitigateny.org/nys_risk_environment/people_and_communities/social_vulnerability.

Planning Process

This section of the plan outlines the planning process, detailing who contributed to the development of this document, the steps taken to complete each phase, and how public involvement was incorporated throughout the process. During the plan's development, information was gathered from various participating jurisdictions, state, federal, and local agencies as well as from community members, business owners, and other stakeholders. Representatives from the Planning team were responsible for collecting data and information from their respective jurisdictions or areas of expertise. The content of this plan reflects the outcomes of a comprehensive planning process that benefited from the input of numerous jurisdictions and community members.

Resources and Information Collection

The planning process followed for the development of the 2024 Orange County HMP update is consistent with the guidelines provided in the State Mitigation Planning Policy Guide,[17] the Local Mitigation Planning Policy Guide[18] and the New York State Hazard Mitigation Planning Standards.[19]

In addition to these references and Orange County's existing Hazard Mitigation Plan (2018), the following County and Regional documents were reviewed and considered during the development of the HMP update:

- Orange County Comprehensive Plan (2019)[20]
- Wallkill River Watershed Conservation and Management Plan (2013)[21]
- Moodna Creek Watershed Conservation and Management Plan (2010)[22]
- Quassaick Creek Watershed Plan Report (2014)[23]
- Agricultural and Farmland Protection Plan (2015)[24]

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[17] FEMA. "State Mitigation Planning Policy Guide." https://www.fema.gov/sites/default/files/documents/fema_state-mitigation-planning-policy-guide_042022.pdf.
[18] FEMA. "Local Mitigation Planning Policy Guide." https://www.fema.gov/sites/default/files/documents/fema_local-mitigation-planning-policy-guide_042022.pdf.
[19] Division of Homeland Security and Emergency Services. "New York State Hazard Mitigation Planning Standards." https://www.dhses.ny.gov/system/files/documents/2021/12/2017-nys-mitigation-planning-standards.pdf.
[20] "Orange County, New York Hazard Mitigation Plan." https://www.orangecountygov.com/2102/County-Hazard-Mitigation-Plan.
[21] Hudson Watershed. "Wallkill River Watershed Conservation and Management Plan." https://hudsonwatershed.org/wp-content/uploads/2013/01/wallkill.pdf.
[22] Orange County, New York. "Moodna Creek Watershed Conservation and Management Plan." https://hudsonwatershed.org/wp-content/uploads/2013/01/wallkill.pdf.
[23] Orange County, New York. "Quassaick Creek Watershed Management Plan." https://www.orangecountygov.com/DocumentCenter/View/24533/Quassaick-Creek-Watershed-Plan-PDF?bidId=.
[24] Orange County, New York. "Orange County Agricultural and Farmland Protection Plan." https://www.orangecountygov.com/290/Orange-County-Agricultural-and-Farmland-.

- Orange County Transportation Council Long Range Transportation Plan (2023)[25]

The planning team members provided much of the event-specific information and details. Throughout the planning process, the public and other interested parties were provided numerous opportunities to provide input and comments.

Planning Mechanisms and Capabilities

Another important objective of updating the Orange County HMP is to incorporate the document into existing and future planning efforts and initiatives throughout the County. Elements of the plan will be considered during municipal and county development and comprehensive planning efforts. The approved HMP will also be an important resource for developing and updating Orange County emergency operations plans and procedures. This updated HMP will be incorporated into, considered during, and referenced by future updates and efforts at the county and municipal levels concerning the plans, policies, ordinances, programs, studies, reports, and staff included in Table 1.

Planning Team and Key Stakeholders

Two groups of selected and interested individuals were assembled to assist in various facets of information collection and document preparation and review: Planning team and Key Stakeholders. The planning team is represented by at least one municipal representative from each participating jurisdiction and is responsible for assisting in data collection, document review, and coordination efforts. The key stakeholders group includes various members of the community and adjacent governments, such as local elected officials, municipal employees, school officials, fire and emergency response personnel, neighboring counties and their representatives, utility contacts, and other interested community members.

Strategic meetings were held with the planning team and key stakeholders throughout the HMP development process. Appendix A provides meeting agendas, materials, PowerPoint presentations, and meeting notes. Participants and representatives who attended every meeting, as well as their affiliations related to the project, are also listed in Appendix A. Orange County mailed an invitation to every individual on this list in advance of the Stakeholders Workshop.

Jurisdiction Participation

To be included in the Orange County HMP, all interested jurisdictions were required to express their willingness to participate in the process and thereafter remain active participants throughout all stages of plan development. Active participation for each jurisdiction was gauged based on meeting attendance, information collection and research, plan review and comment, mitigation action submission, public review assistance, and final resolution to adopt the HMP. It was not necessary that a jurisdiction meet all

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[25] Orange County, New York. "Orange County, New York Long Range Transportation Plan 2050." https://www.orangecountygov.com/DocumentCenter/View/29739/OCTC-Long-Range-Transportation-Plan-LRTP-2050-PDF.

listed criteria (e.g., meeting attendance) to be considered a participating member. Nevertheless, each jurisdiction was expected to participate and provide relevant information, such as by initiating follow-up email correspondence after missed meetings to catch up. The Orange County Division of Emergency Management and its consultant made a concerted effort to follow up with jurisdictions that needed more representation at project meetings.

Overall, it was determined that ? of the 43 jurisdictions within Orange County (including the Orange County Government itself) met the participation requirements and are, therefore, included and considered in this document. Participating jurisdictions and their representatives are listed in Table 1. All participating jurisdictions have agreed to pass a resolution to adopt the HMP after NYS DHSES and FEMA review and approval. These resolutions will be added to Appendix B, as they are adopted. For now, a sample resolution is provided.

Table 1: Participating Jurisdictions within Orange County

Jurisdiction	Primary Contact	Position
City of Middletown	Joseph Stefano	City Mayor
City of Newburgh	Francis Spinelli	Acting Fire Chief
City of Port Jervis	Thomas Vicchiariello	Local Emergency Manager
Town of Blooming Grove	Robert Jeroloman	Town Supervisor
Town of Chester	Brandon Holdridge	Town Supervisor
Town of Cornwall	Joseph Gebert	Police Chief
Town of Crawford	Daniel McCann	Coordinator of Safety and Security
Town of Deerpark	Gary Spears	Town Supervisor
Town of Goshen	Broderick Knoell	Highway Superintendent
Town of Greenville	John Bensen	Town Supervisor
Town of Hamptonburgh	Kimberly DeSocio	Building Inspector
Town of Highlands	Mervin “Bob” R. Livsey	Town Supervisor
Town of Minisink	Randal Filipowski	Highway Superintendent
Town of Monroe	Anthony Cardone	Town Supervisor
Town of Montgomery	Steve Brescia	Town Supervisor
Town of Mount Hope	Dean Hassenmayer	Highway Superintendent
Town of Newburgh	Gilbert J. Piaquadio	Town Supervisor
Town of New Windsor	Jeffrey Barrett	Town Supervisor
Town of Tuxedo (including the Village of Tuxedo)	David McMillen	Town Supervisor
Town of Wallkill	George Serrano	Town Supervisor

Jurisdiction	Primary Contact	Position
Town of Warwick	Jesse Dwyer	Town Supervisor
Town of Wawayanda	Denise Quinn	Town Supervisor
Town of Woodbury	Kathryn Luciani	Town Supervisor
Village of Chester	John Orr	Building Inspector
Village of Cornwall-on-Hudson	James Gagliano	Village Mayor
Village of Florida	Daniel Harter Jr.	Village Mayor
Village of Goshen	Molly O'Donnell	Village Mayor
Village of Greenwood Lake	Thomas Howley	Village Mayor
Village of Harriman	G. Bruce Chichester	Village Mayor
Village of Highland Falls	Joseph D'Onofrio	Village Mayor
Village of Kiryas Joel (including the Town of Palm Tree)	Abe Wieder	Village Mayor
Village of Maybrook	Matthew Thorp	Public Works Superintendent
Village of Monroe	Brian T. Smith	Public Works Superintendent
Village of Montgomery	Ralph "Buddy" Nelson	Public Works Superintendent
Village of Otisville	Robert Clouse	Councilperson
Village of South Blooming Grove	George Kalaj	Village Mayor
Village of Tuxedo Park	Marc Citrin	Village Mayor
Village of Unionville	Martin T. Howard	Village Mayor
Village of Walden	John Ramos	Village Mayor
Village of Warwick	Michael Newhard	Village Mayor
Village of Washingtonville	James M. Farr, P.E.	Consulting Engineer
Village of Woodbury	Rob Weyant	Public Works Supervisor

Table 2: Jurisdictional Capability Assessment and Resource Availability

Plans	Town of Blooming Grove	Town of Chester	Village of Chester	Town of Cornwall	Village of Cornwall-on-Hudson	Town of Crawford	Town of Deerpark	Village of Florida	Town of Goshen	Village of Goshen	Town of Greenville	Village of Greenwood Lake	Town of Hamptonburgh	Village of Harriman	Village of Highland Falls	Town of Highlands	Village of Maybrook	City of Middletown	Town of Minisink	Town of Monroe	Village of Monroe
Comprehensive/Land Use Plan	Yes	'15	No	Yes	Yes	'01	'03	'02	'09	Yes	'04	'75	Yes	No	'06	'09	'07	Yes	'05	'08	'14
Capital Improvement Plan	No	No	No	No	No	No	No	'87	Yearly	No	Yes	No	Yes	Yes	No	Yes	'13	Yes	No	No	No
Economic Development Plan	No	No	No	No	Yes	No	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	Yes	Yes	No	No	Yes
Local Emergency Operations Plan	Yes	'12	No	Yes	Yes	'09	Yes 911	Yes	Yes	Yes	No	Yes 911	Yes	Yes	'06	Yes	'95	Yes	'00	'93	Yes
Continuity of Operations Plan	No	Yes	No	No	No	No	Yes		No	No	Yes	Yes	Yes		Yes	No			No		No
Transportation Plan	Yes	No	No	No	No	'15	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes	Yes
Stormwater Management Plan	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	No	Yes	Yes
Community Wildfire Protection Plan	No	No	No	Yes	No		Yes	Yes	No	No	No	No	No	No	No	No	No		No	No	No
Other special plans (e.g., Brownfields redevelopment, disaster recovery, coastal zone	Yes	No	No	No		Yes, Emergency Plan (disaster recovery protocol)		No	No	No			State Code Dec. EPA GCT			No	Yes		No	Yes, Aquafer Protect-ion Plan	Yes

Plans	Town of Blooming Grove	Town of Chester	Village of Chester	Town of Cornwall	Village of Cornwall-on-Hudson	Town of Crawford	Town of Deerpark	Village of Florida	Town of Goshen	Village of Goshen	Town of Greenville	Village of Greenwood Lake	Town of Hamptonburgh	Village of Harriman	Village of Highland Falls	Town of Highlands	Village of Maybrook	City of Middletown	Town of Minisink	Town of Monroe	Village of Monroe
management, climate change adaptation																					
Building Code	Yes	Yes	NYS '10	Int'l Code '10	Yes	'10	NYS BC '10	NYS Uniform Code '10	NYSBC '10	'10 Updated as per NYS	'07	NYSBC '10	10	NYSBC '10	NYSBC '10	NYS Uniform Codes '10	'13 NYS	Yes	Yes	'10 NYS	Yes
Building Code Effectiveness Grading Schedule (BCEGS) Score	Yes	N/A	No	Class 9	Yes	Yes	N/A	No	Yes	No		N/A			N/A		Yes		N/A	No	No
Fire Department ISO Rating		Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		Yes			Yes	Yes	Yes	Yes	Yes		Yes
Site Plan review requirements	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zoning Ordinance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Subdivision Ordinance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Floodplain Ordinance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Natural Hazard specific ordinance (stormwater, steep slope, wildfire)	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Flood Insurance rate maps	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

Plans	Town of Blooming Grove	Town of Chester	Village of Chester	Town of Cornwall	Village of Cornwall-on-Hudson	Town of Crawford	Town of Deerpark	Village of Florida	Town of Goshen	Village of Goshen	Town of Greenville	Village of Greenwood Lake	Town of Hamptonburgh	Village of Harriman	Village of Highland Falls	Town of Highlands	Village of Maybrook	City of Middletown	Town of Minisink	Town of Monroe	Village of Monroe
Acquisition of land for open space and public recreation uses	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	yes
Other								Yes, NYS Building Code					Yes 2015			Erosion control codes, storm-water mgmt. codes					
Planning Commission	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	No	Yes	Yes	Yes	Yes	Yes
Mitigation Planning Committee	Yes	Yes		Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes		Yes	No	Yes	Yes	Yes	Yes	No
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mutual aid agreements	Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		Yes
Chief Building Official	FT	FT	FT	Yes	Yes	FT	FT	FT	FT	FT	PT	FT	FT	FT	FT	FT	PT		Yes	Yes	FT
Floodplain Administrator	FT	FT	FT	Yes	FT	FT	FT	FT	FT	FT	Yes	FT	FT	FT	FT	Yes	N/A		Yes	Yes	FT
Emergency Manager	Yes	FT	FT	Yes	PT	PT	PT	PT	No	No	Yes	FT	Yes	FT	FT	PT	Yes		Yes	Yes	No
Community Planner	No	PT	No	Yes		PT	PT	No	No	FT	No	PT	PT	No	PT	No	Yes	Yes	PT	No	Yes

Plans	Town of Blooming Grove	Town of Chester	Village of Chester	Town of Cornwall	Village of Cornwall-on-Hudson	Town of Crawford	Town of Deerpark	Village of Florida	Town of Goshen	Village of Goshen	Town of Greenville	Village of Greenwood Lake	Town of Hamptonburgh	Village of Harriman	Village of Highland Falls	Town of Highlands	Village of Maybrook	City of Middletown	Town of Minisink	Town of Monroe	Village of Monroe
Civil Engineer	PT	PT	Yes	Yes	PT	Yes, Contracted	PT	PT	No	FT	Yes	PT	PT	PT	PT	PT	Yes	PT	PT	PT	FT
GIS Coordinator	No	PT	No			PT	PT	No	No	Yes	No	PT	PT	No	PT		Yes		No	No	FT
Warning systems/services (Reverse 911, Outdoor warning signals)	No	No	No	No	No	No	No	Yes	No	Yes	No	No	Yes	No	No	No	Yes	Yes	No	Yes	Yes
Hazard data and information	Yes	Yes	No	No		Yes	Yes	Yes	No	No	No	Yes		No	Yes		Yes	Yes	N/A	Yes	No
Grant writing	No	Yes	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No	Yes		No	No	Yes
Hazus analysis	No	No	No	No	Yes	No	No		No	No	Yes	No		No	No		Yes	Yes	Yes	Yes	No
Capital improvements project funding	Yes	No			Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes		No		Yes	Yes	Yes		Yes
Authority to levy taxes for specific purposes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Fees for water, sewer, gas or electric services	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes	N/A	N/A	Yes	Yes
Impact fees for new development	Yes	Yes	Yes	Yes	Yes		No	Yes	Yes	Yes	Yes	Yes	Yes		Yes	No	Yes	Yes	Yes	Yes	Yes
Stormwater utility fee	No	No	Yes		Yes	No	No		No	No	No	No	No		No	No	No	No	No		No

Plans	Town of Blooming Grove	Town of Chester	Village of Chester	Town of Cornwall	Village of Cornwall-on-Hudson	Town of Crawford	Town of Deerpark	Village of Florida	Town of Goshen	Village of Goshen	Town of Greenville	Village of Greenwood Lake	Town of Hamptonburgh	Village of Harriman	Village of Highland Falls	Town of Highlands	Village of Maybrook	City of Middletown	Town of Minisink	Town of Monroe	Village of Monroe
Incur debt through general obligation bonds and or special tax bonds	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
Incur debt through private activities	No	No	Yes			No	No	No	No	No	No	No	No		No	No	No		No		No
Community Development Block Grant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Other federal funding programs	Yes	Yes		Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes
State funding programs	Yes	Yes				Yes	Yes	Yes	No	Yes	Yes	Yes	Yes		Yes		Yes		Yes		Yes
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	No	No	No	Yes	No	No	No	Yes	No		No	No		No	Yes	No	Yes	No	Yes	No
Ongoing public education or information program (e.g., responsible water use, fire	No	No	No	No	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	No		Yes

Plans	Town of Blooming Grove	Town of Chester	Village of Chester	Town of Cornwall	Village of Cornwall-on-Hudson	Town of Crawford	Town of Deerpark	Village of Florida	Town of Goshen	Village of Goshen	Town of Greenville	Village of Greenwood Lake	Town of Hamptonburgh	Village of Harriman	Village of Highland Falls	Town of Highlands	Village of Maybrook	City of Middletown	Town of Minisink	Town of Monroe	Village of Monroe
safety, household preparedness, environmental education)																					
Natural disaster or safety-related school programs		No	No	No	No	Yes	No		No	Yes	N/A	No	No		No	No	Yes	N/A	N/A	Yes	Yes
StormReady Certification	No	No	No	No		No	No		No	No	Yes	No	Yes		No	No	Yes	No	Yes	Yes	No
Firewise Communities Certification	No	No	No	No	Yes	No	No		No	No	N/A	No	No		No	No	No		No	No	No
Public–private partnership initiatives addressing disaster-related issues	No	No	No	No	No	No	No	No	No	No	No	No	Yes		No	Yes	No		No	No	No
Other								Yes, NYS Building Code					Yes 2015			Erosion control codes, Storm-water mgmt. codes					

Table 3: Jurisdictional Capability Assessment and Resource Availability (Continued)

Plans	Town of Montgomery	Village of Montgomery	Town of Mount Hope	City of Newburgh	Town of Newburgh	Village of Otisville	County of Orange	City of Port Jervis	Village of South Blooming Grove	Town of Tuxedo	Village of Tuxedo Park	Village of Unionville	Village of Walden	Town of Wallkill	Town of Warwick	Village of Warwick	Village of Washingtonville	Town of Wawayanda	Town of Woodbury	Village of Woodbury
Comprehensive/Land Use Plan	‘88	‘08	Yes	Yes	‘05	‘11	Yes	Yes	Yes	Yes	No	No	‘10	Yes	Yes	‘04	Yes	Yes	‘88	‘11
Capital Improvement Plan	No	Yes	No	Yes	Yes	‘11	Yes	Yes	No	No	Yes	No	‘10	In progress	Yes	No	No	No	No	‘15
Economic Development Plan	No	Yes	No	Yes	No	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	No	No	No	No	No
Local Emergency Operations Plan	Yes	No	Yes	‘09	Yes	Yes	Yes	Yes	Yes	‘15	Yes	No	Yes	Yes	Yes	‘15	Yes	Yes	Yes 911	Yes
Continuity of Operations Plan	No	No	Yes	No	No	Yes	Yes		No	No	Yes	No	Yes		Yes	Yes	Yes	Yes	Yes 911	Yes
Transportation Plan	No	No	No	No	No	No	Yes		Yes	No	No	No	No	N/A	Yes	No	No	No	No	No
Stormwater Management Plan	Yes, ‘05	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes 911	Yes
Community Wildfire Protection Plan	No	No	No	No		No	No	No	No	No	Yes	No	No		No	No	No	No	No	No
Other special plans (e.g., Brownfields redevelopment, disaster recovery, coastal zone management,	No	No	No			No			Yes	Yes	Yes	Yes	No		No	Yes	Yes			

Plans	Town of Montgomery	Village of Montgomery	Town of Mount Hope	City of Newburgh	Town of Newburgh	Village of Otisville	County of Orange	City of Port Jervis	Village of South Blooming Grove	Town of Tuxedo	Village of Tuxedo Park	Village of Unionville	Village of Walden	Town of Wallkill	Town of Warwick	Village of Warwick	Village of Washingtonville	Town of Wawayanda	Town of Woodbury	Village of Woodbury
climate change adaptation																				
Building Code	Yes, ‘10	‘74	‘15	‘10 NYS	Int’l Code ‘10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NYSBC ‘10	NYSBC ‘10	NYSBC ‘10	NYSBC ‘10	NYSBC ‘10
Building Code Effectiveness Grading Schedule (BCEGS) Score			No	No	No		No		Yes	No	Yes	No	No			Yes	No	Yes	N/A	No
Fire Department ISO Rating			Yes	Yes	Yes		N/A	Yes		Yes	N/A		Yes	Yes		Yes	Yes		Yes	Yes
Site Plan review requirements	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zoning Ordinance	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Subdivision Ordinance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Floodplain Ordinance	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Natural Hazard-Specific Ordinance (stormwater, steep slope, wildfire)		Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Plans	Town of Montgomery	Village of Montgomery	Town of Mount Hope	City of Newburgh	Town of Newburgh	Village of Otisville	County of Orange	City of Port Jervis	Village of South Blooming Grove	Town of Tuxedo	Village of Tuxedo Park	Village of Unionville	Village of Walden	Town of Wallkill	Town of Warwick	Village of Warwick	Village of Washingtonville	Town of Wawayanda	Town of Woodbury	Village of Woodbury
Flood Insurance Rate maps	Yes, '07	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Acquisition of land for open space and public recreation uses		Yes	Yes		Yes	Yes	Yes		Yes		Yes	No	No	Yes	Yes	No	Yes	No	Yes	Yes
Planning Commission	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mitigation Planning Committee	No	No	No	No	Yes	No	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mutual aid agreements		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Chief Building Official	Yes	Yes	PT	Yes	FT	PT	Yes	FT	FT	Yes	Yes	Yes	FT		PT	FT	PT	PT	FT	FT
Floodplain Administrator	FT	Yes	No	Yes	FT	No	Yes	FT	FT	Yes	Yes	No	FT		PT	PT	PT	PT	FT	FT
Emergency Manager	FT	Yes	PT	Yes	Yes	Yes	Yes	PT	Yes	Yes	Yes	No	FT		PT	Yes	PT	PT	FT	Vol

Plans	Town of Montgomery	Village of Montgomery	Town of Mount Hope	City of Newburgh	Town of Newburgh	Village of Otisville	County of Orange	City of Port Jervis	Village of South Blooming Grove	Town of Tuxedo	Village of Tuxedo Park	Village of Unionville	Village of Walden	Town of Wallkill	Town of Warwick	Village of Warwick	Village of Washingtonville	Town of Wawayanda	Town of Woodbury	Village of Woodbury
Community Planner	Consult	Yes	PT	Yes	Yes	No	Yes		No	Yes	Yes	No	PT	Yes	Yes	PT	No	PT	PT	FT
Civil Engineer	Consult		PT	Yes	Yes	Yes	Yes	PT	PT	Yes	Yes	FT	FT	PT	Yes	PT	PT	PT	PT	Consult
GIS Coordinator	No	No	PT	Yes	No	No	Yes	No	No	Yes	Yes	Yes	No		No	No	No		PT	No
Warning Systems/services (Reverse 911, Outdoor warning signals)	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Hazard data and information	No		No		No	No	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes		Yes	Yes	Yes	Yes
Grant writing	As needed	Yes	Yes		No	No	Yes	Yes	No	No	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Hazus analysis		No	No		No	No	Yes		No	No	Yes	No	No	Yes			No	No	No	Yes
Capital improvements project funding	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Authority to levy taxes for specific purposes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Fees for water, sewer, gas or electric services	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes

Plans	Town of Montgomery	Village of Montgomery	Town of Mount Hope	City of Newburgh	Town of Newburgh	Village of Otisville	County of Orange	City of Port Jervis	Village of South Blooming Grove	Town of Tuxedo	Village of Tuxedo Park	Village of Unionville	Village of Walden	Town of Wallkill	Town of Warwick	Village of Warwick	Village of Washingtonville	Town of Wawayanda	Town of Woodbury	Village of Woodbury
Impact fees for new development	Yes	Yes	Yes	No	Yes	No	Yes		Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stormwater utility fee	Yes	No	No	No	Yes	No	Yes	No	No	No	Yes	No	Yes	No	No	No	No	No	No	No
Incur debt through general obligation bonds and or special tax bonds	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Incur debt through private activities	Yes	No	No	No	N/A	No	No	No	No	No	No	No	No		No	No	No	No	NO	No
Community Development Block Grant	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes		Y/N	Yes	N/A	Yes	Yes	Yes
Other federal funding programs			No		Yes	Yes	Yes		Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State funding programs			No		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Local citizen groups or non-profit organizations focused on environmental protection, emergency	Yes	Yes	No	No		No	Yes		Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	Yes

Plans	Town of Montgomery	Village of Montgomery	Town of Mount Hope	City of Newburgh	Town of Newburgh	Village of Otisville	County of Orange	City of Port Jervis	Village of South Blooming Grove	Town of Tuxedo	Village of Tuxedo Park	Village of Unionville	Village of Walden	Town of Wallkill	Town of Warwick	Village of Warwick	Village of Washingtonville	Town of Wawayanda	Town of Woodbury	Village of Woodbury
preparedness, access and functional needs populations, etc.																				
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	Yes	Yes	No		Yes	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	No	Yes
Natural disaster or safety-related school programs	No	No	No	No		Yes	Yes	Yes		Yes	Yes		No	N/A	No	No	No	No	No	Yes
StormReady Certification	No	No	No	No		No	Yes		No	Yes	Yes	No	No	No		No	Yes	No	No	No
Firewise Communities Certification	No	No	No	No		No	No		No	No	Yes	No	No		No	No	No	No	No	
Public–private partnership initiatives addressing disaster-related issues	No	No	No	No		No	Yes		No	Yes	Yes	No	No			Yes	No	No	No	Yes

Plans	Town of Montgomery	Village of Montgomery	Town of Mount Hope	City of Newburgh	Town of Newburgh	Village of Otisville	County of Orange	City of Port Jervis	Village of South Blooming Grove	Town of Tuxedo	Village of Tuxedo Park	Village of Unionville	Village of Walden	Town of Wallkill	Town of Warwick	Village of Warwick	Village of Washingtonville	Town of Wawayanda	Town of Woodbury	Village of Woodbury
Other											Dams		Code Enforcement Officer		Yes					

Public Participation

The public was involved at two levels during the 2024 Orange County HMP update process. At the local level, community input was sought during the project's hazard vulnerability and assessment phase. Each participating jurisdiction ensured that hazard history and vulnerabilities were accurately recorded in the draft HMP. Collecting this information often involved individuals who were not members of the Planning team. Additionally, the Planning team set up meetings with local hazard mitigation and emergency management officials to facilitate discussion on the draft HMP and associated information collection. During these meetings, we asked local municipal representatives in attendance to complete several worksheets outlining which hazards, critical facilities, etc., they considered most relevant to their individual municipality. A list of these efforts and a blank copy of the worksheets completed can be found in Appendix A. The information retrieved from local municipal representatives through these worksheets has been summarized in their respective annexes.

The second level of public involvement for the County HMP was provided through a stakeholders meeting held at the Orange County Emergency Operations Center in Goshen on Thursday, November 21, 2024. Key public organizations, such as the Wallkill River Task Force, Scenic Hudson, and the Orange County Land Trust, were invited to attend.

Additionally, important private sector companies and firms such as Norfolk Southern Rail and Orange Regional Medical Center were also invited to the meeting. All attendees were updated on the draft status of the plan and directed on how to raise concerns and issues or suggest potential hazard mitigation projects. Stakeholders were invited to provide comments for a 30-day period after the meeting. Information and materials, including a list of invitees, are in Appendix A.

Shortly after the stakeholders' meeting, the public was invited to review the draft document and provide comments and input on hazards, hazard response, and mitigation. The draft 2024 Orange County HMP was also available for review electronically on the website of the Orange County Department of Emergency Services at https://storymaps.arcgis.com/stories/4b5cf197b48c4ee0aae54206ea15c66c. All comments received as part of the public review were considered and incorporated into the HMP as appropriate.

Lastly, the complete draft of the HMP was also posted to the Orange County Department of Emergency Services website in December 2024 to allow for another round of public review and comment concurrent to review and comment by the NYS DHSES. Such comments were requested to be submitted by early June 2016. Local municipal representatives and those on the stakeholder invitation list were contacted via email by Orange County Emergency Planner Dominick Greene to inform them of the posted full draft. Each municipal representative was directly emailed a link to their respective annex between November 5, 2024, and December 15, 2024.

When the second-draft HMP was completed in December 2024 following comment from NYS DHSES, the public was notified of the plan's availability for comment and posting on the Orange County website. The public was notified via official press release from the Orange County Executive's Office in newspapers, web postings, direct email notification, and flyers posted at public gathering places throughout the county. The intake system for public comment was a survey link on the Orange County website hosted by SurveyMonkey. Documentation of this public participation phase can be found at the end of Appendix A.

A third and final draft of the HMP was completed in January 2025 following a second round of comments from NYS DHSES. A final review was completed by NYS DHSES before the HMP was forwarded to FEMA for final approval.

Coordination with Other Agencies

County, regional, state, and federal agencies were consulted for relevant information and recommendations about the HMP update effort. The contributions from agencies and organizations that supported the update process include participation in the CEPA risk assessment, review and comment on portions of the draft HMP, and the collection and/or dissemination of information or data to be used in the planning process. The agencies that contributed most to this process include FEMA, Orange County Department of Emergency Services, Orange County Division of Emergency Management, NOAA, Orange County Planning Department, Orange County G.I.S. Division, National Weather Service, New York State Office of Emergency Management, Orange County Office of Real Property, and the U.S. Geological Survey.

Risk Assessment

Evaluating the risks associated with natural hazards is essential for understanding their potential effects on lives, property, and the economy. The purpose of risk assessment is to identify both the qualitative and quantitative vulnerabilities of a community using available data. This process enhances our understanding of how natural disasters affect the community and serves as a foundation for developing and prioritizing mitigation strategies, as detailed in the Mitigation Strategy section. The objective is to minimize damage and loss from natural disasters by enhancing preparedness, improving response times, and directing resources to the most at-risk areas. This risk assessment was carried out using the methodology outlined in the 2023 Federal Emergency Management Agency (FEMA) Local Mitigation Planning Handbook, which details a five-step approach:

1. **Hazard Identification:** This step helps clarify the hazards present in the planning area.
2. **Hazard Description:** This step involves collecting additional information about hazards. It assesses where they may occur, their potential impact, and the frequency and intensity of their occurrence.
3. **Identifying Community Assets:** This step assesses which assets are most at risk of loss during a disaster. It must also account for any developmental changes that have occurred since the previous plan was established.
4. **Analyze the Impacts:** This step outlines how each hazard may affect the assets of every community.
5. **Vulnerability Summarization:** This step combines all the analyses into a cohesive summary. It utilizes the risk assessment to draw conclusions, which the planning team can then use to develop strategies to enhance the resilience of residents, businesses, the economy, and other essential assets.

Risk Assessments should generally be conducted in the order identified above, as each phase utilizes information from previous steps.

- **Hazard Identification:** This section recognizes and prioritizes the natural hazards that pose risks to Orange County and its various jurisdictions. It also includes a comprehensive discussion of the assessment of vulnerabilities related to these hazards.
- **Hazard Profiles:** This section outlines the various natural hazards that pose a threat to Orange County and its jurisdictions. Each profile includes critical information such as the geographical areas affected, the extent and severity of the hazard, historical occurrences, and the probability of future events. Notably, Extreme Heat has been identified as a new hazard, with details on recent events since the last update of the plans included in this assessment.
- **Community Assets:** This section focuses on the various resources within Orange County and its municipalities that may be at risk from hazards. It encompasses a range of elements, including the population, infrastructure, vital community services, and critical facilities, as well as valuable natural, historic, and cultural resources. Additionally, it considers the local economy and other community activities that hold significance for residents.

- **Analysis of Impacts:** This part of the assessment highlights the vulnerabilities of the identified assets and provides a detailed evaluation of the potential consequences of various hazards. This analysis aims to help understand the extent of risks and inform strategies for mitigation and preparedness.
- **Vulnerability Summarization:** This section summarizes key information drawn from hazard profiles, highlighting the vulnerability of assets, recent developments, and potential impacts and losses. This analysis aims to assist Orange County and its jurisdictions comprehensively understand their most significant risks and vulnerabilities.

Figure 15 depicts the relationship between hazards and community assets.

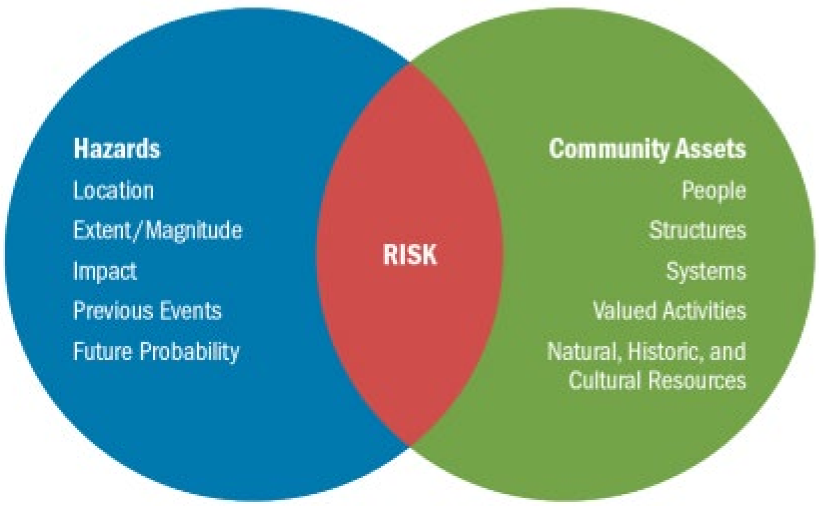

Figure 15: FEMA Risk Assessment Process[26]

Orange County is vulnerable to numerous natural, technological, and human-caused hazards. The historical documentation associated with past hazard events was included in the County's 2019 HMP and has been expanded as part of the risk assessment to include the most recent data available, as well as analysis of identified potential impacts from a changing climate. Some key revisions included in this section of the plan update include the results of Orange County's 2025 risk assessment, profiles of new hazards, and the establishment of updated hazard rankings and hazard mitigation planning goals.

Risk Assessment Tools

County Emergency Preparedness Assessment (CEPA)

All applicable hazards were evaluated, reviewed, and ranked during a risk assessment session moderated by the New York State Department of Homeland Security and Emergency Services (NYS DHSES) using the automated CEPA program. The key component of CEPA is an in-person meeting between state and local subject matter experts (SMEs) to discuss and analyze local hazards and capability information, as well as

[26] FEMA. "Local Hazard Mitigation Handbook May 2023." https://www.fema.gov/sites/default/files/documents/fema_local-mitigation-planning-handbook_052023.pdf.

potential resource gaps. DHSES provides a facilitator and scribe for each CEPA session. Hazard risks and response capabilities within the County were assessed during the session. In December 2022, local, county, and state stakeholders participated in the CEPA for Orange County. The listing of CEPA participants for the County is listed in Table 4.

Table 4: 2022 Orange County CEPA Participants

Name	Agency	Email Address
Alan Mack	Orange County Emergency Services	amack@orangecountygov.com
Andrew Jones	NYS DHSES OFPC	andrew.jones@dhses.ny.gov
Bill Herbert	Orange County Dept. of E.F.& S.	bherbert@orangecountygov.com
Danielle Darling	NYS DHSES	danielle.darling@dhses.ny.gov
Darcie Miller	Orange County Mental Health & Social Services	damiller@orangecountygov.com
Darren Hoffman	Orange County 911	dhoffman@orangecountygov.com
Dominick Greene	Orange County Emergency Management	dgreene@orangecountygov.com
Erik Denega	Orange County	edenega@orangecountygov.com
Frank Cassanite	Orange County Emergency Services	fcassanite@orangecountygov.com
Gary Tuthill	NYS DHSES OEM	gary.tuthill@dhses.ny.gov
Gyongyi McQueston	NYS DOH	gyongyi.mcqueston@health.ny.gov
Irene Kurlander	Orange County Social Services	ikurlander@orangecountygov.com
James Burpoe	Orange County DGS	jburpoe@orangecountygov.com
Jason Casale	NYS DOH	jason.casale@health.ny.gov
Justin Rodriguez	Orange County Government	jrodriguez@orangecountygov.com
Kaylin Harrington	NYS DHSES	kaylin.harrington@dhses.ny.gov
Kyle Lindemann	American Red Cross	kyle.Lindemann@redcross.org
Lacey Trimble	OC Mental Health	ltrimble@orangecountygov.com
Lane Hunt	Orange County (NY)	lhunt@orangecountygov.com
Maria Donovan	Orange County Office of General Services	mdonovan@orangecountygov.com
Matt Curran	NYS DHSES	matthew.curran@dhses.ny.gov
Michael Clahane	NYS DHSES	michael.clahane@dhses.ny.gov
Michael Buckley	NYS DEC	michael.buckley@dec.ny.gov
Michael J Dwyer	Orange County DPW / EF&S	mdwyer@orangecountygov.com

Name	Agency	Email Address
Michael Warnon	OC IT	mwarnon@orangecountygov.com
Nadine E. Macura	NYS DHSES	nadine.macura@dhses.ny.gov
Richard Magoch	Orange County Social Services	rmagoch@orangecountygov.com
Robert Gray	Orange County DPW, EF&S Division	rgray@orangecountygov.com
Samantha Sweikata	Orange County General Services	ssweikata@orangecountygov.com
Shannon Fisher	Orange County Dept of Emergency Management	sfisher@orangecountygov.com
Steven Frischknecht	Orange County, New York	sfrischknecht@orangecountygov.com
Taina Lopez	Orange County Department of Health	tlopez@orangecountygov.com
Tammy Bernard	NYS DHSES	tammy.bernard@dhses.ny.gov
Travis Ewald	Orange County DPW	tewald@orangecountygov.com
Vini Tankasali	OC Fire	vtankasali@gmail.com

Participants rated natural, technological, and human-caused disasters based on probability (likelihood) and severity of impact (consequence). For this assessment, only the hazards selected by the county will be profiled.

- High-Rated Hazards:
  - Cyberterrorism
  - Flood
- Medium-Rated Hazards:
  - Dam Failure
  - Drought
  - Hurricanes/Tropical Storms
  - Ice Jams
  - Infrastructure Failure
  - Severe Thunderstorms
  - Tornadoes
  - Wildfires
  - Severe Winter Storms

- Low-Rated Hazards:
  - Earthquakes
  - Extreme Temperatures
  - Landslides

During the initial stages of the 2022 CEPA for Orange County, dam failure was not explicitly included in the assessment of hazards. However, consultations clarified that this issue warranted attention due to its potential risks. Various communities within the county, particularly those located near aging infrastructure and water bodies controlled by dams, identified dam failure as a significant concern. Consequently, although it was not initially highlighted, dam failure was incorporated into the hazard rankings to ensure a more comprehensive understanding of regional risks. Figures 2 and 3 display bar charts and relative risk score charts depicting the hazard ratings and rankings of each natural, human-caused, or technological hazard.

In Orange County, jurisdictions such as the Town of Wallkill, the City of Middletown, and the Town of Newburgh could be particularly vulnerable to dam failure. These areas are home to vital infrastructure, including several dams that, if compromised, could lead to devastating flooding and infrastructure damage. Consultation played an essential role in recognizing the importance of this hazard, prompting local officials and emergency planners to prioritize prevention and preparedness measures. By acknowledging dam failure within the broader context of hazard mitigation, the risk assessment aims to enhance resilience and safety for all residents in the county.

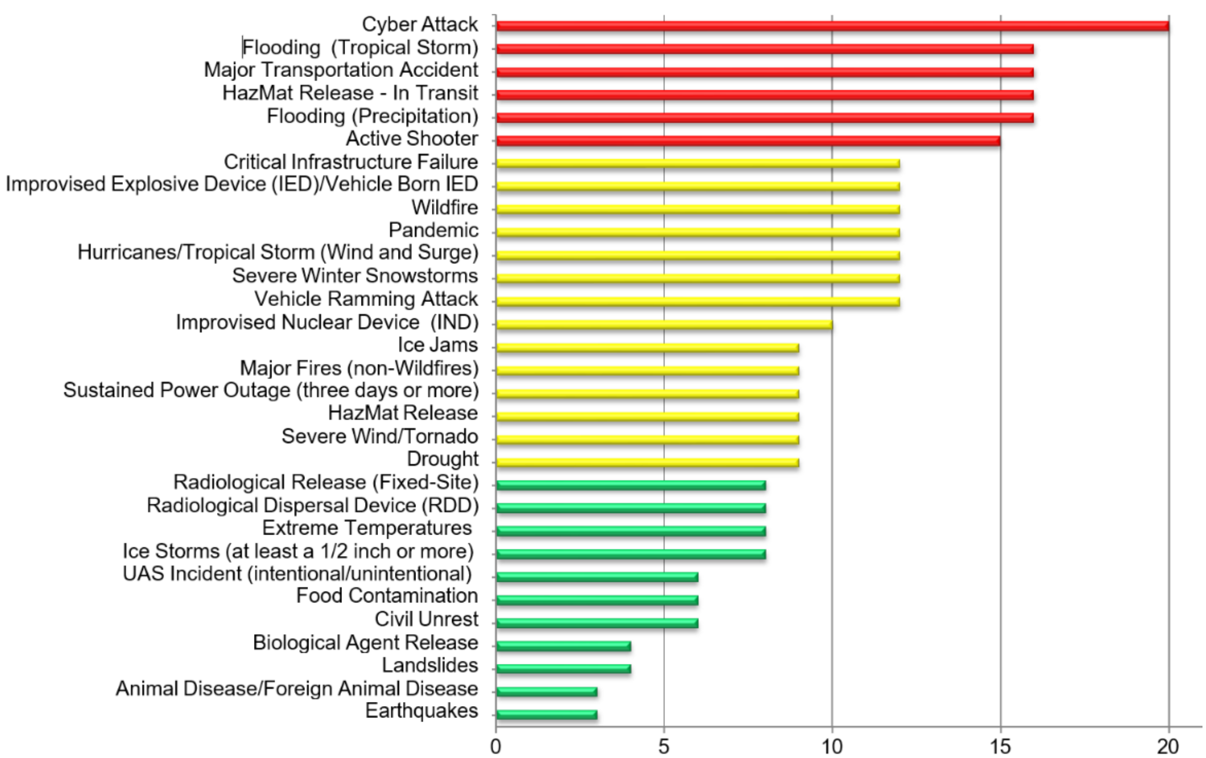

Figure 16: Orange County Hazard Assessment Bar Chart, 2022

Hazard	Likelihood	Consequence	Relative Risk Score
Cyber Attack	High	Very High	20
Flooding (Tropical Storm)	High	High	16
Major Transportation Accident	High	High	16
HazMat Release - In Transit	High	High	16
Flooding (Precipitation)	High	High	16
Active Shooter	High	High	15
Critical Infrastructure Failure	Medium	High	12
Improvised Explosive Device (IED)/Vehicle Born IED	Medium	High	12
Wildfire	High	Medium	12
Pandemic	Medium	High	12
Hurricanes/Tropical Storm (Wind and Surge)	Medium	High	12
Severe Winter Snowstorms	High	Medium	12
Vehicle Ramming Attack	Medium	High	12
Improvised Nuclear Device (IND)	Low	Very High	10
Ice Jams	Medium	Medium	9
Major Fires (non-Wildfires)	Medium	Medium	9
Sustained Power Outage (three days or more)	Medium	Medium	9
HazMat Release	Medium	Medium	9
Severe Wind/Tornado	Medium	Medium	9
Drought	Medium	Medium	9
Radiological Release (Fixed-Site)	Low	High	8
Radiological Dispersal Device (RDD)	Low	High	8
Extreme Temperatures	High	Low	8
Ice Storms (at least a 1/2 inch or more)	Low	High	8
UAS Incident (intentional/unintentional)	Medium	Low	6
Food Contamination	Low	Medium	6
Civil Unrest	Medium	Low	6
Biological Agent Release	Very Low	High	4
Landslides	Low	Low	4
Animal Disease/Foreign Animal Disease	Very Low	Medium	3
Earthquakes	Very Low	Medium	3

Figure 17: Orange County Hazard Likelihood, Consequence, and Relative Risk Score Chart, 2022

Hazards U.S. – Multi-Hazard (Hazus-MH)

The current version of Hazus is 4.2, released in September 2021. Hazus (Hazards U.S.) is a tool developed by FEMA to assess the impact of disasters such as floods, earthquakes, and hurricanes.

Hazus is a robust software application developed by FEMA to assess the potential impacts of natural hazards, including floods, earthquakes, hurricanes, and other disasters. Its origins date back to the early 1990s, when FEMA recognized the need for a standardized method to evaluate losses and vulnerabilities associated with these hazards. The goal was to improve nationwide disaster preparedness, response, recovery, and mitigation efforts.

The initial version of Hazus was released in 1997, focusing primarily on flood hazard assessments. Over time, the program evolved to include additional hazards and was continually updated to improve functionality and accuracy. The current version, Hazus 4.2, released in September 2021, includes enhanced features and more comprehensive data sets.

Hazus offers a variety of uses for different stakeholders, including local, state, and federal agencies, as well as private organizations and researchers. Some critical applications of Hazus for emergency management and planners include:

1. **Risk Assessment:** Hazus allows planners to assess the potential impacts of various hazards (such as earthquakes, floods, and hurricanes) on buildings and infrastructure. This helps in understanding the level of risk within a community.

2. **Loss Estimation:** The software provides estimates of physical, economic, and social losses that could result from a disaster. This information is crucial for prioritizing mitigation efforts and allocating resources effectively.
3. **Scenario Planning:** Hazus enables users to create and analyze different disaster scenarios, which helps planners evaluate various response strategies and identify weaknesses in existing plans.
4. **Emergency Planning:** By modeling hazards' potential impacts, Hazus supports emergency management in developing response plans based on realistic projections of disaster consequences.
5. **Mitigation Strategy Development:** Planners can use Hazus data to develop targeted mitigation strategies focusing on the most vulnerable areas and populations, enhancing overall community resilience.
6. **Policy Formation:** The insights gained from Hazus can inform policy decisions and help advocate for funding and resources to implement mitigation measures.
7. **Public Awareness and Education:** Hazus outputs can communicate risk to stakeholders and the public, raising awareness about vulnerabilities and the importance of preparedness.
8. **Collaboration and Coordination:** Hazus fosters collaboration among various agencies, organizations, and stakeholders by providing a common framework for assessing and mitigating hazard risks

Hazus is crucial in enhancing community resilience against natural hazards by providing essential data and tools for informed decision-making in disaster preparedness and mitigation planning.

Hazard Identification

Several resources were accessed and reviewed to ascertain which hazards affect Orange County. Utilized sources included reviews of available reports or plans, consultation with community experts, access to available information online, and documentation of information provided by the public during public meetings.

Based on this review, the most prevalent and potentially damaging hazards that could affect the county were included in the 2024 Orange County HMP and the County's 2022 CEPA risk assessment. The chosen hazards are caused mainly by various storms, especially those that create cascading effects like power outages, flooding, or structural damage. Other hazards appear less frequently or typically have an insignificant impact based on the historical data collected.

The following hazards are those included in the CEPA program, not just the danger selected for additional analysis during Orange County's recent risk assessment event. These descriptions, which include natural, technological, and human-caused hazards, summarize the hazards' applicability and ability to affect Orange County.

- **Cyberattack:** An attack via cyberspace targeting an organization's use of cyberspace to disrupt, disable, destroy, or maliciously control a computing environment/infrastructure, destroy the integrity of data, or steal controlled information.[27] This technological hazard is referred to as cyberterrorism in this plan, and it is further detailed in the Hazard Data and Profiles section.

- **Flooding (Tropical Storm):** Flooding from a tropical storm is known as "storm surge," which occurs when winds from a hurricane push seawater toward the shore. Its severity depends on the storm's intensity and coastal geography.[28] Storm surge poses a significant threat to coastal communities, leading to severe flooding, erosion, and infrastructure damage, making disaster preparedness and response crucial. Flooding and tropical storms are considered two distinct hazards for this plan update, as detailed in the Hazard Data and Profiles section.
- **Major Transportation Accident:** A transportation accident is an unexpected event causing loss or injury. Historically, minor traffic accidents frequently occur in Orange County. Some of these events are due to the cascading effects caused by other hazards, such as severe winter weather or ice storms. More severe accidents are common, especially within densely populated areas of the county or on main transportation routes. While major transportation accidents scored highly on the CEPA risk assessment, the hazard is a human-caused or technological event and will not be profiled in the Hazard Data and Profiles section.
- **HazMat Release (In Transit):** A hazardous materials release in transit is the discharge of hazardous materials (toxic, flammable, or corrosive) during their transport via various transportation means (motor vehicle, truck, train, boat, or plane). This hazard scored a high number in Orange County's CEPA, but because it is a human-caused or technological event, this hazard was not included for further detail in the Hazard Data and Profiles section.
- **Flooding (Precipitation):** Flooding refers to the overflow of water onto normally dry land, which can occur due to various reasons such as heavy rainfall, storm surges, rapid snowmelt, or the failure of infrastructure like dams or levees. It can significantly damage property, infrastructure, and the environment and pose severe risks to human life. Flooding can vary in duration and intensity, ranging from minor, temporary inundations to catastrophic events lasting days or weeks.[29] Flooding is detailed in the Hazard Data and Profiles section of this plan.
- **Active Shooter:** An active shooter is defined by the U.S. Department of Homeland Security (DHS) as an "individual actively engaged in killing or attempting to kill people in a confined and populated area."[30] This situation often involves the use of firearms and poses a severe threat to public safety. This hazard is not profiled in this plan because it is human caused.
- **Critical Infrastructure Failure:** Refers to the breakdown or malfunction of essential systems and assets that are vital for the functioning of a society and its economy. These infrastructures are crucial for maintaining public safety, health, and economic stability, and their failure can lead to significant

[27] National Institute of Standards and Technology. "Cyber Attack." https://csrc.nist.gov/glossary/term/cyber_attack.
[28] National Weather Service. "Tropical Definitions." https://www.weather.gov/mob/tropical_definitions.
[29] National Weather Service. "Flood and Flash Flood Definitions." https://www.weather.gov/mrx/flood_and_flash.
[30] ALICE. "Active Shooter Definition." https://www.alicetraining.com/active-shooter/.

disruptions and emergencies.[31] For this plan update, this hazard will be known as "infrastructure failure" as well as "dam failure."

- **Improvised Explosive Device (IED)/Vehicle-Borne IED:** A homemade bomb and/or destructive device meant to destroy, incapacitate, harass, or distract.[32] This hazard is not profiled in this plan because it is a technological hazard.
- **Wildfire:** Wildfires are described as the uncontrollable combustion of trees, brush, or grass over a substantial land area that may threaten human life and property. This hazard was analyzed as part of Orange County's CEPA risk assessment and profiled in further detail in the Hazard Data and Profiles section.
- **Pandemic:** A pandemic is "an epidemic occurring worldwide or over an extensive area, crossing international boundaries and usually affecting a large number of people."[33] Although it was greatly affected by the 2020 pandemic, Orange County will not be profiling this hazard in the plan update.
- **Hurricanes/Tropical Storm (Wind and Surge):** A hurricane is a type of tropical cyclone with winds exceeding 74 miles per hour (mph) accompanied by rain, thunder, and lightning. High-wind events are commonly documented within Orange County but are classified in this plan update as thunderstorm events. Weather patterns that begin as hurricanes are often re-classified as tropical storms or tropical depressions (two other types of tropical cyclones) by the time they reach New York State. Tropical storms are organized systems of strong thunderstorms with a defined circulation and maximum sustained winds of 39 to 73 mph. Tropical depressions are organized systems of clouds and thunderstorms with a defined circulation and maximum sustained winds of 38 mph or less. The rate of hurricane events in the northeastern United States has been increasing in recent years. Although this hazard has a moderately low potential, hurricanes were included in the County's risk assessment process and will be further detailed in the Hazard Data and Profiles section.
- **Severe Winter Snowstorms:** Winter storms include heavy snowfall and extreme cold and can immobilize an entire region. Major snowstorms have occurred in Orange County, placing high demands on the Public Works Departments of the County, cities, towns, and villages and adding risks for emergency response personnel. Due to its frequent occurrence, this hazard is included in the County's risk assessment and hazard profiles of the Hazard Data and Profiles section but is profiled as severe winter storm.
- **Vehicle Ramming Attack:** "The use of a vehicle as a weapon."[34] This hazard is not included because it is a human-caused hazard.

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[31] United Nations Office for Disaster Risk Reduction. "Structural Failure." https://www.undrr.org/hips-cluster/structural-failure#:~:text=Critical%20Infrastructure%20failure%20is%20defined,society%20(UNGA%2C%202016).

[32] Department of Homeland Security. "IED Attack: Improvised Explosive Devices." https://www.dhs.gov/xlibrary/assets/prep_ied_fact_sheet.pdf.

[33] National Library of Medicine. "The Classical Definition of a Pandemic is not Exclusive." https://pmc.ncbi.nlm.nih.gov/articles/PMC3127276/.

[34] CISA. "Vehicle Ramming: Security Awareness for Soft Targets and Crowded Places." https://www.cisa.gov/sites/default/files/2022-11/Vehicle%20Ramming%20-%20Security%20Awareness%20for%20ST-CP.PDF.

- **Improvised Nuclear Device (IND):** "A device, including adversary-modified U.S. or foreign nuclear weapons, incorporating nuclear (actinide) materials, that are designed, constructed, or modified outside of an official Government agency and which has, appears to have, or is claimed to have the capability to produce a nuclear explosion."[35] This hazard will not be profiled because it is a technological hazard.
- **Ice Jams:** Ice jams occur when water bodies are clogged with large ice blocks. The freezing of the water body typically forms the ice and becomes dislodged due to hydraulic conditions whereby the ice floats and may jam at sections of the water body with a limited cross-section (e.g., at bridges and natural channel contractions). Ice jam events have occurred occasionally in the county, especially along the Delaware River, Shawangunk Kill, Neversink River, Ramapo River, and Wallkill River. Rare occasions of Hudson River ice jams have produced minor damage. This hazard is profiled in the Hazard Data and Profiles section.
- **Major Fires (non-wildfire):** Fire is the uncontrolled burning of residential, commercial, industrial, institutional, or other property. As is common in many populated areas, structural fires occur frequently within Orange County. Although this specific hazard is not profiled in the Hazard Data and Profiles section, an analysis of wildfires in the county is included. This hazard will not be profiled in the plan update.
- **Sustained Power Outage (three or more days):** "Sustained outages are planned or accidental total power losses in a localized community area. These types of outages usually last more than five minutes. Storms, accidents, or equipment damage may cause a sustained outage."[36] This hazard will not be profiled in this plan update.
- **HazMat Release (Fixed Site):** Hazardous materials releases at fixed site locations are defined as the discharge of hazardous materials (toxic, flammable, or corrosive) into the environment from a facility located at a specific area. Although the county contains some such sites, including the Indian Point Energy Center, this hazard is not included in further assessments.
- **Severe Wind/Tornado:** A severe storm hazard event includes hailstorms, windstorms, and severe thunderstorms (with associated severe wind events such as derechos, gustnadoes, and downbursts). Severe storm was included in the CEPA risk assessment completed by Orange County. This hazard will be separated into thunderstorms and tornadoes and profiled individually in the Hazard Data and Profiles section.
- **Drought:** Drought is the loss of water supply due to the lack of rainfall. Most of Orange County's water supply is obtained from groundwater wells, with the remainder being sourced from surface waters and the New York City aqueduct system. Groundwater levels are less susceptible to seasonal and drought conditions than surface waters. Given the importance of the "Black Dirt" agricultural

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[35] U.S. Department of Energy. "Improvised Nuclear Device (IND)." https://www.directives.doe.gov/terms_definitions/improvised-nuclear-device-ind.
[36] DTE Energy. "About Outages & Power Restoration." https://www.dteenergy.com/us/en/residential/emergency-and-safety/outage/dte-outage-center.html#:~:text=Sustained%20outages%20are%20planned%20or,storms%2C%20accidents%20or%20equipment%20damage.

areas of Orange County and climate change's role in future drought events, drought is further detailed as a hazard profile in the Hazard Data and Profiles section.

- **Radiological Release (Fixed Site):** Radiological materials at fixed sites are defined as the release or threat of release of radioactive material from a nuclear power generating station, research reactor, or other stationary source of radioactivity. While some sites, such as the Indian Point Energy Center, exist within the county, this hazard is not included in further assessments.
- **Radiological Dispersal Device (RDD):** Any device that causes the purposeful dissemination of radioactive material without a nuclear detonation.[37] This hazard is not included in this plan update.
- **Extreme Temperatures:** Extreme temperatures include extended periods of excessive hot or cold weather that seriously impact human and/or animal populations. Cascading effects can consist of enhanced fire/wildfire potential and drought. In past years, periods of extreme heat have had a more significant impact within Orange County than extreme cold. Vulnerable populations residing within the county, such as the elderly, elevate the potential risk caused by an extreme temperature event. The effect that climate change may have on yearly temperatures is a growing concern. Therefore, this hazard was assessed and is documented in the Hazard Data and Profiles section.
- **Ice Storms (½ inch or more):** Ice storms include freezing rains, which cause icing of roads, structures, and vegetation, and can cause structural damages and create hazardous slippery conditions. Ice storms have frequently occurred in the county based upon discussion during the risk assessment. These events routinely cause trees to topple due to the weight of the ice, which has the potential to cause structural damage and utility failures. This hazard is not specifically profiled further in the Hazard Data and Profiles section but is included in the severe winter storm hazard profile.
- **UAS Incident (Intentional/Unintentional):** An unmanned aircraft system (UAS) incident refers to any occurrence involving a drone or other types of unmanned aerial vehicles (UAVs) that may lead to safety concerns, operational disruptions, or regulatory violations. This can include accidents such as collisions with other aircraft, loss of control, equipment malfunctions, unauthorized flights in restricted airspace, or incidents that pose a risk to people or property on the ground. UAS incidents are increasingly monitored as drone usage becomes more widespread across various sectors, including commercial, recreational, and governmental applications. Although UAS events occur occasionally in Orange County, they are not profiled in this plan update.
- **Food Contamination:** Food contamination involves harmful substances or microorganisms making food unsafe. It can be categorized into three types: biological (pathogens like bacteria and viruses), chemical (substances like pesticides), and physical (foreign objects like hair or glass). Although food contamination events occur occasionally in Orange County, they are not profiled in this plan update.
- **Civil Unrest:** Civil unrest occurs when an individual or collective action seriously interferes with the peace, security, and/or functioning of a community. Although civil unrest events occur occasionally in Orange County, they are not profiled in this plan update.

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[37] Radiation Emergency Medical Management. "Radiological Dispersal Devices (RDDs)." https://remm.hhs.gov/rdd.htm.

- **Biological Agent Release:** A biological agent release involves the intentional or accidental spread of harmful microorganisms, toxins, or biological substances that can cause disease in humans, animals, and plants. This includes pathogens like bacteria, viruses, and fungi.[38]

  In bioterrorism attacks, these agents may be released deliberately to create fear and disrupt social order. Accidental releases can happen in laboratories or agricultural settings, leading to outbreaks or environmental issues. This hazard will not be assessed in this plan update.

- **Landslides:** Landslides are defined as the downward movement of a sloped land mass under the force of gravity. Based on historical information, landslides have occurred in the county on a localized basis. The potential for this hazard was low, although the potential for cascading hazards was noted. This hazard is profiled further in the Hazard Data and Profiles section.
- **Animal Disease/Foreign Animal Disease:** An animal disease is any condition or infection caused by bacteria, viruses, parasites, or environmental factors that affect the health of domestic or wild animals. Symptoms can range from mild discomfort to severe illness or death.[39]
- **Foreign Animal Disease:** This hazard refers to diseases not commonly found in a specific region; they are often highly contagious. Examples include foot-and-mouth disease and avian influenza. Their introduction can result in significant economic losses, trade restrictions, and challenges in managing animal health.[40] This hazard will not be profiled in this plan update.
- **Earthquakes:** Earthquakes are described as shaking or trembling of the earth that is volcanic or tectonic in origin. There is potential for earthquake tremors to be felt within Orange County. The concerns surrounding this hazard are compounded by the fact that the Indian Point Energy Center and Nuclear Facility is located within the county. Although this hazard is not likely to cause extensive damage within Orange County because of its location within New York State and its adjacency to nuclear facilities, it is included in the HMP risk assessment update.

Presidential Disaster Declarations

After a state declares a State Disaster Area due to a specific disaster event, the state and its local governments will assess recovery options, capabilities, and associated costs. If the damage from the disaster exceeds the state's recovery capabilities, the Governor will send a letter to the President through FEMA, outlining the situation. The President then decides whether to declare a major disaster or emergency. Following a presidential declaration, FEMA designates the affected area as eligible for assistance and announces the types of available aid. FEMA provides supplemental assistance for the

[38] U.S. Department of Homeland Security. "Biological Attack Fact Sheet: Human Pathogens, Biotoxins, and Agricultural Threats." https://www.dhs.gov/publication/biological-attack-fact-sheet#:~:text=A%20biological%20attack%20is%20the,societal%20disruption%2C%20and%20economic%20damage

[39] Royal Veterinary College. "Animal Disease (Current Concepts)." https://www.rvc.ac.uk/Media/Default/UoLW%20Distance%20Learning/Modules/Animal%20Disease%20(Current%20Concepts).pdf.

[40] Minnesota Department of Agriculture. "Foreign Animal Diseases- Foot and Mouth Disease." https://www.mda.state.mn.us/foreign-animal-diseases-foot-mouth-disease.

recovery of state and local governments, with the federal contribution always covering at least 75% of the total eligible costs.

Figure 18 illustrates the total number of Presidential Disaster Declarations for each county in New York State from 2011 to 2023. During this period, Orange County experienced five declarations, which are highlighted in Figure 18.

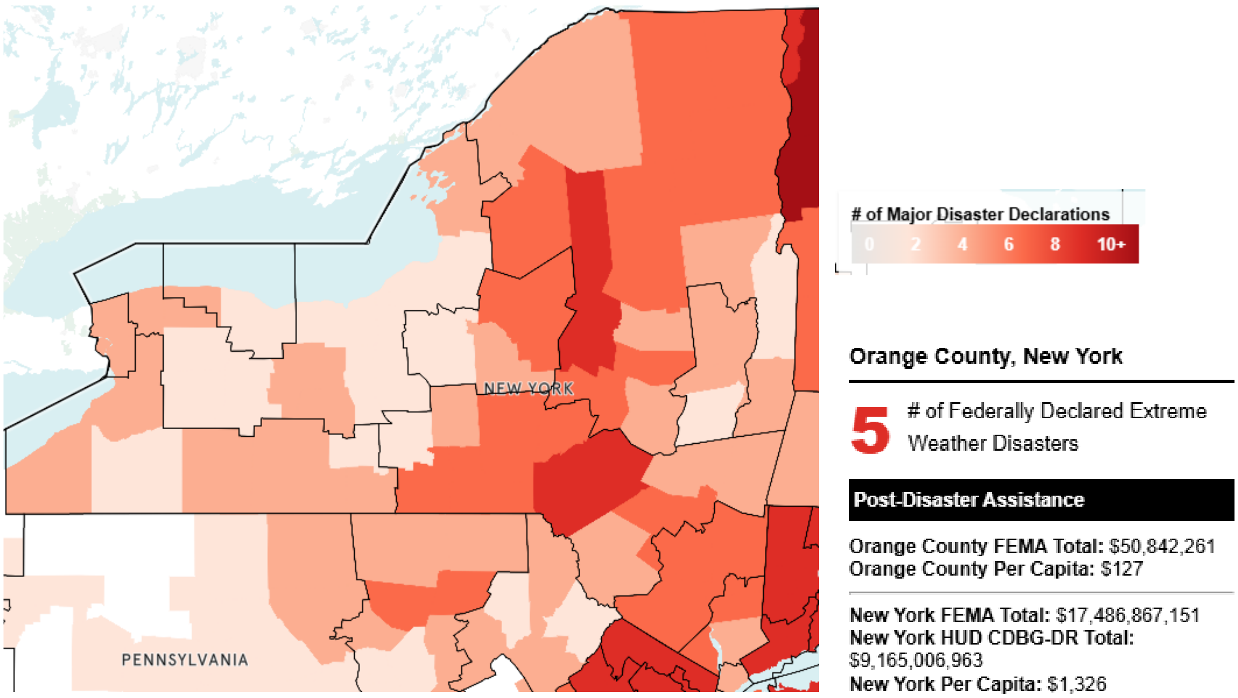

Figure 18: Major Disaster Declarations New York State & Orange County 2011–2023[41]

[41] Rebuild by Design. "Atlas of Accountability (2011-2023)." https://rebuildbydesign.org/atlas-of-disaster/.

Hazard Data and Profiles

This section provides detailed profiles of the hazards identified in the previous section that warrant further evaluation in the overall risk assessment. The hazards chosen by the participating jurisdictions in this plan were done so with an eye toward future impacts made possible by sea level rise and increased chances of flash flooding brought on by climate change. This is why hazards such as landslides are listed in certain areas despite no documented past occurrences.

Each hazard profile includes a description of the hazard and its causes and impacts, the location and extent of areas subject to the hazard, known historical occurrences, and the probability of future occurrences. The level of detail included for each hazard was limited by the amount of historical data and the prior cost and damage estimates available. The profiles also include specific information noted by members of the planning committee and jurisdiction representatives, including unique observations or relevant anecdotal information regarding individual historical hazard occurrences and individual jurisdictions.

The following hazards are being profiled:

- Cyberterrorism
- Dam Failure
- Drought
- Earthquakes
- Extreme Temperatures
- Floods
- Hurricanes/Tropical Storms
- Ice Jams
- Infrastructure Failure
- Landslides
- Thunderstorms
- Tornadoes
- Wildfires
- Winter Storms

Cyberterrorism

Hazard Description

As the world becomes increasingly interconnected and reliant on digital technologies, cybercrime is surging in frequency and impact. In 2023 alone, the United States experienced 2,365 significant cyberattacks, resulting in more than 343 million victims.[42] Between 2021 and 2023, data breaches rose by 72%, surpassing the previous record.[43] Cyberterrorism (the collective term for cyberattacks) involves any deliberate attempts to steal, alter, disable, or destroy data and systems through unauthorized access to networks, computer systems, or digital devices.[3] It is especially critical for Orange County to address this in its Hazard Mitigation Action Plan because the increasing frequency and sophistication of cyberattacks poses significant risks to the county's infrastructure, economy, and public safety. By proactively addressing cyber threats, Orange County can better protect its residents and maintain the integrity of its essential services. Cybercriminals—whether acting independently, as part of organized groups, or within dark web networks—exploit system vulnerabilities to commit digital offenses. Their motivations vary (see Figure 19), but often their goals are to breach security protocols, steal sensitive data, or disrupt essential services. By proactively addressing these risks, Orange County can enhance the protection of its residents and maintain the resilience of critical services in an ever-evolving digital landscape.

[42] Identity Theft Resource Center (ITRC). "Annual Data Breach Report." 2023. https://www.idtheftcenter.org/publication/2023-data-breach-report/.
[43] Forbes. "Cybersecurity Stats: Facts And Figures You Should Know." 2024. https://tinyurl.com/38j82wuz.

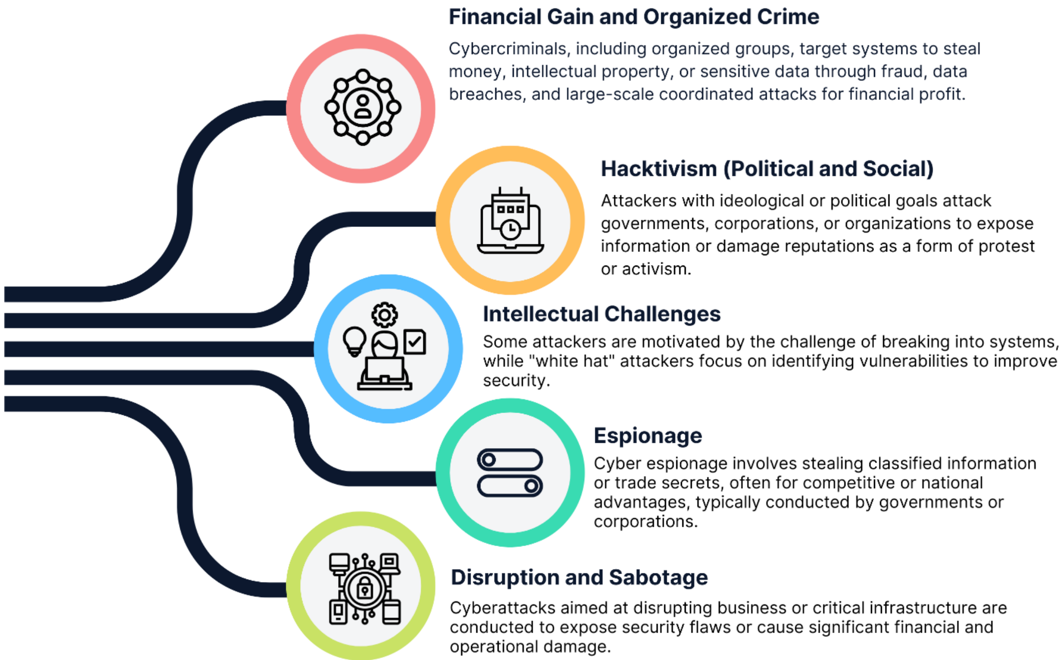

Figure 19: Prevalent Motivations for Cyberattacks[44]

In information technology systems, events, alerts, and incidents represent distinct stages of activity monitoring and security response, forming a critical framework for identifying and managing potential security threats.[45,46]

- **Event:** This refers to any observable occurrence in an information technology (IT) system, such as creating a file, deleting a folder, or even routine actions like logging in. Events happen frequently and may not indicate a security issue on their own. However, they form the raw data that security teams monitor for irregular patterns. Most events are benign and are part of the normal operation of systems.
- **Alert:** An alert is a notification triggered by one or more events deemed unusual or significant by security monitoring tools. An alert indicates that something may require attention, but alerts do not necessarily confirm security breaches; rather, they advise the relevant personnel to investigate further. Alerts act as warnings that help teams identify potential issues early.
- **Incident:** An incident is a more severe situation in which a group of correlated alerts is identified as a real or potential security threat. Examples of incidents include actions like confirmed unauthorized access to systems, data breaches, and malware attacks. An incident usually disrupts normal operations and requires immediate response to prevent or minimize damage.

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[44] Ecosystm. "Things You Need to Know About Cyber Attacks, Threats and Risks." 2024. https://blog.ecosystm.io/cyber-attacks-threats-risks/.
[45] National Institute of Standards and Technology. "Computer Security Incident Handling Guide." https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-61r2.pdf.
[46] IBM Documentation, 2023. "About events, alerts and incidents." https://www.ibm.com/docs/en/cloud-paks/cloud-pak-aiops/4.5.1?topic=alerts-about-events-incidents.

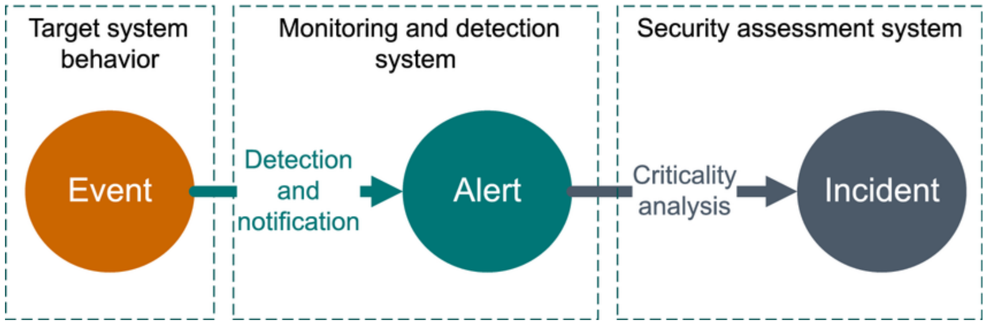

Figure 20: Relationships among Event, Alert, and Incident in Information Technology Systems[47]

Location and Extent

Cyberattacks have significant financial and operational impacts across various sectors. In 2024, the average cost of a data breach rose to $4.88 million, emphasizing the growing expense of cyber vulnerabilities.[48] In 2022, the FBI received 800,944 cybercrime reports nationwide, marking a 168% increase since 2016, when there were 298,728 complaints.[49] The financial losses associated with these cybercrimes also saw a dramatic surge, growing from $1.5 billion in 2016 to $10.3 billion in 2022—an increase of 587%.[50] This trend highlights the rapidly escalating costs and prevalence of cybercrime in the U.S. Between 2016 and 2022, Business Email Compromise (BEC), increased by 81%.[51] BEC has become a significant threat, especially to organizations that rely on email for financial transactions and sensitive communications.[52] BECs alone accounted for more than $2.9 billion in losses in 2023.[53] Particularly concerning is the rise in ransomware attacks, which have impacted 14 out of 16 critical infrastructure sectors tracked by the FBI's Internet Crime Complaint Center (IC3). In 2022, sectors such as Healthcare/Public Health (210 attacks), Critical Manufacturing (157 attacks), and Government Facilities (115 attacks) were among the most targeted. The Critical Manufacturing sector saw the largest year-over-year increase, with incidents more than doubling from 65 in 2021 to 157 in 2022—a 142% increase.[54] Ransomware attacks on Government Facilities also nearly doubled, while the Financial Services and

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[47] Levshun, D., Kotenko, I. "A survey on artificial intelligence techniques for security event correlation: models, challenges, and opportunities." *Artif Intell Rev* 56, 8547–8590 (2023). https://link.springer.com/article/10.1007/s10462-022-10381-4.

[48] Forbes, 2023. "Cybersecurity Stats: Facts and Figures You Should Know." https://www.forbes.com/advisor/education/it-and-tech/cybersecurity-statistics/.

[49] FBI News, 2023. "Internet Crime Complaint Center Releases 2022 Statistics." https://www.fbi.gov/contact-us/field-offices/springfield/news/internet-crime-complaint-center-releases-2022-statistics.

[50] New York State Comptroller. "Cyberattacks on New York's Critical Infrastructure." October 2023. https://www.osc.ny.gov/files/reports/pdf/cyberattacks-on-new-yorks-critical-infrastructure.pdf.

[51] InfoSecurity Magazine, 2023. "BEC Attacks Surge 81% in 2022." https://www.infosecurity-magazine.com/news/bec-attacks-surge-81-in-2022/.

[52] FBI. "FY 2022 FBI Congressional Report: Business Email Compromise and Real Estate Wire Fraud." November 14, 2022. https://www.fbi.gov/file-repository/fy-2022-fbi-congressional-report-business-email-compromise-and-real-estate-wire-fraud-111422.pdf/view.

[53] Abnormal Security. "Takeaways from the 2023 FBI IC3 Report." 2023. https://abnormalsecurity.com/blog/2023-fbi-ic3-report-takeaways.

[54] New York State Comptroller. "Cyberattacks on New York's Critical Infrastructure." October 2023. https://www.osc.ny.gov/files/reports/pdf/cyberattacks-on-new-yorks-critical-infrastructure.pdf.

Information Technology sectors continued to experience high numbers of attacks. In 2021, the U.S. Treasury Department reported $1.2 billion in payments made to ransomware gangs, reflecting the increasing frequency and scale of such attacks.[55] Phishing attempts, one of the most common types of cybercrime, saw a dramatic rise from 19,465 in 2016 to 300,497 in 2022, with a notable increase during the pandemic starting in 2019.[56] The attacks are also becoming more sophisticated and are spreading beyond emails to text messages and other forms of personal communication.[57]

TYPES OF CYBERATTACKS

Cyberattacks target entities of all sizes and sectors—individuals, government and private corporations, non-profit organizations, and critical social and physical infrastructures. Cybercriminals use many sophisticated tools and techniques to launch cyberattacks against enterprise IT systems, personal computers, and other targets.[58] Some of the most common types of cyberattacks are included on Table 5.

Table 5: Types of Cyberattacks[59]

Types of Cyberattacks	Explanation
Botnet	A portmanteau of "robot" and "network" that refers to a collection of computers for which one or more unauthorized parties have seized control. Once an unauthorized party controls an individual computer, they may then connect it to other computers in their control to create a pool of computing resources (e.g., network bandwidth or processing power). Botnets are used to further illicit activity online, such as distributing malware and surreptitiously mining cryptocurrencies.
Business Email Compromise (BEC)	A scam in which an attacker creates an email address (usually impersonating a high-ranking official in an organization) and alters the identifying information of that email to make it appears to come from the organization (e.g., changing the name associated with the email address). Typically, scammers then email members of that organization with urgent needs for funds to be transferred. These are sometimes under the guise of paying past-due invoices. However, the invoices are fraudulent, and the accounts where the funds are to be transferred belong to the scammers.
Denial of Service (DOS) or Distributed Denial of Service (DDOS)	A DOS attack inhibits an authorized user's ability to access a resource (e.g., a website) by overwhelming that resource with unauthorized requests (e.g., more requests to load a webpage than it was built to support). DDOS attacks, which are more common, use many hosts to attack a single resource (e.g., a network of

[55] Financial Crimes Enforcement Network. "FinCEN Analysis Reveals Ransomware Reporting in BSA Filings Increased Significantly During the Second Half of 2021." November 1, 2022. https://www.fincen.gov/news/news-releases/fincen-analysis-reveals-ransomware-reporting-bsa-filings-increased-significantly.
[56] AAG IT Services. "The Latest Phishing Statistics." 2023. https://aag-it.com/the-latest-phishing-statistics/.
[57] CNBC. "Phishing Attacks Are Increasing and Getting More Sophisticated." January 7, 2023. https://www.cnbc.com/2023/01/07/phishing-attacks-are-increasing-and-getting-more-sophisticated.html.
[58] IBM. "What is a Cyber Attack?" 2024. https://www.ibm.com/topics/cyber-attack.
[59] Congressional Research Service. "Cybersecurity: Selected Cyberattacks, 2012-2022." August 9, 2023. https://crsreports.congress.gov/product/pdf/R/R46974.

Types of Cyberattacks	Explanation
	malware-infected computers—a botnet—sending junk web traffic to a single service provider).
Hack and Leak	An attack in which an unauthorized party gains access to a sensitive data store and exfiltrates (steals) the data. Once the sensitive data is in their control, the attacker either releases it to expose and embarrass the victim, or else they contact the victim and demand a ransom in order to withhold the data (i.e., blackmail).
Phishing	An attack that attempts to gain access to a system by tricking authorized users into engaging with malicious computer code. Frequently, this attack is carried out by combining an email that uses social engineering (i.e., an attempt to manipulate someone into revealing information or taking some action) with a malicious web link or attachment. When the web link is clicked or the attachment is opened, the device downloads and executes malware.
Malware	A portmanteau of “malicious” and “software” that refers to software and firmware intentionally added to an information technology (IT) device and designed to cause harm to the IT device or its data. There are many ways of introducing malware into a device, such as via internet downloads or inserted USB drives. Data may be harmed by making it no longer private (i.e., compromising its confidentiality), manipulating it (i.e., compromising its integrity), or deleting it (i.e., compromising its availability).
Malvertising	A portmanteau of “malicious” and “advertising,” this attack uses online advertising networks to spread malware and compromise computer systems. Malvertisers buy ad space and inject malware into those ads in an effort to easily spread it online. When a user visits a website, they may be presented with the ad and download the malicious code via a legitimate advertising network. If the code downloads and successfully executes, then the computer succumbs to the malware. Generally, neither the website delivering the ad nor the advertising networks are aware of the malicious code being delivered.
Man-in-the-Middle (MitM)	An attack where a malicious actor seeks to insert itself between two computers in an effort to access the communications between those computers, usually in an effort to eavesdrop between the users of those computers (either directly or by intercepting encryption keys so that encrypted text may be decrypted).
Ransomware	A portmanteau of “ransom” and “malware,” ransomware attacks seek to deny users access to data and IT systems by encrypting files and systems, thereby locking the users out. Perpetrators usually extort victims for payment—typically in cryptocurrency—to decrypt the system. Recently, such attacks have been coupled with data breaches in which perpetrators also steal data from their victims. In addition to locking the computer systems, the perpetrators typically notify victims that they have copies of their data and will release sensitive information unless a ransom is paid, thus potentially extorting them twice. Worse still, a triple extortion may occur if the perpetrators contact a company’s clients to tell them about the attack to pressure the victim to pay the ransom or risk harming their future business prospects.

Types of Cyberattacks	Explanation
Supply Chain Attack	In a supply chain attack, an adversary inserts an unauthorized physical or software component into a product to surreptitiously access data or manipulate a system. These attacks can occur during any phase of a product lifecycle (e.g., development, shipping, updating).
Zero-Day	An attack that exploits a previously unknown vulnerability in an IT product. This type of attack is particularly dangerous because until it is noticed, there is usually no defense against it. This attack is sometimes written as "0-Day" and sometimes pronounced "oh-day."

Previous Historical Occurrence

- **On September 3, 2019,** the Monroe-Woodbury Central School District in Orange County, New York, experienced a ransomware attack that disrupted its computer systems. The attack forced the district, which serves more than 7,000 students, to cancel the first day of classes scheduled for September 4.[60] The ransomware targeted the district's network, disabling computers and printers while denying access to critical systems. However, thanks to proactive cybersecurity measures, including the district's annual cybersecurity investment of more than $100,000, as well as the use of on-site and off-site data backups, the Superintendent confirmed that no data was compromised.[61] The district paid no ransom because its rapid response—shutting down the network after an alarm from its cybersecurity monitoring system—prevented the hackers from fully executing the attack. Upon restoring data from backups, the district reopened schools the next day.[62]
- **On June 10, 2024,** the City of Newburgh experienced a significant ransomware attack, disrupting its municipal operations. The ransomware group BlackByte targeted the city government, impacting its ability to process payments for essential services, including property taxes, water, sewer, sanitation, permit fees, and parking tickets.[63] This incident forced the closure of City Hall and other municipal offices for several days. However, critical services, such as 911 and emergency response systems, remained operational throughout the disruption.[64] The attack highlighted vulnerabilities in the city's IT infrastructure despite its use of standard cybersecurity protocols, including daily backups of both onsite and offsite data. External cybersecurity experts were quickly engaged to mitigate the situation,

[60] CBS News. "Cyber Attack On Orange County School District's Computers Delays First Day Of School." September 3, 2019. https://www.cbsnews.com/newyork/news/cyber-attack-first-day-of-school/.
[61] CBS News. "Monroe-Woodbury School District Confident Data Not Compromised Following Cyber Attack." September 4, 2019. https://www.cbsnews.com/newyork/news/monroe-woodbury-school-district-cyber-security-attack-hackers-ransomware/.
[62] NBC New York. "NY School Delays Start of Year After Ransomware Attack." September 4, 2019. https://www.nbcnewyork.com/news/local/ny-school-delays-start-of-year-after-ransomware-attack/1990459/.
[63] Ransomware Attacks. "BlackByte Ransomware Disrupts Newburgh City Operations." June 22, 2024. https://ransomwareattacks.halcyon.ai/attacks/blackbyte-ransomware-disrupts-newburgh-city-operations.
[64] News 12. "Officials: Serious Cybersecurity Attack Holds Data, Operations in City of Newburgh at Ransom." June 12, 2024. https://westchester.news12.com/officials-serious-cybersecurity-attack-holds-data-operations-in-city-of-newburgh-at-ransom.

and operations were gradually restored over the course of a week. City Hall reopened on June 17, 2024, while payment systems were expected to be fully restored over a 7- to 10-day period. The attack directly affected the city's 30,000 residents, especially those who needed to make payments for municipal services. Residents were temporarily unable to complete transactions related to property taxes and utility services, causing disruptions to routine operations.[65] A grace period for late payments was granted in recognition of the inconvenience caused by the ransomware attack.[66] In the wake of the attack, Newburgh worked closely with county, state, and federal authorities, including the FBI, to address the breach. The FBI confirmed that the incident was a targeted attack carried out by a known ransomware group. Newburgh's response included shutting down its network to prevent further damage and relying on its backup systems to restore functionality. Emergency laptops and communication equipment were provided to essential city services, such as the police department, thereby ensuring the continuity of public safety operations. Although the immediate threat was mitigated, the City of Newburgh continues to face challenges in ensuring the long-term security of its systems. The incident underscored the need for heightened cybersecurity measures and ongoing vigilance in protecting municipal infrastructure from cyber threats. City government is now working to strengthen its IT defenses to prevent future attacks and maintain the trust of its residents in the integrity of its services.

- **On July 10, 2024,** the Goshen Central School District in Orange County, New York, was targeted by a ransomware attack. The cyberattack disabled the district's computer services, including access to phones and emails, disrupting normal operations across its four schools, which serve more than 2,800 students.[67] The attack rendered all school-related accounts inaccessible. In response, the district engaged law enforcement and cybersecurity experts to investigate the incident and work on restoring the system. Despite the disruptions, in-person meetings and summer programs continued as planned. The district worked with external agencies to restore critical services but did not provide details of any ransom demands. The full recovery process took several days as disaster recovery teams worked to re-establish phone and email communication.[68]
- **On July 19, 2024,** a global technology outage caused by a faulty CrowdStrike software update impacted numerous systems worldwide, including Orange County, New York. The outage primarily affected systems running Microsoft Windows and disrupted various county government operations. Despite these challenges, critical services such as 911, 311, and emergency services continued to function without interruption.[69] Orange County officials worked diligently to minimize the impact of

[65] WRRV. "City of Newburgh's Systems Disrupted by 'Cybersecurity Incident." June 12, 2024. https://wrrv.com/newburgh-cybersecurity-incident/.
[66] Insurance Journal. "City in Upstate New York Restoring Systems Disrupted by Cyber Incident." June 17, 2024. https://www.insurancejournal.com/news/east/2024/06/17/779946.htm.
[67] Hudson Valley Post. "Goshen School District Hit by Cyber-Attack." July 11, 2024. https://hudsonvalleypost.com/goshen-school-district-cyber-attack/?utm_source=tsmclip&utm_medium=referral.
[68] Mid Hudson News. "Breaking: Goshen School District Under Cyber Attack." July 11, 2024. https://midhudsonnews.com/2024/07/11/breaking-goshen-school-district-under-cyber-attack/#google_vignette.
[69] Wright, Wendy. "New York counties coping with CrowdStrike global tech outage." Spectrum News 1. July 19, 2024. https://spectrumlocalnews.com/nys/central-ny/news/2024/07/19/counties-across-new-york-state-work-to-fix-the-crowdstrike-global-computer-outage-in-their-systems.

the outage.[70] While county offices remained open, several department services experienced delays throughout the day as the IT team employed automated and manual methods to restore affected systems.[71] The outage extended beyond Orange County, disrupting global operations across sectors such as banks, airlines, and other organizations reliant on Microsoft systems. This event underscored the critical nature of IT infrastructure and the importance of rapid response and backup protocols to mitigate the effects of such widespread disruptions. Nearby counties, including Monroe County in New York, also faced significant challenges due to the outage. County officials in Monroe highlighted the need for both automated and manual fixes to restore affected systems, highlighting how widespread the issue was across governmental operations in New York.

Preventative Measures

- Orange County has implemented several proactive measures to enhance its cybersecurity posture, particularly in light of increasing cyber threats. The State Joint Security Operations Center (JSOC) placed the county under 24/7 monitoring after two public agencies in the area were attacked within the span of a month during June and July of 2024.[72] This heightened alert system helps detect and respond more effectively to suspicious activities, reducing the risk of future incidents.
- The county recently held a cybersecurity tabletop exercise on October 12, 2023,[73] which brought together government and private sector stakeholders to simulate responses to various cyber threats, including ransomware attacks and data breaches. This exercise was part of Orange County's ongoing efforts to improve resilience against cyber threats. The event tested the county's ability to detect, respond to, and mitigate attacks, thus reinforcing decision-making and preparedness for real-world incidents. Furthermore, under the broader cybersecurity framework set by New York State,[74] Orange County benefits from state-level initiatives such as shared services for local governments, access to cybersecurity tools and resources, and participation in statewide collaboration efforts to protect critical infrastructure.[75] These combined efforts reflect Orange County's commitment to maintaining a strong cybersecurity defense and ensuring the security of its digital infrastructure and critical services.

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[70] Mid Hudson News. "Technology outage impacts county government operations." July 19, 2024. https://midhudsonnews.com/2024/07/19/technology-outage-impacts-county-government-operations/.
[71] Orange County Chamber of Commerce. "Orange NY Members: CrowdStrike Outage Impacts Orange County Operations." July 19, 2024. https://members.orangeny.com/member-press-releases/Details/crowdstrike-outage-impacts-orange-county-operations-224171.
[72] Mid Hudson News. "Orange County takes first step in creating IT services department." August 24, 2023. https://midhudsonnews.com/2023/08/24/orange-county-takes-first-step-in-creating-it-services-department/.
[73] Orange County Government. "Orange County hosts cybersecurity tabletop exercise on October 12th." October 12, 2023. https://www.orangecountygov.com/CivicAlerts.aspx?AID=1885&ARC=2509.
[74] Governor of New York. "New York's First-Ever Cybersecurity Strategy Fact Sheet." August 2023. https://www.governor.ny.gov/sites/default/files/2023-08/2023-NewYorkCybersecurity_FactSheet.pdf.
[75] New York State Department of Financial Services. "Governor Hochul Announces New York's First-Ever Statewide Cybersecurity Strategy." August 9, 2023. https://www.dfs.ny.gov/reports_and_publications/press_releases/pr230.

Future Potential Impacts

The probability of future events is pulled from the likelihood categories of the 2022 CEPA. Tornadoes are ranked “high,” indicating the potential for this event to occur once every 5 years.

In 2022, New York reported the third-highest number of ransomware attacks (135) and corporate data breaches (238) among U.S. states, trailing behind only California and Texas.[76] The number of cybercrime complaints in New York increased by 53% from 2016 to 2022, with financial losses growing by a staggering 632% over that same period, from $106.2 million to more than $775 million. On a national scale, the U.S. saw a 168% increase in cybercrime reports from 2016 to 2022, with financial losses rising from $1.5 billion to $10.3 billion.[77] New York’s high ranking in cybercrime incidents can be attributed to its large population, concentration of financial institutions like the New York Stock Exchange, and high density of critical infrastructures such as government and healthcare facilities. These factors make the state a target-rich environment for cybercriminals. The growth in specific types of cyberattacks further highlights the changing landscape:

- BECs, which involve fraudulent emails targeting businesses, saw the most substantial growth, increasing by 91% during the six-year period. In 2022 alone, BEC incidents accounted for 76% of the monetary losses from cybercrime in New York, with 1,468 cases reported, surpassing phishing attacks.[78]
- Ransomware and data breaches were the most prevalent threats to New York’s critical infrastructure. The state had the third-highest number of ransomware attacks in 2022, with 135 incidents, behind only California and Texas. Similarly, New York ranked third in corporate data breaches with 238 incidents, following California and Florida. Notably, these attacks targeted critical sectors such as healthcare and public health (nine incidents) and financial services (eight incidents), which were among the most targeted by these attacks.[79]
- A particularly concerning trend is the doubling of attacks on critical infrastructure, which increased to 83 incidents in the first half of 2023, compared to 48 incidents for the entirety of 2022.[80] This surge suggests that cybercriminals are increasingly targeting critical infrastructure, including healthcare and financial services, posing growing risks to essential services.

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[76] StateScoop. “New York lost $775M to cyberattacks on critical infrastructure in 2022, report says.” October 5, 2023. https://statescoop.com/new-york-775-million-cyberattacks-critical-infrastructure/.
[77] Governor of New York. “Cyberattacks on New York’s Critical Infrastructure." October 2023. https://www.osc.ny.gov/files/reports/pdf/cyberattacks-on-new-yorks-critical-infrastructure.pdf.
[78] FBI, Internet Crime Complaint Center. “Internet Crime Report: 2022” and “Internet Crime Report: 2016.” https://www.ic3.gov/AnnualReport/Reports/2016_IC3Report.pdf.
[79] Office of the New York State Comptroller. “Cyberattack complaints in New York rise 53 percent.” October 3, 2023. https://www.osc.ny.gov/press/releases/2023/10/cyberattack-complaints-in-new-york-rise-53-percent.
[80] IC3 Supplemental Data.

Vulnerability Assessment

EXPOSURE

To understand its vulnerability to natural hazards, a community must determine the assets that are exposed or vulnerable in the hazard area. The increasing reliance on networked technology has made critical infrastructure highly vulnerable to cyberattacks. Critical infrastructure refers to essential systems and assets whose disruption could severely impact the functioning of society, the economy, and national security. This infrastructure includes everything from transportation systems and energy grids to healthcare networks and financial services, all of which store vast amounts of sensitive data. The consequences of a cyberattack on these systems can be far-reaching, leading to compromised security, economic damage, disruptions to public health, and exposure of personal data, potentially resulting in identity theft, fraud, or worse.

IMPACT ON COUNTY ASSETS

In August 2023, the State of New York unveiled its first-ever comprehensive cybersecurity strategy. This strategy was developed to protect the state's critical infrastructure, digital assets, and personal data from cyber threats that have grown increasingly sophisticated and frequent. Central to this approach are three core principles: unification, resilience, and preparedness. The strategy is underpinned by five mutually reinforcing strategic pillars (Figure 21) that, taken together, will contribute to a defense that levels the cybersecurity playing field and ensures that New York's cybersecurity and resilience is greater than the sum of its parts. The strategy aims to provide a coordinated defense system by unifying cybersecurity services across state, county, and local governments. It also integrates public and private stakeholders into the larger goal of ensuring digital security across all levels of the state's infrastructure, from healthcare to energy to financial services.[81]

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[81] Office of the Governor of New York. "Fact Sheet: New York's First-Ever Cybersecurity Strategy." August 2023. https://www.governor.ny.gov/sites/default/files/2023-08/2023-NewYorkCybersecurity_FactSheet.pdf.

Figure 21: Strategic Pillars[82]

The state has made significant financial investments to support this strategy. A $90 million cybersecurity initiative was included in the fiscal year 2024 budget, of which $30 million was earmarked for assisting local governments in strengthening their defenses. An additional $500 million was dedicated to enhancing healthcare IT, focusing primarily on cybersecurity. Another $7.4 million will be used to expand the New York State Police's Cyber Analysis Unit and Internet Crimes Against Children Task Force. These initiatives showcase the state's commitment to a proactive and well-funded cybersecurity posture to protect against evolving threats.[83] Orange County can significantly benefit from these strategic pillars—especially through the second pillar, which promotes collaboration between the state and local governments. Access to shared cybersecurity services and 24/7 monitoring through the JSOC will strengthen the county's ability to detect, respond to, and mitigate cyber threats. Additionally, by aligning with the state's regulatory frameworks, Orange County's critical infrastructure—such as its energy and healthcare sectors—will benefit from strengthened security regulations. The strategy's workforce development investment also offers local governments to hire skilled cybersecurity professionals, thereby strengthening the county's ability to safeguard its digital assets.

VULNERABLE POPULATIONS

For more information on vulnerable populations, please refer to the Orange County Profile section of this plan.

[82] Office of the Governor of New York. "New York State Cybersecurity Strategy." August 2023. https://www.governor.ny.gov/sites/default/files/2023-08/2023-NewYork-CybersecurityStrategy.pdf.
[83] New York State Department of Financial Services. "Governor Hochul Announces Cybersecurity Budget Proposals." October 2023. https://www.dfs.ny.gov/reports_and_publications/press_releases/pr230.

In New York, certain groups are more vulnerable to cybercrime, particularly senior citizens, youths, small and medium-sized enterprises, and vulnerable populations.[84] Vulnerable groups often lack the awareness or resources to protect themselves adequately, making them prime targets for cybercriminals.[85]

- **Adults over 75:** Adults over the age of 75 are especially susceptible to cybercrime. This demographic often lacks familiarity with the latest digital technologies, making them prime targets for scams and phishing attacks. In the United States, 63% of adults over 75 years old experience some form of cyber abuse in their lifetime, with financial threats like fraudulent requests for personal information being most prevalent.[86] Adults over 75 years old are frequently targeted due to their limited digital literacy and the higher potential financial gains from successful attacks.[87]
- **Younger adults:** Contrary to the assumption that younger adults are more protected due to their tech-savviness, they are also highly vulnerable to cybercrime. Younger adults, particularly those new to digital platforms, often have a false sense of security, which makes them more likely to overshare personal information online. This overconfidence is exploited by fraudsters, resulting in increased risks of identity theft, online scams, and other forms of cybercrime.[88] In fact, the under-25 age group has experienced a 10% rise in new cybercrime victims in recent years. Although these individuals are proficient with mobile devices, their heavy reliance on social media and online transactions leaves them particularly susceptible to these types of attacks.[89]
- **Small and medium-sized enterprises:** These businesses are at high risk due to limited or weak cybersecurity defenses. Small businesses are frequent targets of ransomware and BEC attacks, which in New York have grown by 91% over recent years. Without robust cybersecurity systems in place, these businesses are vulnerable to operational disruptions and data breaches.
- **Disadvantaged groups:** Disadvantaged communities, including individuals from lower-income backgrounds and minority groups, are disproportionately affected by cybercrime. These populations face challenges such as lower digital literacy and access to security tools, making them easier targets

[84] Tech News World. "Young Adults, Seniors Over 75 Most Susceptible to Cyber Fraud: Report." 2023. https://www.technewsworld.com/story/Young-Adults-Seniors-Over-75-Most-Susceptible-to-Cyber-Fraud-Report-87059.html.
[85] InfoGuard Security. "Who Is Most Vulnerable to Cybercrime: New Report Reveals Surprising Insights." 2023. https://www.infoguardsecurity.com/who-is-most-vulnerable-to-cybercrime-new-report-reveals-surprising-insights/.
[86] NORC at the University of Chicago. "Majority of Older Adults Experience Cyber Abuse in Their Lifetime." November 22, 2021. https://www.norc.org/research/library/majority-of-older-adults-experience-cyber-abuse-in-their-lifetim.html.
[87] LexisNexis Risk Solutions. "Cybercrime Report." 2023. https://risk.lexisnexis.com/global/en/insights-resources/research/cybercrime-report#:~:text=The%20LexisNexis%C2%AE%20Risk%20Solutions%20Cybercrime%20Report%20is%20based%20on,payments%20and%20other%20non%2Dcore.
[88] Home of Cybersecurity News. "Who is Most Vulnerable to Cybercrime: New Report Reveals Surprising Insights." 2023. https://cybernews.com/security/who-is-most-vulnerable-to-cybercrime-new-report-reveals-surprising-insights/.
[89] Cyber Magazine. "Cybercrime Impacting Communities Differently, Study Finds." 2023. https://cybermagazine.com/cyber-security/cybercrime-impacting-communities-differently-study-finds.

for cybercriminals. They are often especially vulnerable to phishing and identity theft, and the emotional and financial burdens of such attacks tend to be greater for these groups.[90]

COMMUNITY LIFELINES

A cyberattack can have significant impacts on essential community lifelines, especially in regions heavily reliant on digital infrastructure. Community lifelines such as safety and security, health and medical services, energy, water systems, communications, and transportation (see Figure 22) can all be compromised if critical systems are disrupted or data is manipulated. For instance, an attack targeting power grids can lead to widespread outages that hinder emergency services, shut down medical equipment, and disrupt transportation signals. If communications networks are compromised, resulting disruptions may prevent coordination among first responders and limit public access to important updates. Such an attack could also jeopardize sensitive data in healthcare and governmental systems, thus undermining not only response efficiency but also public trust.

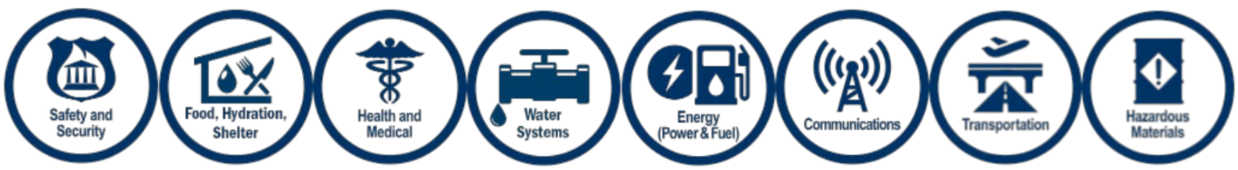


Figure 22: Community Lifelines

[90] Tech News World. "Young Adults, Seniors Over 75 Most Susceptible to Cyber Fraud: Report." 2023. https://www.technewsworld.com/story/Young-Adults-Seniors-Over-75-Most-Susceptible-to-Cyber-Fraud-Report-87059.html.

Dam Failure

Hazard Description

Dams are structures designed to store, control, or divert water by holding it back in reservoirs. Dams can fail in various ways, such as by collapsing or breaching. Because most dams hold relatively small volumes of water, dam failures usually have minimal impact. However, the failure of dams with large storage capacities can lead to serious flooding downstream.

Dams provide numerous benefits, such as supplying water for drinking, irrigation, and industrial purposes, controlling floods, generating hydroelectric power, and facilitating recreation and navigation. However, they also pose safety risks. Dams require regular maintenance, monitoring, safety inspections, and occasional rehabilitation to ensure their continued safe operation.

The Orange County Department of Public Works primarily monitors the dam safety program. Additionally, the New York State Department of Environmental Conservation (DEC) is crucial in overseeing dam safety regulations and inspections statewide.[91] Local municipalities may also have specific responsibilities for the dams within their jurisdictions.

The New York State dam hazard classifications are as follows[92]:

- **Class A: Low Hazard:** A dam failure is unlikely to result in damage to anything more than isolated or unoccupied buildings, undeveloped lands, or minor roads such as town or county roads; is unlikely to result in the interruption of important utilities, including water supply, sewage treatment, fuel, power, cable or telephone infrastructure; and/or is otherwise unlikely to pose the threat of personal injury, substantial economic loss or substantial environmental damage.
- **Class B: Intermediate Hazard:** A dam failure may result in damage to isolated homes, main highways, and minor railroads; may result in the interruption of important utilities, including water supply, sewage treatment, fuel, power, cable, or telephone infrastructure; and/or is otherwise likely to pose the threat of personal injury and/or substantial economic loss or substantial environmental damage. Loss of human life is not expected.
- **Class C: High Hazard:** A dam failure may result in widespread or serious damage to home(s); damage to highways, industrial or commercial buildings, railroads, and/or important utilities, including water supply, sewage treatment, fuel, power, cable, or telephone infrastructure; or substantial environmental damage; such that the loss of human life or widespread substantial economic loss is likely.
- **Class D: No Hazard:** 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

[91] New York State. "Dam Safety." https://mitigateny.org/resource_library/shmp_appendices/dam_safety.
[92] Thomas Reuters Westlaw. "Unofficial New York Codes, Rules and Regulations." https://govt.westlaw.com/nycrr/Document/I4ed7566ecd1711dda432a117e6e0f345?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default).

considered defunct dams, posing negligible or no hazard. The department may retain pertinent records regarding such dams.

The "inundation zone" refers to the area downstream of a dam that would be flooded in the event of a dam failure or an uncontrolled release of water. This zone is typically much larger than the area affected by a regular river or stream flood. Because dams fail most often when they are at maximum capacity, the released water most often inundates downstream areas with volumes of water proportional to the dam's maximum capacity.

Dam failures can result from one or more of the following causes:

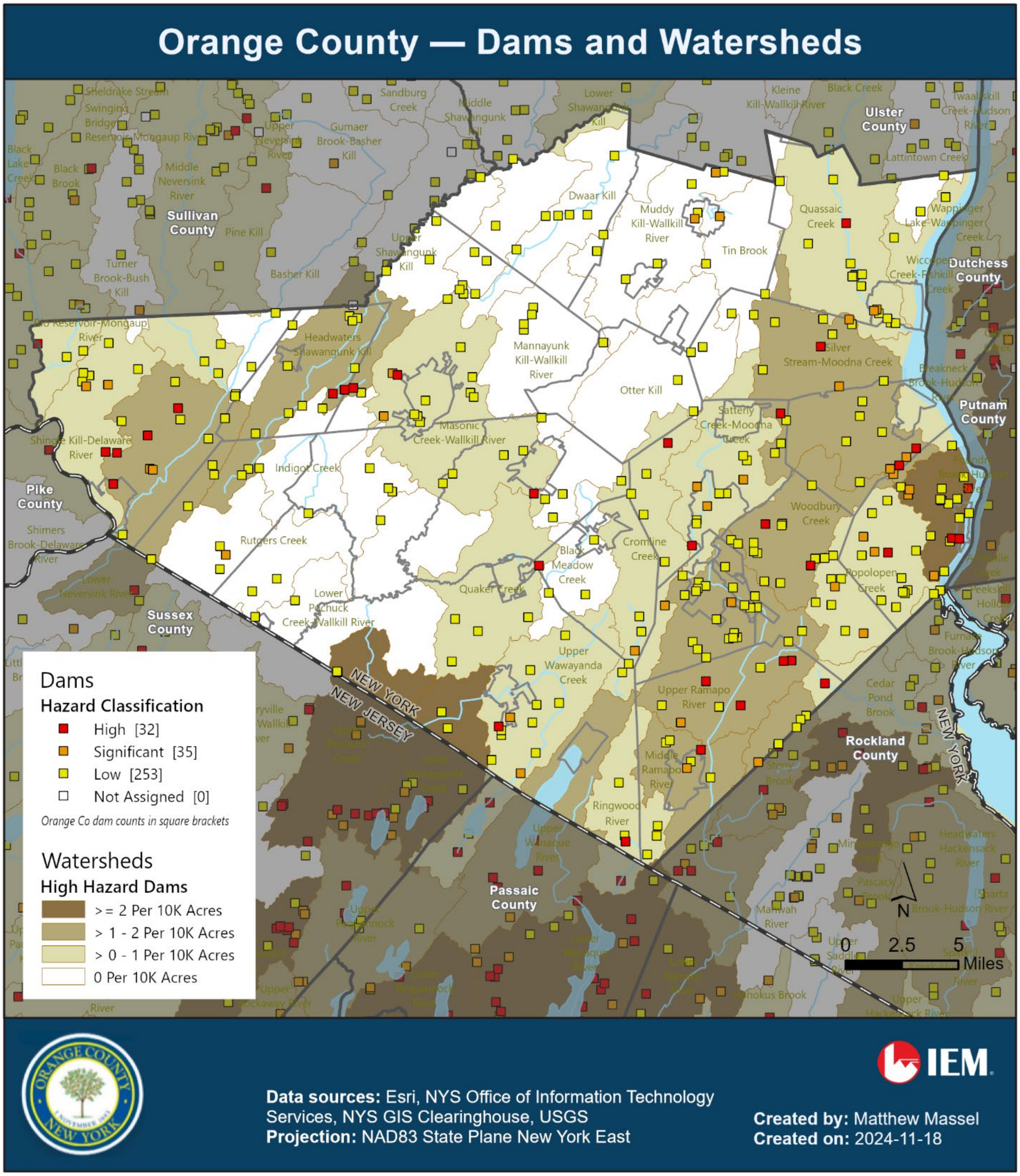
- Prolonged periods of rainfall and flooding, which cause most failures
- Inadequate spillway capacity, resulting in excess overtopping of the embankment
- Internal erosion due to embankment or foundation leakage or piping
- Improper maintenance, including failure to remove trees, repair internal seepage problems, or maintain gates, valves, or other operational components
- Improper design or use of improper construction materials
- Failure of upstream dams in the same drainage basin
- Landslides into reservoirs, which cause surges that result in overtopping
- High winds that cause significant wave action and result in substantial erosion
- Destructive acts of terrorism
- Earthquakes typically cause longitudinal cracks at the tops of the embankments, leading to structural failure

Location and Extent

Orange County is home to an impressive network of dams, 32 of which are classified as high-hazard potential dams (HHPDs), each playing a vital role in the region's water management and ecological balance. These structures help regulate water levels, control flooding, and support local ecosystems by maintaining wetland habitats. Many of the dams also contribute to recreational activities, providing opportunities for fishing, kayaking, and hiking in the beautiful landscapes surrounding them. The presence of these dams reflects the county's commitment to sustainable water resources and the protection of its natural environment, making it an essential component of Orange County's infrastructure and community identity.

In Orange County, some areas may be less affected in the event of dam failures, primarily those far away from major water bodies or dams. Towns such as Warwick and Chester, located at higher elevations and farther inland, tend to be at lower risk. Additionally, areas like Montgomery and Wallkill may face less immediate danger because they are farther from significant dams.

The map in Figure 23 displays the locations, categorized by their hazard level, of Orange County dams.[93]



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93 USACE. "National Inventory of Dams." https://nid.sec.usace.army.mil/#/dams/search/sy=@countyState:Orange,%20New%20York%20@name:orange%20county%20new%20york&viewType=map&resultsType=dams&advanced=false&hideList=false&eventSystem=false.

Figure 23: Orange County Dam Locations

- **Satisfactory:** No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the minimum applicable state or federal regulatory criteria or tolerable risk guidelines.
- **Fair:** No existing dam safety deficiencies are recognized for normal operating conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action. Note: "Rare" or "extreme" event is defined by the regulatory agency based on their minimum.
- **Poor:** A dam safety deficiency is recognized for normal operating conditions that may realistically occur. Remedial action is necessary. "Poor" may also be used when uncertainties exist regarding critical analysis parameters that identify a potential dam safety deficiency. Investigations and studies are necessary.
- **Unsatisfactory:** A dam safety deficiency is recognized as requiring immediate or emergency remedial action for problem resolution.
- **Not Rated:** The dam has not been inspected, is not under state or federal jurisdiction, or has been inspected but, for whatever reason, has not been rated.
- **Not Available:** Dams for which the condition assessment is restricted to approved government users.

Table 6 displays information on the HHPDs in Orange County. Condition assessments are defined as[94]:

Table 6: High Hazard Potential Dams in Orange County[95]

Name	Owner	Owner Type	Height (Ft.)	Storage (Acre-ft.)	Emergency Action Plan?	Condition Assessment
Stillwell	West Point	Federal	62	4,038	Yes	Unsatisfactory
Port Jervis Reservoir #2 Dam	City of Port Jervis	Local government	41	950	Yes	Fair
Chadwick Lake Dam	Town of Newburgh	Local government	37	3,840	Yes	Satisfactory
Goshen Reservoir #1 Dam	Village of Goshen	Local government	37	867	Yes	Poor

[94] InYork. "Data Central|Dam Safety Inspection." https://data.ydr.com/dam/new-york/orange-county/walden-pond-dam/ny13182/.
[95] Ibid.

Name	Owner	Owner Type	Height (Ft.)	Storage (Acre-ft.)	Emergency Action Plan?	Condition Assessment
Silver Stream Reservoir Dam	City of Newburgh	Local government	36	1,029	Yes	Satisfactory
Beaver Lake Dam	Carlos and Aurora Domingues, Orange County Department of Public Works	Local government, Private	35	2,644	Yes	Not Rated
Port Jervis Reservoir #3 Dam	City of Port Jervis	Local government	35	1,570	Yes	Fair
Lake Frederick	West Point	Federal	35	273	Yes	Poor
Lower Warwick Dam	Village of Warwick	Local government	33	48	Yes	Fair
Cornwall Upper Reservoir Dam	Village of Cornwall-on-Hudson	Local government	33	222	Yes	Satisfactory
Greenleaf Dike	City of Middletown	Local government	32	1,633	Yes	Fair
Popolopen Lake	West Point	Federal	32	1,030	Yes	Poor
Sterling Forest Lake Dam	Watchtower Bible and Tract Society of New York, NC.	Private	30	1,380	Yes	Satisfactory
Highland Lake Dam	City of Middletown	Local government	30	2,147	Yes	Fair
Woodward Dam	City of Middletown	Local government	30	1,633	Yes	Fair
Lower Wee-Wah Lake Dam	Village of Tuxedo Park	Local government	30	610	Yes	Satisfactory

Name	Owner	Owner Type	Height (Ft.)	Storage (Acre-ft.)	Emergency Action Plan?	Condition Assessment
Lusk Reservoir	West Point	Federal	30	283	Yes	Poor
Arthurs Pond Dam	Village of Cornwall-on-Hudson	Local government	27	259	Yes	Satisfactory
Earl Reservoir Dam	Town of Woodbury	Local government	26	172	Yes	Fair
YMCA Camp Mcalister Dam	YMCA of Greater New York	Private	26	155	Yes	Poor
Lake Cohasset Upper Dam	NYSOPRHP-Palisades Interstate Park Commission	State	25	373	Yes	Poor
Tomahawk Lake Dam	David Plotkin, David Plotkin dba Waterway Associates, Sidney Marshall	Private	25	3,359	Yes	Satisfactory
Glenmere Lake Dam	Orange County Public Works, Town of Chester Village of Florida	Local government	24	3,327	Yes	Satisfactory
Lake Tiorati Dam	NYSOPRHP-Palisades Interstate Park Commission	State	21	6,000	Yes	Satisfactory
Lake Cohasset Lower Dam	NYSOPRHP-Palisades Interstate Park Commission	State	21	84	Yes	Fair
Willow Brook Dam	Orange and Rockland Utilities Inc.	Public utility	20	995	Yes	Poor

Name	Owner	Owner Type	Height (Ft.)	Storage (Acre-ft.)	Emergency Action Plan?	Condition Assessment
Monhagen Lake Dike	City of Middletown	Local government	20	858	Yes	Fair
Port Jervis Reservoir #1 Dam	City of Port Jervis	Local government	20	550	Yes	Fair
Delafield Pond	West Point	Federal	18	10	Yes	Unsatisfactory
Lake Stahahe Dam	NYSOPRHP-Palisades Interstate Park Commission	State	14	737	Yes	Fair
Little Dam Lake Dam	NYSOPRHP-Palisades Interstate Park Commission	State	12	191	Yes	Satisfactory
Port Jervis Reservoir #3 Dike	City of Port Jervis	Local government	12	1,570	Yes	Fair
Lower Cragston Lake	West Point	Federal	10	46	Yes	Unsatisfactory

To measure the extent of dam failure, authorities rely on a combination of tools and methodologies rather than a single, specific instrument. Essential tools include flow gauges that measure the volume and rate of water released alongside hydraulic modeling software such as HEC-RAS, which simulates water flow and predicts downstream flooding scenarios. GIS are employed to analyze geographic data, assessing the extent of flooding and the potential impacts on nearby infrastructure. Drones provide valuable aerial views for visual inspections, allowing quick structural integrity assessments after a failure. Additionally, remote sensing techniques, including satellite imagery, offer large-scale evaluations of flooding and environmental impacts. Monitoring stations collect real-time data on various parameters, adding depth to the analysis.

In the event of a high-hazard dam failure in Orange County, flooding could be substantial, particularly affecting areas downstream of the dam. Communities such as Middletown, Port Jervis, and Newburgh are especially vulnerable due to their proximity to major rivers like the Wallkill and the Hudson. Low-lying regions and places along the Neversink River may also experience significant flooding. The consequences could include rapid water rise, infrastructure damage, and evacuations.

The following dams have had incidents or concerning issues:

- The Lake Osiris Dam has encountered several significant issues throughout its operational history. One primary concern has been structural integrity; aging infrastructure can lead to safety risks if not properly maintained and inspected. Additionally, the dam's presence impacts local ecosystems, disrupting natural habitats and affecting fish migration patterns. Sedimentation is another challenge, as accumulated debris can reduce the dam's storage capacity and complicate water management efforts. Furthermore, the design may pose flood risks, mainly if the spillway cannot handle heavy rainfall or rapid snowmelt, which could threaten downstream areas. Maintenance is critical but can be hindered by budget constraints, thus complicating repair efforts. Finally, the reservoir's creation has historically displaced local communities, affecting their livelihoods and access to essential resources. These issues highlight the complexities of managing and operating the Lake Osiris Dam.
- Wawayanda Pond Dam has faced several issues related to its structural integrity and water management. Over the years, concerns have arisen regarding the deterioration of the dam's structure, necessitating thorough inspections and repairs to maintain safety. Effective water management has also presented challenges, particularly in balancing water levels to prevent flooding during heavy rainfall and managing low water conditions during dry periods. The dam has also been subject to regulatory scrutiny to ensure compliance with safety standards, leading to ongoing assessments and potential upgrades.
- The Mount Peter Ski Area Dam has experienced historical issues related to flooding, particularly during periods of heavy rainfall. These incidents often stem from the dam's inability to effectively manage excessive water runoff, which can overwhelm its capacity. Such flooding events have raised concerns about the dam's structural integrity and the potential for property damage in the surrounding areas.
- Woodbury Dam has faced several specific issues related to its structural integrity and safety concerns. Over the years, monitoring reports have indicated potential structural vulnerabilities, raising alarms about the dam's capacity to handle heavy rainfall and associated flooding.

Additionally, maintenance challenges have been identified, particularly regarding debris and sediment accumulation, which can affect dams' functionality and water management.

Previous Historical Occurrence

From January 1, 1914 until October 30, 2024, there have been 220 reported dam incidents in New York State.[96] No dam breaks have been reported in Orange County; however, several instances have occurred in which dams were overwhelmed or their structural integrity was questioned.

During April 2005, heavy rainfall caused the Neversink Dam release valves to open, resulting in a deluge of water flowing down the Neversink River and significant flooding in Port Jervis despite the dam being in Sullivan County. The excessive rainfall caused water levels to rise beyond the dam's capacity, which

[96] National Performance of Dams Program. "NPDP Dam Incidents Database." https://npdp.stanford.edu/dam_incidents.

overwhelmed the area. Consequently, many neighborhoods in Port Jervis experienced extensive flooding, damaging homes, businesses, and infrastructure. Emergency services were mobilized to assist residents, and evacuations were conducted in the hardest-hit areas.[97]

In Orange County, several dams have been closely monitored due to heavy rainfall and rising water levels. Some of the dams that have experienced overwhelming conditions include:

- **Moodna Creek Dam:** Located in the Town of Cornwall, this dam has been scrutinized during heavy rainfall due to its proximity to developed areas.
- **Wawayanda Dam:** Situated in the Town of Wawayanda, this dam is part of a more extensive system that manages water flow in the region and has been impacted during flood events.
- **Woodbury Creek (or Woodbury Dam):** This dam serves the Town of Woodbury and has also been on alert during periods of heavy precipitation.

Future Potential Events

The probability of future events is pulled from the likelihood categories of the 2022 CEPA. Dam Failure is ranked "very low," meaning this event is not expected to occur within the county. Earthquakes cannot be predicted. They strike without warning, at any time of the year, and at any time of the day or night. According to USGS, there are an estimated 700 shocks each year with the capability of shaking homes, rattling windows, displacing objects, or even strong enough to cause property damage, death, and injury.[98] It is fortunate that many of these shocks occur in unpopulated areas. Forecasting earthquakes is often a difficult task. However, historical occurrences indicate that NYS experiences damaging earthquake events once every 22 years, on average. Lower-magnitude earthquakes are more common. Overall, the frequency of damaging earthquakes within and in the immediate vicinity of Orange County is low relative to other parts of the country and the world.

Impact of Climate Change

The impacts of climate change due to dam failure can be profoundly negative. As climate change leads to more extreme weather events—such as intense rainfall, precipitation, and floods—the risk of dam failure increases significantly. A dam breach can unleash a torrent of water downstream, resulting in catastrophic flooding that endangers lives, destroys property, and disrupts ecosystems. The sudden release also can degrade water quality by introducing sediments and pollutants into the water supply, posing health risks to communities and harming aquatic life. Additionally, infrastructure damage can be extensive, crippling transportation networks and compromising essential services. The economic repercussions are also severe, as affected communities may face enormous costs for recovery and rebuilding, loss of livelihoods,

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[97] Times Herald-Record. "Judge Rejects Flood Claims: Neversink Suit Blamed NYC." https://www.recordonline.com/story/news/2012/10/07/judges-reject-flood-claims-neversink/49365286007/.

[98] U.S. Geological Survey, Earthquake Hazards Program. "100% Chance of an Earthquake." https://www.usgs.gov/programs/earthquake-hazards/100-chance-earthquake#:~:text=It%20is%20estimated%20that%20about%20700%20shocks%20each,earthquakes%20center%20in%20unpopulated%20areas%20far%20from%20civilization.

and increased reliance on emergency services. Furthermore, the displacement of populations can lead to long-term challenges, particularly for vulnerable groups already impacted by climate change.

Vulnerability Assessment

EXPOSURE

Orange County is home to several dams that are essential for flood control, water supply, and recreation. However, their failure poses a significant risk to the community and the environment. This assessment identifies vulnerabilities related to dam failures, including high-hazard dams and critical county assets. Orange County has 114 dams, 33 classified as high-hazard dams. Failure of these dams could potentially result in the loss of human life and significant property damage. The list of high-hazard dams is displayed in Table 1 within Location and Extent. These dams are strategically located, and their failure could lead to catastrophic effects on surrounding communities and infrastructure. The extent of damage will vary depending on the nature of the failure, the volume of water released, and the velocity of the water released.

IMPACT ON COUNTY ASSETS

Several critical assets and infrastructure within Orange County are at risk in the event of a dam failure. Dam failure can result in severe flooding, substantial property and infrastructure damage, economic losses, and injury or loss of life. The highest depth and velocity are typically in the immediate area of the dam and decreases over distance. Inundation boundary data was not available for the dams to analyze specific assets in potential inundation zones or to summarize loss estimates. Possible impacts are described for a variety of community assets.

- **Residential Areas:** Residential communities downstream of high-hazard dams face significant risks. Swift moving flood waters may isolate people in their homes or force them to seek protection on higher ground. Evacuation and rescue efforts are challenging, particularly if there is little warning time before the dam failure. Individuals with mobility constraints or disabilities may be unable to evacuate. Individuals can be swept away by flood waters, and swift water rescues are risky for responders. Residents may be displaced from damaged homes, and some may seek public shelter or strain capacities of other temporary housing options.
- **Transportation Infrastructure:** Major roadways and bridges such as I-87, US 6, and state and local highways could be inundated, washed out, or blocked by debris. Road closures lead to disruptions in transportation and delays in emergency response and delivery of recovery supplies.
- **Utilities:** Power generation facilities and water supply systems are also vulnerable, potentially leading to prolonged outages and service disruptions. Lack of power, communication, and other services slows overall community recovery and diminishes the safety and well-being of the population.
- **Critical Facilities:** Facilities downstream of dam failure could be damaged and may experience service interruptions or closures. Damage to these facilities reduces the overall capacity to provide critical response services to the community.

- Hospitals (e.g., Orange Regional Medical Center)
- Emergency services (e.g., police and fire stations)
- Schools
- Water treatment facilities

- **Economy**: Loss of homes, damage to business, and interruption of essential services disrupts local economies and affects livelihoods. Businesses may be unable to operate, and employees may be unable to report to work, resulting in lost revenue and lost income for employees. The recovery and reconstruction process can be lengthy and costly, resulting in prolonged economic disruptions and financial instability and hardship for residents.
- **Natural Systems:** High-velocity water flow may pick-up and carry debris, hazardous materials and pollutants and deposit them downstream. Vegetation and top soil may be eroded. Fish and other wildlife habitat may be damaged or destroyed.

ESTIMATED IMPACT AND POTENTIAL LOSSES

In the event of a dam failure in Orange County, the impacts and potential losses could be devastating. The sudden release of water would likely result in severe flooding, inundating homes, businesses, and infrastructure, leading to significant property damage and displacement of residents. Critical infrastructure such as roads, bridges, and utilities could be compromised, hampering emergency response efforts and disrupting daily life. Additionally, the risk to human life would be considerable, with the potential for fatalities and injuries, particularly among those unable to evacuate in time. Economic consequences would also be profound, with local businesses suffering losses and increased demand for emergency services driving up costs. Environmental damage could occur as pollutants enter waterways, leading to long-term ecological impacts.

Orange County has not experienced any fatalities or significant economic damage from Orange County dam failures; however, the county reported $17 million in damages from flooding,[99] some of which was linked to the Neversink Dam incident in Sullivan County. Nevertheless, many incidents may have gone unreported, which means the actual number of events could be higher. There are no annualized loss estimates for dam failures, nor is there data on inundation boundaries that would allow for a detailed analysis of potential financial losses affecting critical facilities and infrastructure. Nevertheless, in the event of a major dam failure, the repercussions could be severe for downstream structures.

In Orange County, certain towns and villages may be more susceptible to dam failures due to their proximity to water bodies and existing dams. Areas like Montgomery and Middletown have multiple small ponds and waterways, increasing the risk of flooding in the event of a dam breach; however, Middletown is more inland and highly elevated, which could negate the impacts. Newburgh, located alongside the Hudson River, could face significant impacts from dam failures upstream, while Cornwall's location near the river also makes it vulnerable. Warwick, with its lakes and rural setting, may also be at risk from smaller

[99] FEMA. "Storm Events Database." https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=5443447.

regional dams if they should fail. Lastly, Harriman, surrounded by various lakes and ponds, could experience the effects of nearby dam breaches.

When seeking to identify those towns and villages in Orange County that may be less susceptible to dam failures, it helps to consider their geographical location and elevation relative to significant water bodies. Areas such as Goshen and Middletown are situated more inland, resulting in higher elevations and potentially reducing their risk of flooding caused by dam failures. Due to its location along the Hudson River, Newburgh has developed infrastructure that might mitigate immediate impacts. Similarly, Walden and Hamptonburgh, located further from major lakes and rivers, could experience lower risks. With its various elevated areas, Monroe also benefits from a more beneficial position concerning flood hazards.

VULNERABLE POPULATIONS

In Orange County, various vulnerable populations are at heightened risk in the event of a dam failure. One of the most affected groups is low-income families who may reside in areas more prone to flooding. These families often lack the resources and means to evacuate quickly, leaving them in unsafe situations during emergencies. When a dam fails, the immediate threat of flooding and limited financial resources can hinder their ability to find temporary housing or access essential services.

Elderly individuals are also a particularly vulnerable demographic. Many seniors may have mobility issues or health concerns that complicate evacuation efforts. Those who live alone face additional challenges, as they may not receive timely information about impending dangers or have the necessary support to evacuate safely. In emergencies, the lack of mobility can put seniors at significant risk, emphasizing the need for targeted emergency response planning to assist this population.

People with disabilities face unique challenges as well. Those with physical disabilities may require specialized assistance to evacuate, while individuals with cognitive disabilities may struggle to process information quickly in high-stress situations. Furthermore, families with children are also vulnerable; parents must ensure their children's safety while managing their own logistical needs, which can create additional stress in a crisis. Access to family-oriented resources during emergencies is essential for safeguarding this population.

Residents with limited English proficiency may encounter barriers in accessing vital information during an emergency, which can hinder their ability to respond adequately to a dam failure. Effective communication ensures all residents understand the risks and available resources. Similarly, those experiencing homelessness are at extreme risk, as they often lack access to timely information, transportation, and safe shelters. Their situation can quickly become dire in the event of flooding due to a dam failure.

In regions with significant agricultural activity, agricultural workers face challenges if a dam failure impacts local farms and equipment. Their close living conditions can amplify the dangers in a community-wide emergency. Furthermore, ethnic and racial minorities may experience systemic barriers that affect their preparedness for emergencies, including a lack of access to resources and support networks.

DEVELOPMENT TRENDS

The development trends influenced by dam failures are increasingly significant as communities reassess their infrastructure and land use strategies. Historically, many regions have relied on dams for water storage, hydroelectric power, and flood control. However, with rising awareness of the risks associated with aging infrastructure, a shift toward safer, more sustainable practices is becoming evident. This has led to a growing trend in prioritizing green infrastructure solutions, such as natural water retention systems and wetland restoration. These alternatives mitigate flooding risks, enhance local ecosystems, provide recreational spaces, and promote biodiversity.

Regarding future land use trends, there is likely to be a marked increase in zoning adjustments and land development regulations prioritizing resilience against natural disasters. As the impacts of climate change become more pronounced, areas previously deemed suitable for development may be reevaluated. Coastal regions and floodplains, for example, could see tighter restrictions to prevent further construction in high-risk zones after experiencing dam failures and resultant flooding. Simultaneously, urban areas may invest more in retrofitting existing structures to withstand extreme weather events. At the same time, rural communities might explore diversified land use practices, such as agroecology, to improve ecological balance and water management.

COMMUNITY LIFELINES

Dam failures can severely disrupt multiple FEMA Community Lifelines (see Figure 22), posing significant risks to public safety and well-being. The safety and security lifeline is immediately threatened as the sudden release of water can endanger lives, leading to urgent evacuations. Regarding food, hydration, and shelter, flooding can contaminate drinking water and damage food supplies, causing shortages and forcing many into temporary housing. The health and medical lifeline is compromised when medical facilities are damaged or inaccessible, and the risk of waterborne diseases increases due to flooding. Furthermore, energy infrastructure may be damaged, resulting in power outages impacting homes and critical services like hospitals. Effective communications can break down when infrastructure is destroyed, leaving residents without critical information and emergency updates. Finally, transportation networks can be impacted as roads and bridges are washed out, complicating rescue operations and the delivery of essential supplies.

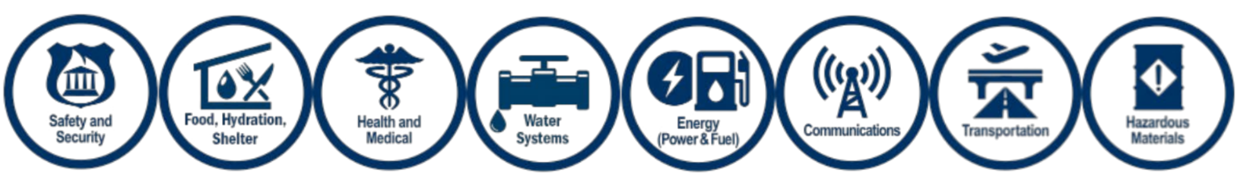

Figure 24: Community Lifelines

Drought

Hazard Description

In general terms, drought is a prolonged period of unusually persistent dry weather that significantly reduces water availability. Drought reduces surface water and groundwater supplies, resulting in widespread ecological, agricultural, and socioeconomic consequences.[100] According to the 2023 New York State Hazard Mitigation Plan (SHMP), droughts can vary widely in duration, from short episodes to extended multi-year periods, with factors such as high temperatures, low humidity, and increased wind speed intensifying their severity. Human activities, including increased demand for water resources, further accelerate the impacts of drought.[101] At the federal level, drought is understood not only as a period of below-normal precipitation but also as a complex event that involves an imbalance between water supply and demand, where specific indices measure meteorological, agricultural, hydrological, and socioeconomic dimensions.[102] Droughts can contribute to wildfire and brush fire risk because dry vegetation provides fuel for fires. Wildfires can spread rapidly, especially during droughts, but also during more ordinary periods of dry weather.[103] Wildfires are defined as uncontrolled fires spreading through natural or unnatural vegetation that can threaten lives and property if not contained.[104]

CAUSES OF DROUGHTS

The State of New York, including Orange County, faces significant drought risks driven by rapid urban expansion, demographic pressures, and climate change, each compounding water scarcity concerns.[105] With a population exceeding 20 million, the state's intense urbanization has led to an Urban Heat Island (UHI) effect, where concrete-heavy development increases temperatures and evaporation rates, aggravating water shortages during dry periods. Rising average temperatures, projected to increase by another 3–5°F by 2050—and 9°F by the 2080s—are worsening these effects, reducing soil moisture and accelerating evaporation from reservoirs.[106] Annual precipitation is projected to increase, yet rather than providing steady rainfall, the region experiences more intense, short-duration storms, leading to reduced

[100] Wilhite, D. A., & Glantz, M. H. (1985). "Understanding: The Drought Phenomenon: The Role of Definitions." *Water International, 10*(3), 111–120. https://www.tandfonline.com/doi/abs/10.1080/02508068508686328.
[101] New York State Division of Homeland Security and Emergency Services. 2023. https://hazardmitigation.ny.gov/.
[102] National Integrated Drought Information System (NIDIS). "Drought Assessment in a Changing Climate Report." 2023. https://www.drought.gov/sites/default/files/2023-11/Drought-Assessment-Changing-Climate-Report-11-2023_0.pdf.
[103] National Integrated Drought Information System. (n.d.). "Drought Impacts on Wildfire Management." https://www.drought.gov/sectors/wildfire-management#:~:text=Drought%20Impacts%20on%20Wildfire%20Management.
[104] FAO. "FAO Term Portal: Collection: Fire Management (A10.6)/CSCM. Food and Agriculture Organization of the United Nations (FAO)." 2010. https://www.fao.org/faoterm/viewentry/en/?entryId=97000.
[105] National Integrated Drought Information System (NIDIS). "New York State Drought Information." (n.d.). https://www.drought.gov/states/new-york.
[106] The Nature Conservancy. "Climate Change Impacts in New York." (n.d.). https://www.nature.org/media/initiatives/new_york_factsheet_5.pdf.

groundwater recharge and prolonged dry spells between rain events.[107] Compounding these climate-driven factors, economic and industrial demands in the area continue to strain limited water resources. Agriculture, particularly in Orange County, requires significant irrigation—especially during dry summers—which overlaps with the water needs of manufacturing and processing industries critical to the region's economy.[108] Furthermore, land-use changes are transforming forested and agricultural areas into suburban developments, reducing the natural landscape's ability to effectively retain and recharge water. The challenges posed by aging water infrastructure add another layer to the crisis: It is estimated that 20% of water is lost due to leaks in outdated pipes—losses that are especially critical during droughts.[109] Water supplies are strained even further by seasonal surges in demand from water use in tourism and recreation, which peaks during the summer months when natural water supplies are already limited for reasons outlined above. These overlapping pressures highlight the complexity of managing drought risks in the New York State, emphasizing the need for resilient water management strategies and infrastructure upgrades to safeguard water resources amidst growing climate and demographic challenges.

[107] New York State Climate Impacts Assessment. "New York State's Changing Climate - Precipitation." (n.d.). https://nysclimateimpacts.org/explore-the-assessment/new-york-states-changing-climate/nysc-precipitation/.
[108] Sweet, S. K., Wolfe, D. W., DeGaetano, A., et al. (2017). "Anatomy of the 2016 Drought in the Northeastern United States: Implications for Agriculture and Water Resources in Humid Climates." *Agricultural and Forest Meteorology*, 247, 571–581. https://www.sciencedirect.com/science/article/pii/S0168192317302800?via%3Dihub.
[109] Technology Networks. "Up to 50% of Water Lost to Leaks in U.S. – Here's How We Stop It." April 16, 2020. https://www.technologynetworks.com/applied-sciences/news/up-to-50-of-water-lost-to-leaks-in-us-heres-how-we-stop-it-331459.

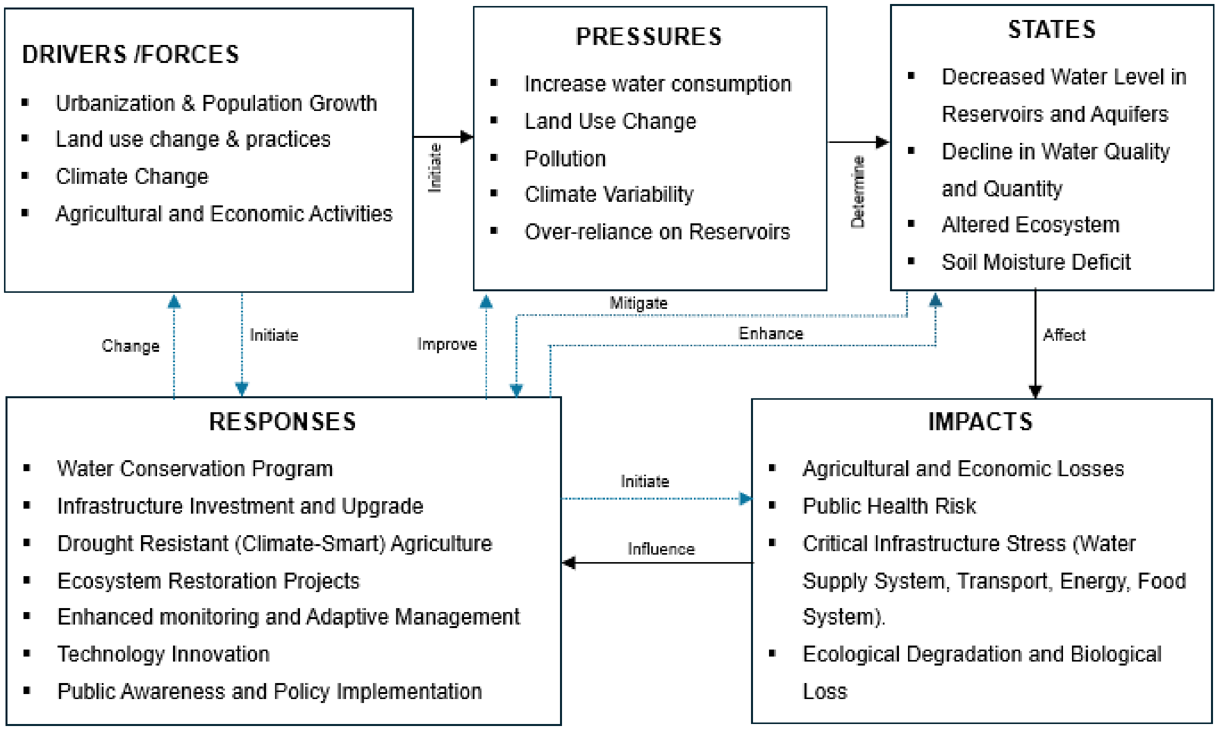

Figure 25: Cause–Effect Relationship of Drought in New York State[110,111]

TYPES OF DROUGHTS

A complex and multi-dimensional phenomenon, drought has been categorized by the National Weather Service (NWS) into five types: meteorological, agricultural, hydrological, socioeconomic, and ecological. Each type of drought reflects distinct impacts and mechanisms that can significantly affect areas like Orange County as well as New York City.[112]

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[110] Adapted from Braneon, C., Ortiz, L., Bader, D., et al. (2024). "NPCC4: New York City Climate Risk Information 2022 – Observations and Projections." *Ann NY Acad Sci.*, 1539, 13–48. https://nyaspubs.onlinelibrary.wiley.com/doi/10.1111/nyas.15116.

[111] Ilcheva, I., Georgieva, D., & Yordanova, A. (2015). "New Methodology for Joint Assessment of Drought-Risk of Water Supply Under Climate Change, Water Stress Areas Identification, and Ecological Flow Provision for Water Framework Directive." *Ecology & Safety, 9, Journal of International Scientific Publications.* https://www.researchgate.net/publication/315058055_new_methodology_for_joint_assessment_of_drought-_risk_of_water_supply_under_climate_change_water_stress_areas_identification_and_ecological_flow_provision_for_water_framework_directive.

[112] National Weather Service. "Understand Drought and Know How to Respond." National Oceanic and Atmospheric Administration. https://www.weather.gov/safety/drought.

METEOROLOGICAL DROUGHT occurs when prolonged dry weather patterns dominate an area, leading to insufficient rainfall and escalating the severity of subsequent drought types.

HYDROLOGICAL DROUGHT follows, manifesting through reduced water supply in reservoirs, streams, and groundwater systems, often as a cumulative effect of sustained meteorological drought. This is particularly relevant for Orange County, where water sources such as the Hudson River watershed are susceptible to fluctuating levels due to changing precipitation patterns and increased demand.

AGRICULTURAL DROUGHT impacts crops and vegetation when soil moisture falls below the levels required for optimal crop growth, often exacerbated by both meteorological and hydrological drought. This type is crucial in agricultural regions of Orange County, where insufficient soil moisture directly affects crop yields and local food security.

SOCIOECONOMIC DROUGHT arises when the supply–demand balance of commodities, including water, food, and energy, is disrupted due to drought conditions. This type of drought particularly impacts urban and semi-urban areas of Orange County, where increasing population and industrial needs place heavy demand on already limited water resources, highlighting the interplay between economic activities and water scarcity.

ECOLOGICAL DROUGHT affects natural ecosystems, altering habitats and biodiversity by stressing water-dependent plants and animals. In Orange County, ecological drought may lead to habitat degradation in the Hudson Valley and nearby ecosystems, affecting both terrestrial and aquatic species and the overall ecological health of the region.

Figure 26: Types of Droughts[113,114]

These classifications allow scientists and policymakers to target responses to the specific impacts of each drought type. Furthermore, they are particularly pertinent for regions like Orange County, where diverse environmental, agricultural, and urban systems interact under varying drought pressures. By understanding and addressing these drought categories, the county can develop a more nuanced approach to water resource management, resilience planning, and ecological conservation in the face of evolving drought risks.

Location and Extent

The severity of a drought depends on the degree of moisture deficiency, the duration of the event, as well as the size and location of the affected area.[115] Drought determination is nuanced and adapted to local

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[113] Wilhite, D.A., et al. (1985). “Understanding the Drought Phenomenon: The Role of Definitions.” *Water International, 10*(3), 111–120.

[114] Crausbay, S.D., et al. (2017). “Defining Ecological Drought for the Twenty-First Century.” *Bulletin of the American Meteorological Society, 98*(12), 2543–2550.

[115] The American Red Cross. “Drought Preparedness and Water Conservation.” https://www.redcross.org/get-help/how-to-prepare-for-emergencies/types-of-emergencies/drought.html#:~:text=A%20drought%20is%20a%20period,size%20of%20the%20affected%20area.

hydrological and meteorological conditions. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts. New York State applies two methodologies to identify the different drought stages: the Palmer Drought Severity Index (PDSI) and the State Drought Index (SDI).[116] The two indices track different aspects of drought. The PDSI, with its emphasis on soil moisture, helps us understand agricultural impacts. The SDI helps assess drought's impact on human welfare and the regional economy. New York has a diverse geographical landscape, and the New York DEC divides New York State into nine drought-management regions based loosely on drainage basins and county lines (Figure 27).[117] Orange County is located within the Catskills Drought Region (Region VII). NYS DEC monitors drought parameters at least once monthly in each region and more frequently in drought periods. This data helps the DEC evaluate each region's status, categorizing conditions along a spectrum of severity from "normal" to "drought disaster."

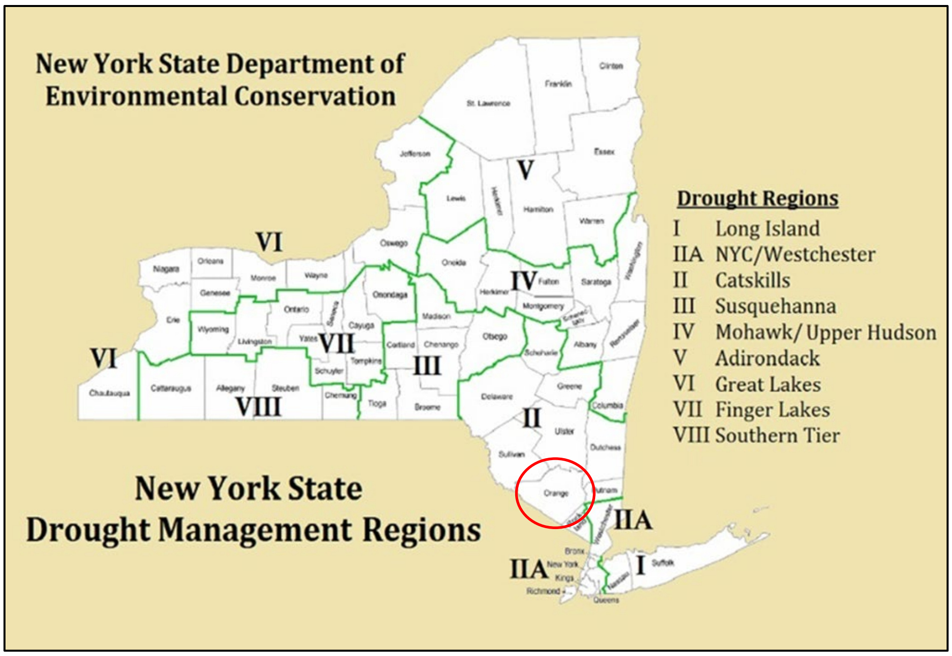

Figure 27: New York State Drought Management Regions[118]

The SDI tool compares four key indicators—stream flows, precipitation levels, lake and reservoir storage, and groundwater status—against historical averages to assign a drought status unique to each of the state's nine drought management regions. This localized approach ensures that drought classifications reflect regional water needs and seasonal variations that may diverge from national classifications.[119]

[116] New York State Division of Homeland Security and Emergency Services. "New York State Drought Management Coordination Annex." March 2024. https://www.dhses.ny.gov/system/files/documents/2024/03/final-nys-drought-management-coordination-annex-wv-march-2024.pdf.
[117] New York State Department of Environmental Conservation. "Drought Management Regions in New York State." (n.d.). https://dec.ny.gov/environmental-protection/water/water-quantity/drought-management-regions.
[118] NYC Hazard Mitigation Plan. "Drought." 2022. https://nychazardmitigation.com/documentation/hazard-profiles/drought/.
[119] New York State Division of Homeland Security and Emergency Services. "New York State Drought Management Coordination Annex." March 2024. https://www.dhses.ny.gov/system/files/documents/2024/03/final-nys-drought-management-coordination-annex-wv-march-2024.pdf.

These state-specific criteria enable targeted water conservation measures by local agencies, enhancing resilience in both urban and rural settings. To assess drought across different parts of the state, New York's Drought Management Task Force uses the SDI while also considering water use, duration of the dry period, and season.[120]

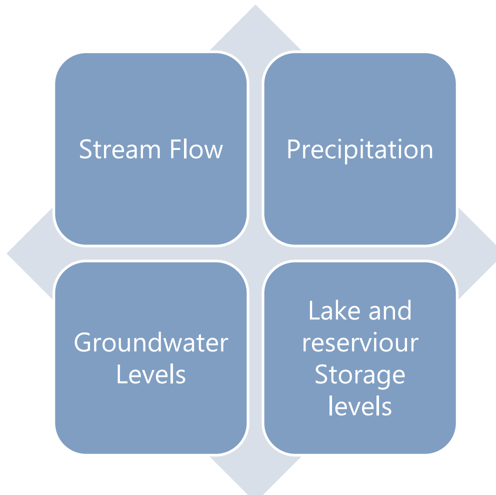

Figure 28: New York Utilizes a Specific State Drought Index

New York State also tracks other drought measurements, including the PDSI calculated by the National Weather Service.[121] The PDSI measures the duration and intensity of long-term drought-inducing circulation patterns and can be used to evaluate the soil moisture level, which helps to understand potential impacts on agriculture. Soil with decreased moisture content is the first indicator of an overall moisture deficit. Figure 29 lists the PDSI classifications. At the one end of the spectrum, 0 is used as the baseline for "normal," whereas drought is indicated by negative numbers. For example, −2 is "moderate drought," −3 is "severe drought," and −4 is "extreme drought." The PDSI can reflect excess precipitation using positive numbers; however, this is not shown in Table 1. Because weather patterns can change almost overnight from a long-term drought pattern to a long-term wet pattern, the PDSI can respond rapidly. Current drought conditions at the state level can be obtained from NYS DEC.[122] As of this writing, Orange County is under "Watch" conditions.

[120] New York State Comprehensive Emergency Management Plan. "NYS Emergency Public Information Annex." 2024. https://www.dhses.ny.gov/system/files/documents/2024/03/final-nys-emergency-public-information-annex-wv-march-2024.pdf.
[121] New York State Department of Environmental Conservation. "Drought." https://dec.ny.gov/environmental-protection/water/water-quantity/drought.
[122] Braneon, C., Ortiz, L., Bader, D., et al. (2024). "NPCC4: New York City Climate Risk Information 2022 – Observations and Projections." *Ann NY Acad Sci*., 1539, 13–48. https://nyaspubs.onlinelibrary.wiley.com/doi/10.1111/nyas.15116.

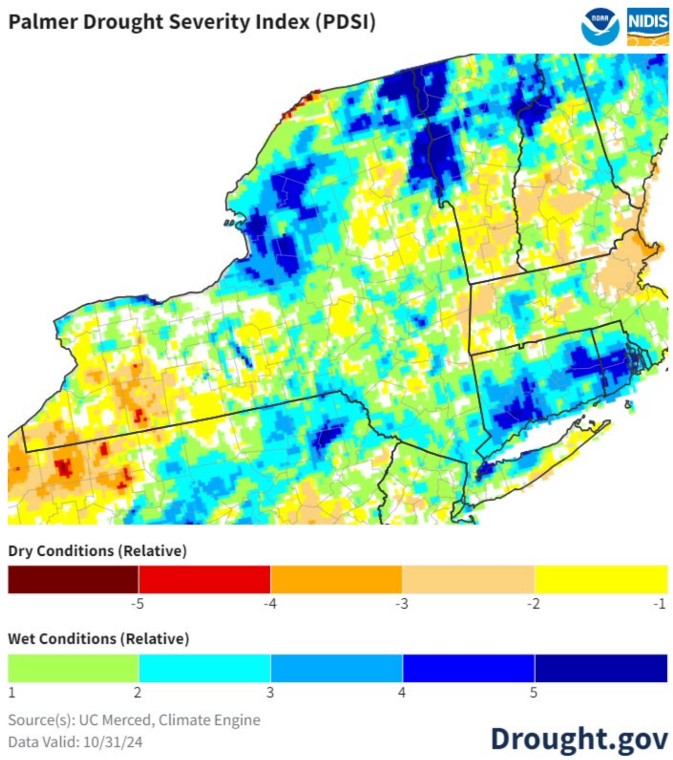

Figure 29: New York Palmer Drought Severity Index

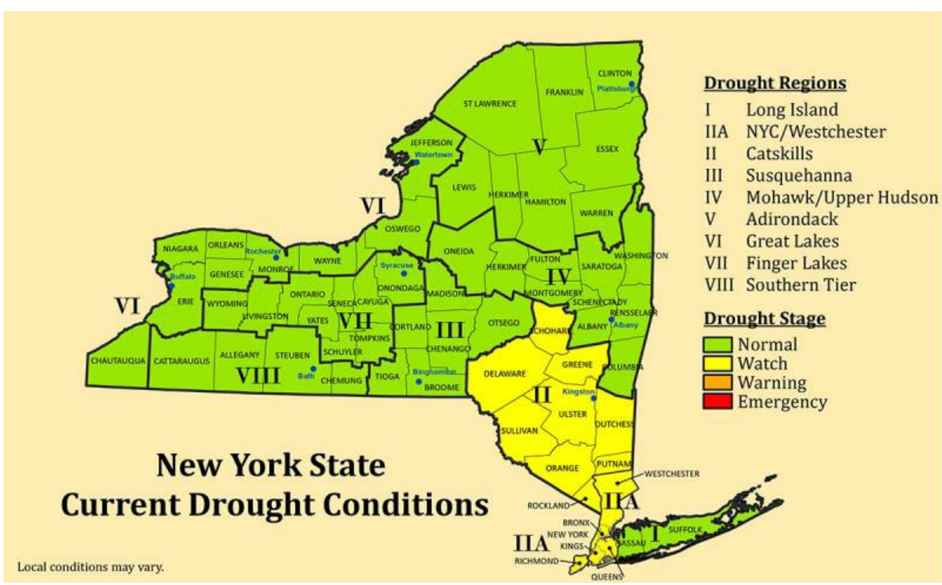

Figure 30: Current New York Drought Conditions[123]

[123] New York State Department of Environmental Conservation. "Current Drought Conditions." https://dec.ny.gov/environmental-protection/water/water-quantity/current-drought-conditions.

Drought Severity	Return Period (Years)	Description of Possible Impacts	Drought Monitoring Indices		
			Standardized Precipitation Index (SPI)	NDMC* Drought Category	Palmer Drought Index
Minor Drought	3 to 4	Going into drought; short-term dryness slowing growth of crops or pastures; fire risk above average. Coming out of drought; some lingering water deficits; pastures or crops not fully recovered.	-0.5 to -0.7	D0	-1.0 to -1.9
Moderate Drought	5 to 9	Some damage to crops or pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested.	-0.8 to -1.2	D1	-2.0 to -2.9
Severe Drought	10 to 17	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed.	-1.3 to -1.5	D2	-3.0 to -3.9
Extreme Drought	18 to 43	Major crop and pasture losses; extreme fire danger; widespread water shortages or restrictions.	-1.6 to -1.9	D3	-4.0 to -4.9
Exceptional Drought	44+	Exceptional and widespread crop and pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells creating water emergencies.	less than -2	D4	-5.0 or less

*NDMC - National Drought Mitigation Center

Figure 31: Drought Severity with Multiple Drought Monitoring Indices

Based on an appraisal of both drought indices (SDI and PDSI), four stages of drought can be declared in New York State, as well as a state of "Normal Condition."[124] The New York State Drought Plan describes the actions to be taken during each drought stage by water purveyors, towns and villages, water authorities, and other agencies with water supply responsibilities.[125]

Table 7: The Four Drought Stages and What They Mean[126]

Stages of Drought	Description	General Response Measures
Normal Conditions	Water availability and precipitation levels meet demand without signs of drought stress. Reservoirs, groundwater, and soil moisture levels align with historical averages, supporting ecological health and sufficient water supply.	
Drought Watch	A Drought Watch is declared when a drought is developing.	Public water suppliers begin to conserve water and urge customers to reduce water use.

[124] Winkley, Steven. "The Four Stages of Drought Response in New York." New York Rural Water Association. 2016. https://www.nyruralwater.org/sites/default/files/winkley_1.pdf.
[125] New York State Department of Environmental Conservation. "Drought." https://dec.ny.gov/environmental-protection/water/water-quantity/drought.
[126] Ibid.

Stages of Drought	Description	General Response Measures
Drought Warning	Voluntary water conservation is intensified.	Public water suppliers and industries update and implement local drought contingency plans, and local agencies make plans in case of emergency declaration.
Drought Emergency	The Governor may declare an emergency. The Disaster Preparedness Commission coordinates the 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	Water use is restricted.	The Governor may declare a disaster and request federal disaster assistance. Emergency legislation may be enacted. The state provides resources and technical assistance to communities.

Previous Historical Occurrence

New York State's most severe recorded drought occurred in the 1960s.[127] This prolonged period of dryness significantly depleted water availability and spurred the development of modern water management strategies that still use this event as a critical benchmark. The 1960s drought highlighted the region's vulnerability to extreme drought conditions, emphasizing the need for comprehensive strategies to address prolonged low water availability.[128] This drought event led to FEMA historical disaster declaration, which classified Orange Country, New York, as a drought-related disaster in 1965 and formally identified the incident as a water shortage event.[129] This classification, part of FEMA's historical disaster records from 1954 to 2020, points to the significant risks posed by water scarcity in an era of increasing climate variability. The drought designation underscored not only the direct impact on water availability for residents and agriculture in Orange County but also the broader regional vulnerabilities in New York State. FEMA's drought-related declarations are critical because they bring federal resources to support local governments in managing water shortages, enhancing resilience, and sustaining essential services. This historical case illustrates the ongoing issues faced by communities like Orange County, emphasizing the need for proactive water management, drought mitigation, and climate adaptation to ensure long-term sustainability.

Beyond the 1960s, New York has continued to experience recurring droughts, with particularly notable occurrences in the 1980s. These events underscored vulnerabilities in water infrastructure and

[127] Braneon, C., Ortiz, L., Bader, D., et al. (2024). "NPCC4: New York City Climate Risk Information 2022 – Observations and Projections." *Ann NY Acad Sci.*, 1539, 13–48. https://nyaspubs.onlinelibrary.wiley.com/doi/10.1111/nyas.15116.
[128] Gonzalez, J. E., Ortiz, L., Smith, B. K., et al. (2019). "New York City Panel on Climate Change 2019 Report Chapter 2: New Methods for Assessing Extreme Temperatures, Heavy Downpours, and Drought (NASA Technical Report No. 20190002194)." NASA Technical Reports Server. https://ntrs.nasa.gov/api/citations/20190002194/downloads/20190002194.pdf.
[129] Federal Emergency Management Agency. "Disaster Declarations for States and Counties." https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties.

coordination among state agencies. To address these gaps, Executive Order #116, issued on January 7, 2002, by then-Governor George Pataki, reconstituted the New York State Drought Management Task Force. This executive action sought to enhance coordination between state and local agencies, improving preparedness and response mechanisms for drought conditions.[130] The task force was tasked with evaluating regional water availability, integrating statewide data, and supporting targeted conservation measures to strengthen resilience against future drought risks.

From 1996 to 2018, the state recorded annualized drought-related losses averaging $2.01 million. This economic impact, documented in state hazard mitigation assessments, reflects the substantial costs associated with drought events in New York, driving a focus on proactive drought management and mitigation strategies.[131] Orange County has directly experienced two (2) significant droughts from 2000 through 2015. Recent analysis, as illustrated in Figure 32, shows spikes in drought conditions in Orange County from 1895 to present that align with statewide historical trends. This data further supports the observed correlation between drought intensity and its recurrence, informing current drought risk assessments and resource allocation practices for affected regions.

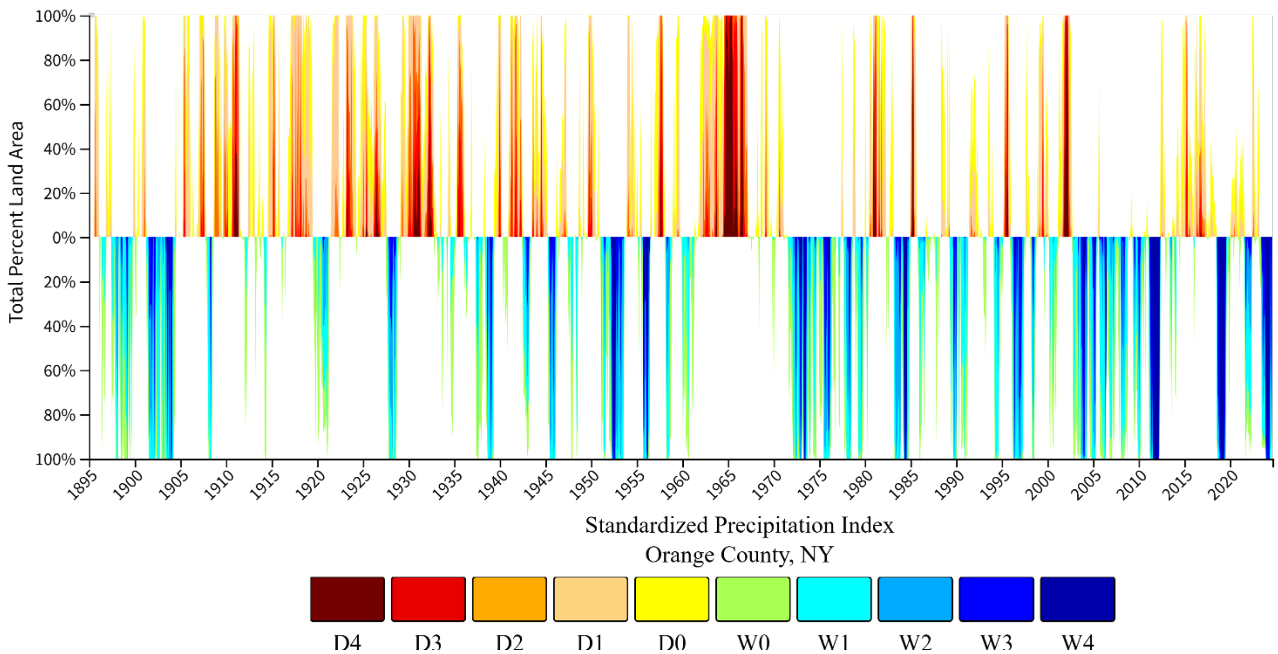

Figure 32: Past Drought Conditions for Orange County[132]

Drought results from an imbalance between water supply and water demand. The Standardized Precipitation Index (SPI) measures water supply, specifically precipitation. The SPI captures how observed precipitation (rain, hail, snow) deviates from the climatological average over a given time period—in this

[130] New York State Division of Homeland Security and Emergency Services. "Drought Management Coordination Annex." 2024. https://www.dhses.ny.gov/system/files/documents/2024/03/final-nys-drought-management-coordination-annex-wv-march-2024.pdf.
[131] MitigateNY. "Drought Hazards in New York." https://mitigateny.availabs.org/hazards/drought.
[132] NOAA, NIDIS, Drought.gov. "Drought Conditions for Orange County. https://www.drought.gov/states/new-york/county/orange.

case, over the 9 months leading up to the selected date. Red hues indicate drier conditions, and blue hues indicate wetter conditions. Data are available monthly from 1895 to now.[133] Figure 33 shows the SPI for the past month, and Figure 34 shows the average SPI over the past 5 years.

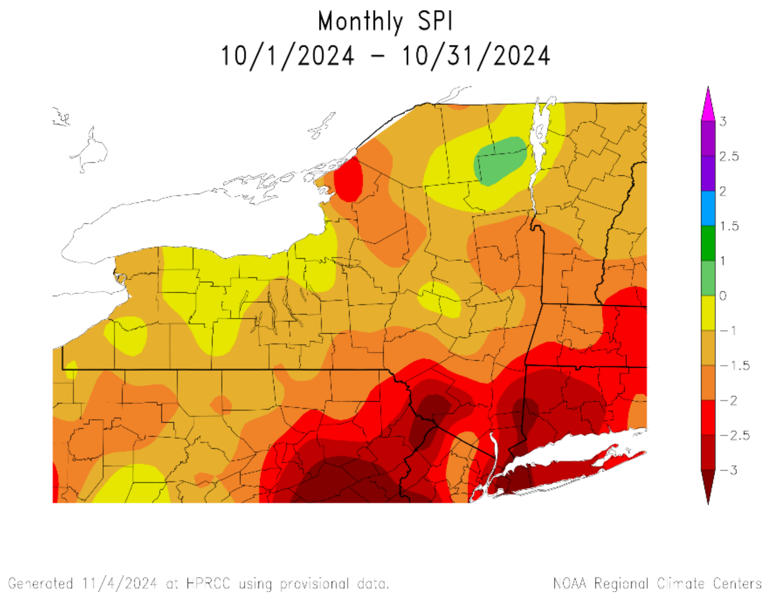

Figure 33: Standard Precipitation Index: October 2024

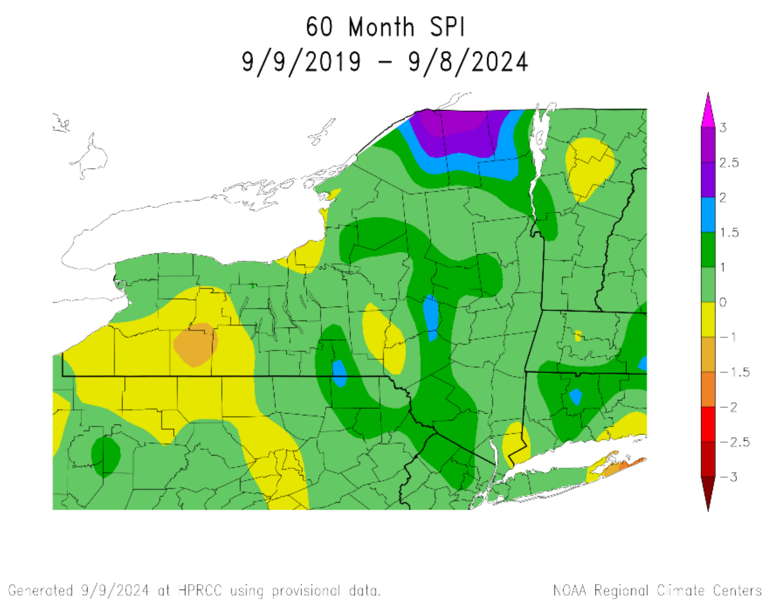

Figure 34: Standard Precipitation Index for New York: Past 60 Months[134]

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[133] Ibid.

[134] High Plains Regional Climate Center (HPRCC). "ACIS Climate Maps Standard Precipitation Index." https://hprcc.unl.edu/maps.php?map=ACISClimateMaps.

Drought is a uniquely critical hazard in the Catskill and Delaware regions because they contain the primary reservoirs that supply much of New York State's water.[135] For instance, New York City's annual drought assessments hinge on the likelihood that these reservoirs will reach full capacity by June each year. NYC's current reservoir levels and drought conditions are accessible through the NYC Water Supply System: NYC DEP Reservoir Levels.

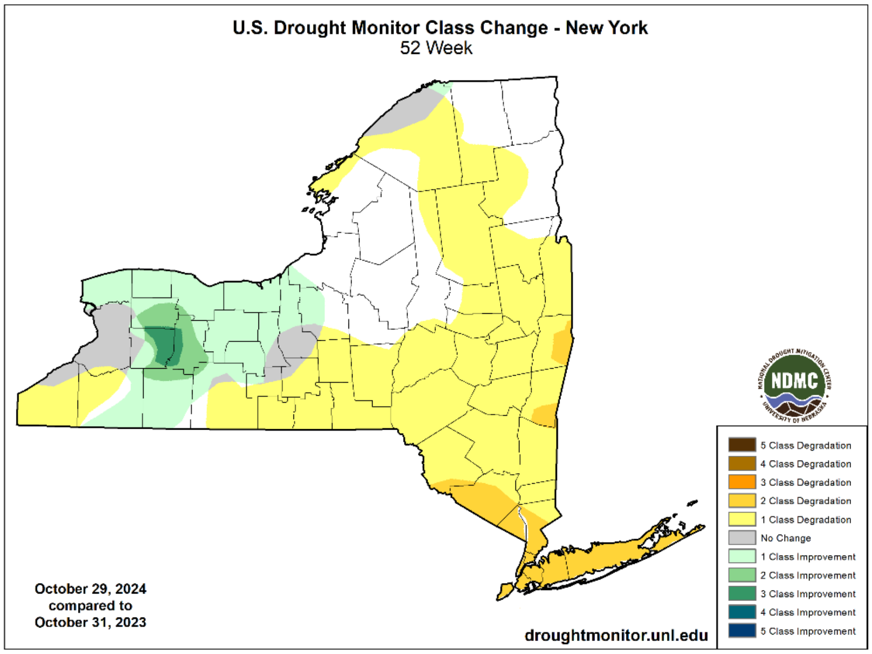

Figure 35: New York Drought Monitor from 2023–2024

USDA AGRICULTURAL DISASTER DECLARATIONS

In November 2022, the U.S. Department of Agriculture (USDA) designated Orange County as one of four New York Counties as a primary disaster Area. This Secretarial natural disaster designation allows the USDA's Farm Service Agency (FSA) to extend much-needed emergency credit to producers recovering from natural disasters through emergency loans. These emergency loans can be used to meet various recovery needs, including the replacement of essential items such as equipment or livestock, the reorganization of a farming operation, or the refinance of certain debts. The FSA reviews loan applications based on the extent of losses, security available, and repayment ability. According to the U.S. Drought Monitor, New York's Orange County suffered from a drought intensity value during the growing season of (1) D2 Drought-Severe for eight or more consecutive weeks or (2) D3 Drought-Extreme or D4 Drought-Exceptional.[136]

[135] Braneon, C., Ortiz, L., Bader, D., et al. (2024). "NPCC4: New York City Climate Risk Information 2022 – Observations and Projections." *Ann NY Acad Sci.*, 1539, 13–48. https://nyaspubs.onlinelibrary.wiley.com/doi/10.1111/nyas.15116.
[136] U.S. Department of Agriculture. "USDA Designates Four New York Counties as Primary Natural Disaster Areas." USDA Farm Service Agency. November 9, 2022. https://www.fsa.usda.gov/news-events/news/11-09-2022/usda-designates-four-new-york-counties-primary-natural-disaster-areas.

Orange County and all of its incorporated jurisdictions are equally susceptible to drought conditions. Orange County, New York, has been identifying droughts using the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) database. The NCEI database records the following significant drought events, which specifically list Orange County as an affected area since August 1993, the point at which NCEI drought records begin for Orange County. According to the NCEI, there have been no recorded droughts since 2019.[137] Although there were no recorded events with NCEI, below are some notable event impacts.

- In August 2022, eastern Orange County, New York, entered a severe drought stage according to CBS News, marking a period of significant water scarcity and environmental stress. Local landscapes turned brown and dry, and residents reported that water bodies, such as the upper pond at Algonquin Park in the town of Newburgh, were reduced to "dryness and muck" rather than flowing water. Streams such as Bushfield Creek also saw water levels drastically decline, leaving once-active waterways dry and rocky. According to County Executive Steve Neuhaus, this drought followed the fifth-driest July on record for the county, with rainfall falling 2.6 inches below average. The drought's impacts extended beyond the environment, raising serious concerns about drinking water and agricultural sustainability in the region. As private wells began to dry up, the city parked a tanker truck to provide supplemental water supplies for residents. Although locals noted that rain could return heavily with the onset of hurricane season, the event underscored the region's vulnerability to drought and the need for adaptive water management as climate variability continues to affect local conditions.[39]

  The DEC identified Drought Watch conditions in multiple regions across New York State, including Orange County. Water supply challenges due to below-normal precipitation as well as low stream flows and low groundwater level were reported due to dry conditions. New York State collaborated with water providers to reduce peak summer demand by promoting pool-cover usage, reduced lawn watering, and best-practice landscaping.[138]
- In June 2012, Orange County experienced two USDA-declared droughts, which are documented in the Town of Blooming Grove Hazard Mitigation Plan (2013). The agricultural sector was particularly affected by these droughts, which occurred from June 1 to October 24, 2012, and over the winter of 2013.

Future Potential Events

The probability of future events is pulled from the likelihood categories of the 2022 CEPA. Drought was ranked "medium," meaning this event could occur once within the next 20 years. Occasional drought is a natural phenomenon of the climate in Orange County, New York, as it is across much of the United States.

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[137] NOAA, National Centers for Environmental Information. "Storm Events Database, Orange County, NY. https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Drought&beginDate_mm=01&beginDate_dd=01&beginDate_yyyy=2019&endDate_mm=07&endDate_dd=31&endDate_yyyy=2024&county=ORANGE%3A71&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=36%2CNEW+YORK.

[138] New York State Department of Environmental Conservation. "DEC Issues Update on Statewide Drought Conditions." October 8, 2022. https://dec.ny.gov/news/press-releases/2022/10/dec-issues-update-on-statewide-drought-conditions.

Despite New York's generally temperate and moist climate, periodic shifts in regional weather patterns can lead to significant dry spells. According to the NYS DEC, New York's annual precipitation varies widely, with areas like the Catskills averaging as much as 60 inches, while regions like the Lake Champlain Valley receive closer to 28 inches. For Orange County, which experiences precipitation patterns between these extremes, even minor variations can lead to drought conditions that affect agriculture, water availability, and ecological health. Given that severe droughts have periodically affected New York throughout history, with particularly notable occurrences in the mid-1960s, the 1980s, and the early 2000s, Orange County will continue to experience an increase in the frequency of drought conditions in the foreseeable future if some of the current predictions regarding climate change prove accurate.[139] A 2012 research conducted by the Lamont-Doherty Earth Observatory underscores the vulnerability of the Catskills region to sudden, severe droughts, akin to the extensive dry period of the 1960s.[140] The study emphasized that the wetter climate conditions observed since the 1970s may not necessarily persist, leaving the region susceptible to unanticipated drought events, the duration and intensity of which remain hard to predict with current forecasting methods.[141] Climate modeling for the northeastern United States further indicates that summer precipitation levels are likely to either stabilize or slightly decline. However, this change in precipitation patterns could trigger more frequent drought occurrences, albeit with magnitudes consistent with historical levels.[142,143] A projected decrease in summer rainfall would increase the frequency of reservoir drawdowns, thereby increasing the frequency of short-duration droughts that place substantial pressure on water resources and ecosystem stability.[144]

Impact of Climate Change

It is anticipated that climate change may increase the frequency and intensity of droughts in New York State. Warmer temperatures will increase evaporation and reduce surface water levels, leading to drier soil. Additionally, the variability of precipitation may increase, meaning there will be more periods of extreme precipitation and more periods of little to no precipitation, the latter of which can spur a drought. Some studies project that late-summer, short-duration droughts will become more common due to

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[139] New York City Emergency Management. "Drought Hazard Profile - Probability." https://nychazardmitigation.com/documentation/hazard-profiles/drought/.

[140] Seager, R., et al. (2012). "The 1960s Drought and the Subsequent Shift to a Wetter Climate in the Catskill Mountains Region of the New York City Watershed. https://ocp.ldeo.columbia.edu/res/div/ocp/drought/catskills/Seager_etal_Catskills2012.pdf.

[141] New York City Emergency Management. "NYC's Risk Landscape: A Guide to Hazard Mitigation - Chapter 4.7: Water Shortage." https://www.nyc.gov/assets/em/downloads/pdf/hazard_mitigation/nycs_risk_landscape_chapter_4.7_watershortage.pdf.

[142] Hayhoe, K., Wake, C. P., Huntington, et al. (2007). "Past and Future Changes in Climate and Hydrological Indicators in the US Northeast." *Climate Dynamics, 28*, 381–407. https://link.springer.com/article/10.1007/s00382-006-0187-8.

[143] Hayhoe, K., Wake, C., Anderson, B., et al. (2008). "Regional Climate Change Projections for the Northeast USA." *Mitigation and Adaptation Strategies for Global Change, 13*, 425–436. https://link.springer.com/article/10.1007/s11027-007-9133-2.

[144] Rosenzweig, C., Solecki, W., DeGaetano, A., et al. (2011). "Responding to Climate Change in New York State: The ClimAID." New York State Energy Research and Development Authority (NYSERDA). https://www.nyserda.ny.gov/About/Publications/Energy-Analysis-Reports-and-Studies/Environmental-Research-and-Development-Technical-Reports/Response-to-Climate-Change-in-New-York.

climate change. At present, climate change has yet to meaningfully affect drought occurrence in New York: Drought frequency in the Northeast has remained relatively consistent, decreasing only slightly. Models have shown that increases in temperature have been counteracted by increases in humidity, resulting in negligible impacts to drought trends in the Northeast between 1980 and 2020. It is unclear to what extent increases in humidity are caused by global climate change versus more localized environmental effects.[145]

Vulnerability Assessment

EXPOSURE

To understand its vulnerability to natural hazards, a community must determine the assets that are exposed or vulnerable in the hazard area. The entire population of Orange County (407,470 people, according to 2023 U.S. Census Bureau estimates) is exposed to drought events.[146] Drought conditions can severely diminish both the quantity and quality of potable water for human consumption in urban and rural areas alike. An increase in drought will result in a disproportionate burden on agricultural producers in the county. However, at particular risk are areas used for agricultural purposes (farms and cropland), open or forested lands vulnerable to wildfire hazard, areas where communities rely on private water supply, and certain areas where elderly, impoverished or otherwise vulnerable populations are concentrated.

IMPACT ON COUNTY ASSETS

Droughts can have wide-ranging impacts that may affect large areas and often cross jurisdictional boundaries. The onset of drought is often slow, and droughts can last for weeks or even years. Drought can affect municipal water supplies, agriculture, recreation, natural resources, and wildlife. All populations, buildings, facilities, and infrastructure are exposed to this hazard and could be impacted. However, drought impacts are experienced mostly as water shortages and related losses.

Water is a critical resource for everyday use in drinking, cooking, cleaning, manufacturing, farming, and natural habitats. Drought can result in water supply shortages and reduce the availability of drinking water for communities. Water supply shortages may result in use restrictions or increased costs to residents. These shortages may disproportionately affect vulnerable populations who may have difficulty absorbing increased costs for water or be more acutely affected by economic losses associated with drought.

Drought does not typically directly damage critical facilities or other structures. However, during prolonged or severe droughts, decreased soil moisture may cause soils to contract and potentially shift or even crack structural foundations.

145 "Mitigate NY, Drought Risk Profile, General Risk." https://mitigateny.org/hazards_of_concern/drought/drought_risk_profile.
146 United States Census Bureau, Quick Facts: Orange County, NY. https://www.census.gov/quickfacts/fact/table/orangecountynewyork/AGE135218.

Agriculture is a major economic driver in Orange County, New York. According to the Agricultural and Farmland Protection Plan (2015), Orange County contains approximately 658 farms comprising some 88,000 acres, or 17% of all land in the county. Much of this land is situated along the north–south corridor parallel to the Wallkill River valley. In 2012, agriculture contributed more than $100 million in cash receipts locally: $72 million from crops and $29 from livestock.[147] Drought can directly impact this economic sector because reduced water supply or water quality can lead to reduced crop yields, total crop loss, or livestock mortality. It may also increase costs to farmers and ranchers to supplement water for irrigation or feed for livestock. Drought can also contribute to insect or disease outbreaks that may cause additional losses. Agricultural losses impact the livelihoods of agriculturalists and can also result in higher prices passed on to consumers. The effects of drought tend to compound as drought conditions persist.

Natural systems are also affected by drought. Water quality can be reduced by higher concentrations of pollutants in the water. Nutrient concentrations, turbidity, and algal levels may also increase. Reduced water supply and compromised water quality can also disrupt habitats for fish, plants, and other wildlife. Drought can also result in dust storms and soil erosion. If grasses and trees dry out, they become more flammable, which may increase the probability of wildfire ignition as well as the speed at which wildfires could spread.

NATIONAL RISK INDEX

RISK SCORE

In Orange County, droughts are not particularly common. The NRI includes data on expected annual loss (EAL) to individual natural hazards, historical loss, and overall risk at a county and Census tract level. Based on the NRI, Orange County has a "relatively moderate" rating for the risk index and a drought score of **84.77**.

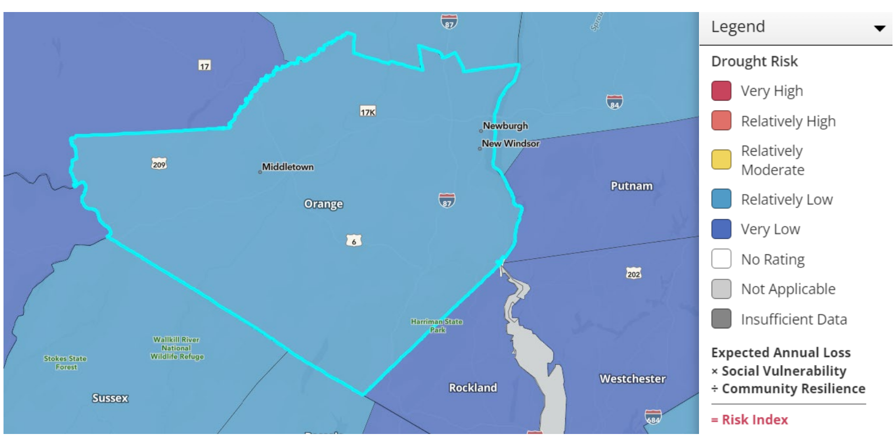

Figure 36: FEMA National Risk Index Orange County Drought Score, Map and Legend[8]

[147] "Orange County, NY: Agricultural and Farmland Protection Plan." February 2015. https://www.orangecountygov.com/DocumentCenter/View/1431/Agricultural-and-Farmland-Protection-Plan-Supplemental-Chapter-4-Adopted-2015-PDF?bidId=.

ESTIMATED ANNUAL LOSSES

According to the FEMA National Risk Index, the estimated composite annual losses from drought in Orange County, New York, is $24,456,657.93. The agricultural loss is $982,812.73. Drought frequency for Orange County is 1.4 events per year. Historically losses recorded for Orange County are 63 events from 2000 to 2021 with an agriculture EAL rate of $1 per $385.76 for agriculture.[148] The New York SHMP (2023) estimates that out of the 62 counties in the state, Orange County ranks third in terms of exposure to drought hazard events. Figure 37 illustrates the NRI rating of Orange County's EAL from drought.

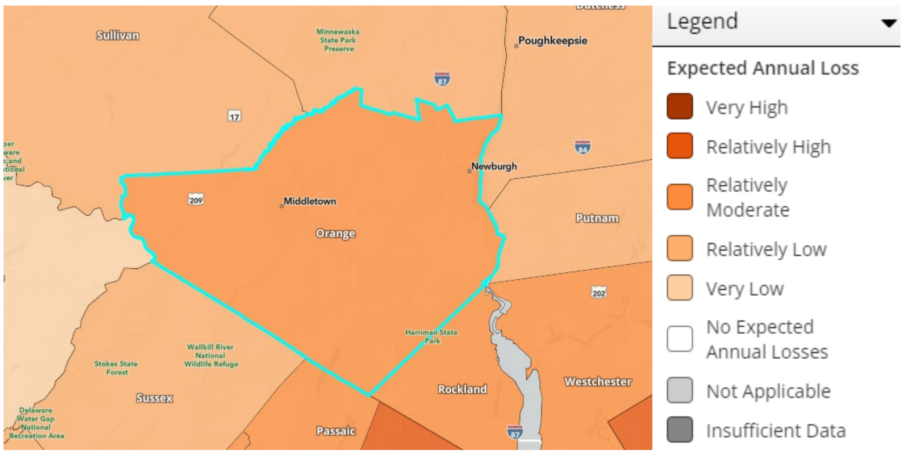

Figure 37: Drought National Risk Index – Expected Annual Loss

VULNERABLE POPULATIONS

For more information on vulnerable populations, please refer to the Orange County Profile section of this plan for a more in-depth analysis on the population and demographics of Orange County.

In Orange County, New York, several groups are particularly vulnerable to drought impacts due to a combination of socioeconomic, environmental, and health-related factors. Each of these groups faces distinct drought-related challenges, underscoring the need for targeted support measures—such as water subsidies, health services, and drought-resistant infrastructure—to build resilience in Orange County's most vulnerable communities. Based on the New York State Climate Act, the Climate Justice Working Group (CJWG) has identified 42 disadvantaged communities[149] in Orange County to ensure that frontline and otherwise underserved communities benefit from the state's historic transition to cleaner, greener sources of energy, reduced pollution, and cleaner air, as well as economic opportunities.[150]

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[148] FEMA National Risk Index. NRI, Drought. https://hazards.fema.gov/nri/map.
[149] New York State Climate Action Council. "List of Disadvantaged Communities." (n.d.). https://climate.ny.gov/-/media/Project/Climate/Files/Disadvantaged-Communities-Criteria/List-of-Disadvantaged-Communities.pdf.
[150] New York State Energy Research and Development Authority. "Disadvantaged Communities." (n.d.). https://www.nyserda.ny.gov/ny/Disadvantaged-Communities.

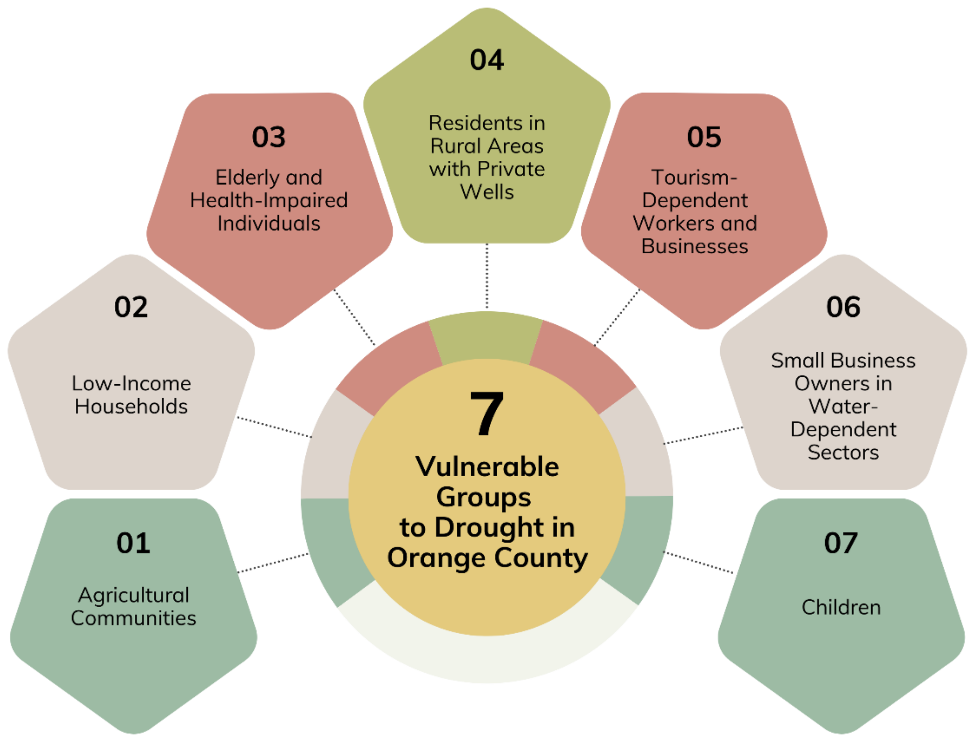

Figure 38: Groups Vulnerable to Drought in Orange County

- **Agricultural communities:** Agricultural communities are profoundly impacted by drought conditions due to their reliance on consistent water supply for crop irrigation and livestock. Drought can degrade soil quality and reduce crop yields, creating financial strain for these communities and jeopardizing regional food security.[151] In Orange County, the effects of drought are particularly acute for crop farmers in the Black Dirt Region, a 26,000-acre area known for its extraordinarily fertile soil.[152] This southern portion of the county would face substantial challenges in maintaining productivity during extended dry spells. Similarly, dairy farmers in the northern towns of Crawford and Montgomery, where significant portions of land are dedicated to pasture, would also experience considerable hardship as pastureland becomes less viable without adequate water resources.
- **Low-income households:** These communities may have limited resources to adapt to rising water costs and potential utility restrictions. When water costs increase during drought, low-income households face additional economic strain that further undermines their ability to meet basic needs—including food and health care—as more of their budget is allocated to water bills.
- **Elderly and health-impaired individuals:** Drought often leads to increased air pollution and higher temperatures, which can exacerbate health issues such as asthma, respiratory illnesses, and heat

[151] Friedlander, Blaine. "NYS Agricultural Assessment Cultivates Climate Crisis Solutions." Cornell Chronicle, Cornell University. February 8, 2024. https://news.cornell.edu/stories/2024/02/nys-agricultural-assessment-cultivates-climate-crisis-solutions.
[152] Gross, Anisse. "Black Magic, Hudson Valley's Special Soil." Edible Hudson Valley. July 12, 2022. https://www.ediblehudsonvalley.com/2022/black-magic-hudson-valleys-special-soil/.

stress. Elderly individuals, those with pre-existing health conditions, and residents without access to air conditioning are at increased risk of adverse health impacts during prolonged drought conditions.

- **Residents in rural areas with private wells:** Many rural households rely on private wells, which are more susceptible to depletion during drought than municipal water supplies. These residents face direct threats to their water security because drought can lower groundwater levels, drying out wells and forcing costly drilling or water rationing.
- **Tourism-dependent workers and businesses:** In areas where tourism is a significant economic driver, such as in the Hudson Valley, water restrictions during droughts can impact recreational activities, including boating, fishing, and other water-related attractions. This can reduce tourist activity and undercut the livelihoods of those who rely on seasonal tourism income.
- **Small to medium businesses in water-dependent sectors:** Small to medium sized enterprises involved in landscaping, car washes, and food service often depend on water availability for daily operations. Drought-induced water restrictions can disrupt these businesses, leading to reduced income, increased operating costs, or even temporary closures.
- **Children:** Young children are more susceptible to the effects of poor air quality and heat stress, both of which are intensified during drought conditions. The impacts of drought on air pollution can worsen respiratory issues, which are particularly concerning for children with asthma or other respiratory conditions.

DEVELOPMENT TRENDS

Although damage to property and development is rarely a direct consequence, drought can diminish both the quality and function of water and hydroelectric power infrastructure.

COMMUNITY LIFELINES

In Orange County, New York, the impact of a drought can significantly undermine essential services and resources, thereby affecting multiple community lifelines given the region's reliance on diverse water sources, transportation networks, energy production, and agricultural operations.[153] It can compromise water supply and quality, disrupt agricultural production, and impact energy infrastructure, all of which have direct effects on communities and the natural environment. The cascading effects of drought on these infrastructures can lead to significant economic and social challenges.[154]

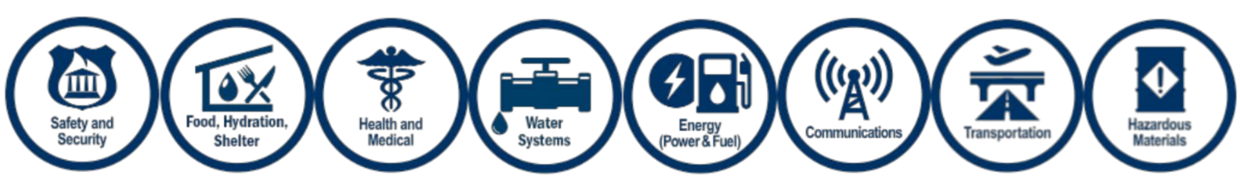

Figure 39: Community Lifelines

[153] FEMA. (2023). "Community Lifelines Implementation Toolkit, Version 2.1" (PPT). July 2023. https://www.fema.gov/sites/default/files/documents/fema_lifelines-toolkit-v2.1_2023.pdf.
[154] NOAA, NIDIS, Drought.gov. "Drought Impacts." (n.d.). https://www.drought.gov/impacts.

Table 8: Community Lifelines and Orange County Risk

Community Lifeline	Orange County's Existing State or Reliance	Risks from Drought
Water Systems	Orange County depends on a mix of local reservoirs, groundwater, and imported water from neighboring areas for residential and agricultural use.	• **Reservoir Levels:** Drought reduces reservoir levels, leading to water use restrictions that affect daily life and business operations. • **Groundwater Resources:** Prolonged drought depletes aquifers, causing well failures and requiring emergency water-hauling, straining local budgets, and posing health risks. • **Water Quality:** Lower aquifer levels lead to higher pollutant concentrations, impacting water quality. • **Increased Water Demand:** Over-extraction from groundwater due to competing needs (agriculture, residential, industrial) strains resources.
Transportation	Transportation in Orange County relies on road and bridge infrastructure to support local businesses and logistics, with some reliance on river transport for goods.	• **Road and Bridge Infrastructure:** Extreme heat during drought causes pavement buckling that decreases road safety; low river levels can also disrupt shipping routes. • **Maintenance Challenges:** Limited water availability complicates dust control on unpaved roads, reducing visibility and safety.
Energy	Although not heavily reliant on hydropower, Orange County's energy stability is often affected by regional droughts because they also impact broader NYS energy supplies and cooling for local thermal plants.	• **Hydropower and Renewables:** Reduced water flow affects regional renewable energy initiatives. • **Cooling Water for Thermal Plants:** Water scarcity impacts local power plants' cooling, raising energy costs and affecting security.
Food, Hydration, Shelter	Agriculture in Orange County depends on a reliable water supply for irrigation, which is crucial for local crop production and food supply.	• **Irrigation Needs:** Reduced water supply lowers crop yields, causing financial losses and raising food prices. • **Soil Moisture and Health:** Low rainfall impacts soil moisture, reducing crop health and farmland viability.

Community Lifeline	Orange County's Existing State or Reliance	Risks from Drought
Safety and Security	Emergency services in Orange County are vital for drought response, firefighting, and supporting vulnerable populations with limited water access.	• **Increased Demand for Water:** Drought elevates demand for water in emergency and conservation efforts, thus straining resources. • **Firefighting Resources:** Drought heightens wildfire risk, challenging firefighting capabilities. • **Health Risks:** Limited access to clean water threatens public health, especially for vulnerable groups.

Earthquake

Hazard Description

An earthquake is a sudden motion or trembling caused by the release of strain accumulated within or along the edge of Earth's tectonic plates. The effects of an earthquake can be felt at distances beyond its actual occurrence, although the impact becomes less severe as the distance increases. Earthquakes often occur without warning and can rapidly cause extensive damage and casualties. The common effects of earthquakes include ground motion and shaking, surface fault ruptures, and ground failure.

The U.S. Geological Society defines a list of hazards resulting from earthquakes as follows:

- **Surface Faulting:** Displacement that reaches the earth's surface during a slip along a fault. Commonly occurs with shallow earthquakes, those with an epicenter less than 20 km (12.43 mi).
- **Ground Motion (Shaking):** The movement of the earth's surface from earthquakes or explosions. Ground motion or shaking is produced by waves generated by a sudden slip on a fault or sudden pressure at the explosive source and travel through the earth and along its surface.
- **Landslide:** The movement of a surface material down a slope.
- **Liquefaction:** The process by which water-saturated sediment temporarily loses strength and acts as a fluid, similar to the movement of wriggling one's toes in the wet sand near the water at the beach. The effect can be caused by the shaking that occurs during an earthquake.
- **Tectonic Deformation:** A change in the original shape of a material as a result of stress and strain.
- **Tsunami:** A sea wave of local or distant origin stemming from large-scale seafloor displacements associated with large earthquakes, major submarine slides, or exploding volcanic islands.
- **Seiche:** A standing wave oscillating in a body of water.[155]

Location and Extent

Earthquakes can occur within any of Orange County's communities. Figure 40 shows the USGS Earthquake Hazard Program's earthquake hazard map for the conterminous United States and New York State which are prepared by the USGS Earthquake Hazards Program. The map shows that although the earthquake hazard in the latter is low relative to other parts of the county, there is a possibility for noticeable earthquakes in the state and planning area.

[155] NOAA, National Ocean Service. "What is a seiche?" https://oceanservice.noaa.gov/facts/seiche.html.

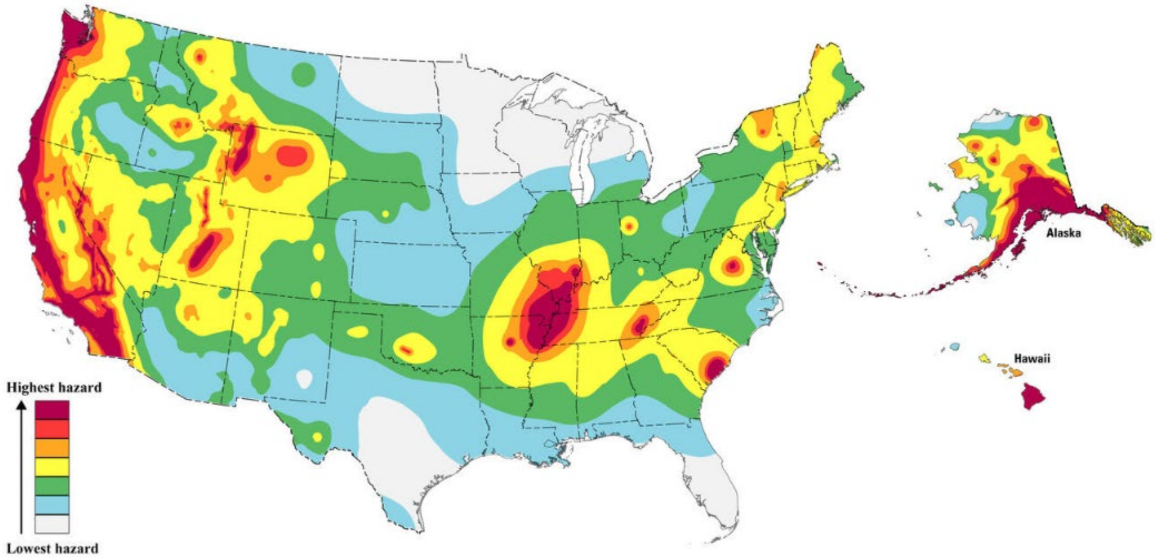

Figure 40: 2023 50-State Update of the National Seismic Hazard Model Project[156]

Of particular interest to the Orange County planning area is the Ramapo Fault. This fault is the longest in the Northeastern United States; beginning in Pennsylvania, it extends through New York and New Jersey. Although the New Jersey-New York region of the fault is relatively stable, it does see occasional activity.[157] The faults in the NY area were particularly active at different times during the evolution of the Appalachians, particularly when they served as border faults to extensional basins, including the Newark Basin, formed by the opening of the Atlantic Ocean in the Mesozoic Era approximately 200 million years ago. The Ramapo Fault crosses the southern and eastern edge of Orange County, running roughly parallel to the boundary with Rockland County. Between 1627 and 2003, the epicenters of earthquakes were typically clustered around the line of this fault.

[156] "Hazard map from the 2023 50-state update of the National Seismic Hazard Model Project." USGS. https://www.usgs.gov/media/images/hazard-map-2023-50-state-update-national-seismic-hazard-model-project.
[157] "A Look at the Tri-State's Active Fault Line." WNYC News. https://www.wnyc.org/story/118211-blog-look-tri-states-active-fault-line/.

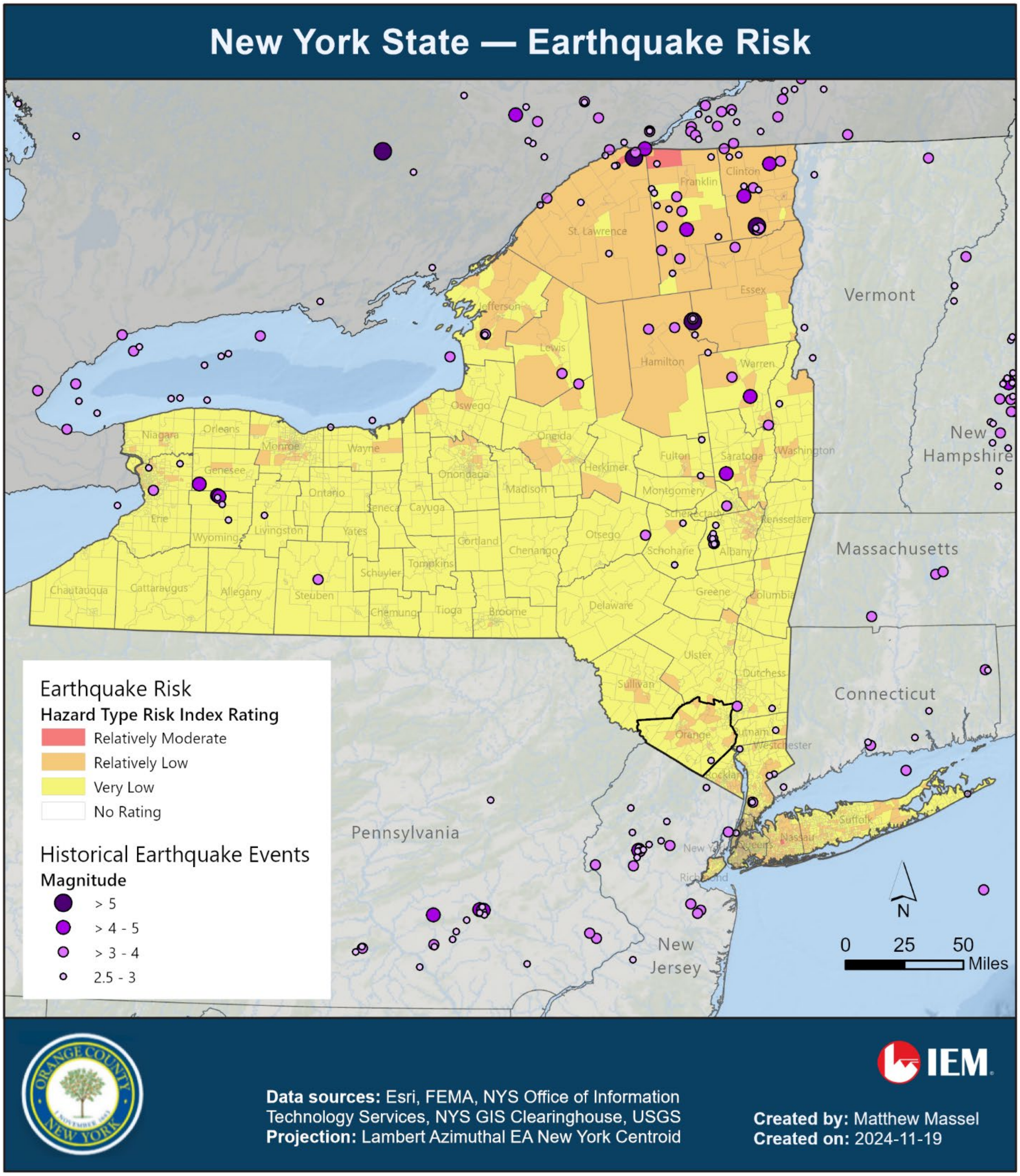

Figure 41: New York State Earthquake Risk and Historical Events

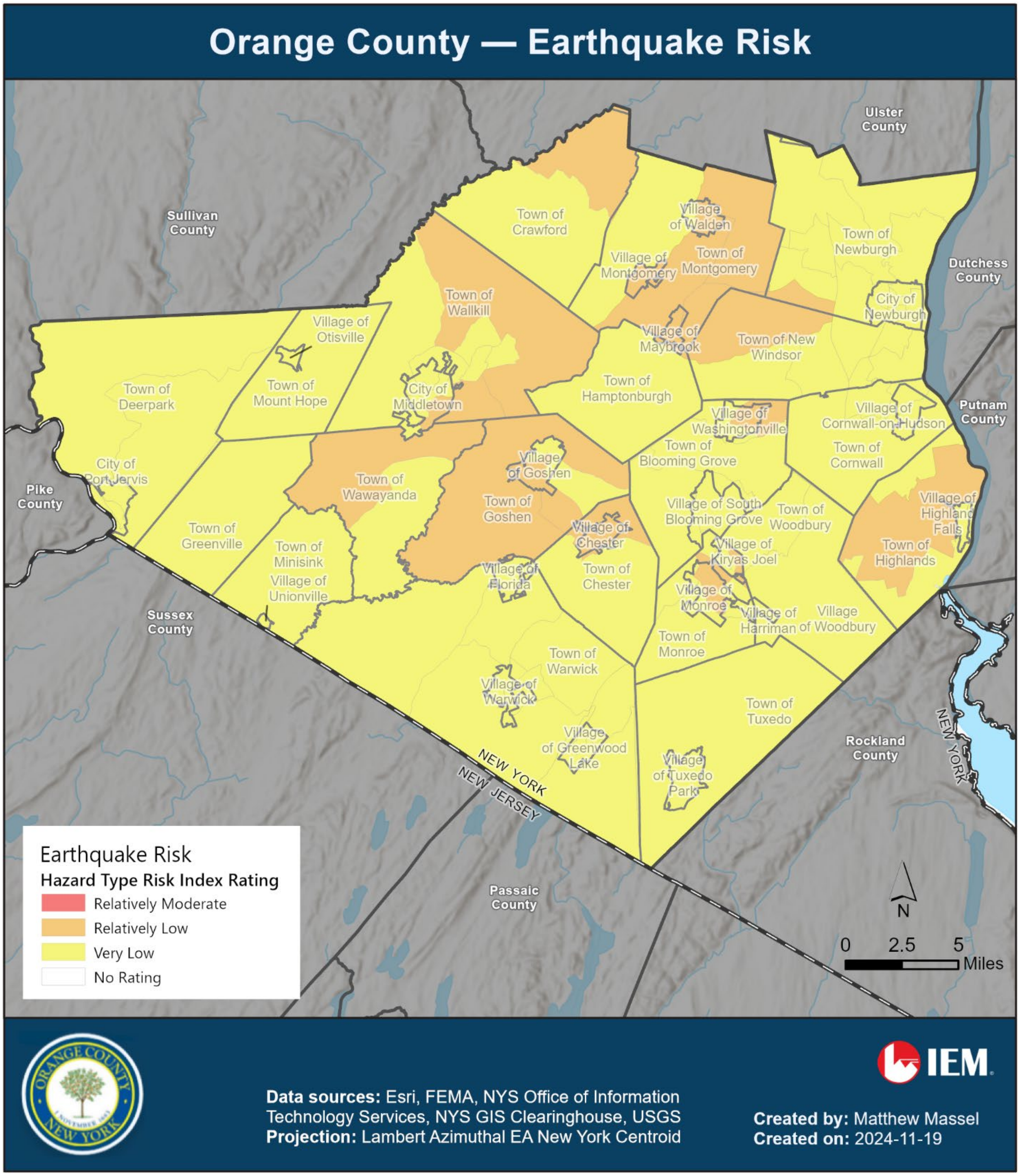

Figure 42: Orange County Earthquake Risk Map

The severity with which a given location experiences an earthquake depends on the amount of energy released at the epicenter and the location's distance from the epicenter. The terms "magnitude" and "intensity" describe an earthquake's severity; the former measures the total amount of energy released, while the latter measures the effects of the earthquake at a particular place. Earthquake intensity and classification are often measured using two scales: the maximum Modified Mercalli Intensity (MMI) Scale and the Richter Magnitude Scale (often shortened to the Richter Scale).

The MMI estimates an earthquake's shaking strength at a specific location, such as the epicenter, or over a particular area by considering its effects on people, objects, and buildings.

The Richter scale quantifies energy released during an earthquake using whole numbers and decimal fractions based on logarithms from the amplitude of waves recorded by seismographs. Figure 43 provides the MMI and Richter Scale's ranking and classification definitions.

Magnitude	Category	Effects	Effects Per Year
< 3.0	Micro	Usually not felt, but can be recorded by seismograph	+100,000
3.0 - 3.9	Minor	Often felt, but causes no damage	12,000 - 100,000
4.0 - 4.9	Light	Felt by all, minor breakage of objects	2,000 - 12,000
5.0 - 5.9	Moderate	Some damage to weak structures	200 - 2,000
6.0 - 6.9	Strong	Moderate damage in populated areas	20 - 200
7.0 - 7.9	Major	Serious damage over large areas with loss of life expected	3 - 20
> 7.9	Great	Severe destruction and loss of life over large areas	<3

Figure 43: Modified Mercalli Intensity Scale and Richter Scale[158]

Earthquake severity can also be expressed by comparing its acceleration to the normal acceleration due to gravity. Earthquake hazard maps—sometimes called "PGA (peak ground acceleration) maps"—are used to project the likelihood of a various-intensity earthquake being exceeded at a certain location over a given period. PGA measures the rate of change in motion of the earth's surface and expresses it as a percent of the established rate of acceleration due to gravity. Figure 44 shows that Orange County is in an area that may be subject to future seismic activity.

[158] Modified Mercalli Intensity Scale. USGS. https://www.usgs.gov/media/images/modified-mercalli-intensity-scale.

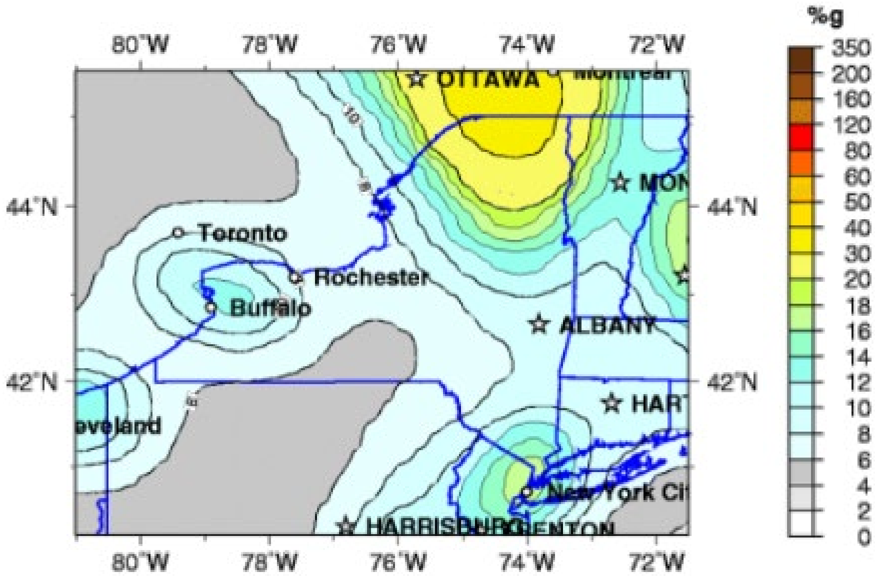

Figure 44: Peak Acceleration (%g) with 2% Probability of Exceedance in 50 years

Table 9 shows an approximate relationship between PGA, magnitude, and intensity. Using this table, one can approximate that, for an earthquake of expected severity for the majority of Orange County (PGA values of 3 to 4%-g), perceived shaking would be light to moderate (depending upon the distance from the epicenter). Meanwhile, potential damage could range from none to very light (also depending upon the distance from the epicenter).

Table 9: Modified Mercalli Intensity and Peak Ground Acceleration Equivalents[159]

Modified Mercalli Intensity (MMI) and Peak Ground Acceleration (PGA) Equivalents			
MMI	PGA (%)	Perceived Shaking	Potential Damage(s)
I	<.17	Not Felt	Not felt except by a very few
II	.17–1.4	Weak	Felt only by a few
III	.17–1.4	Weak	Noticeably felt indoors
IV	1.4–3.9	Light	Felt Indoors, outdoors to some
V	3.9–9.2	Moderate	Felt by everyone
VI	9.2–18	Strong	Felt by all. Frightening
VII	18–34	Very Strong	Damage negligible
VIII	34–65	Severe	Slight–considerable damage
IX	65–124	Violent	Considerable damages

[159] Modified Mercalli Intensity Scale and PGA Equivalents. USGS and Research Gate. https://www.usgs.gov/media/images/modified-mercalli-intensity-scale; https://www.researchgate.net/figure/Mercalli-Scale-of-Peak-Ground-Acceleration-PGA_tbl1_325559647.

Modified Mercalli Intensity (MMI) and Peak Ground Acceleration (PGA) Equivalents			
MMI	PGA (%)	Perceived Shaking	Potential Damage(s)
X	>124	Extreme	Wooden structures, most masonry, and frame structures destroyed
XI	>124	Extreme	Same
XII	>124	Extreme	Same

Soil type can impact the severity of an earthquake at a given location. For instance, soft soils (i.e., fill, sand) are more likely to amplify ground motion during an earthquake, and liquefaction is more likely to occur in areas of soft soils. Conversely, harder soils (i.e., granite) typically reduce ground motion. Figure 45 was developed by the National Earthquake Hazard Reduction Program (NEHRP) and the NYS Geological Survey. It shows soil types in five basic categories with varying degrees of likelihood of amplifying the effects of an earthquake, with Category A far less likely to intensify the seismic motion than Category E.

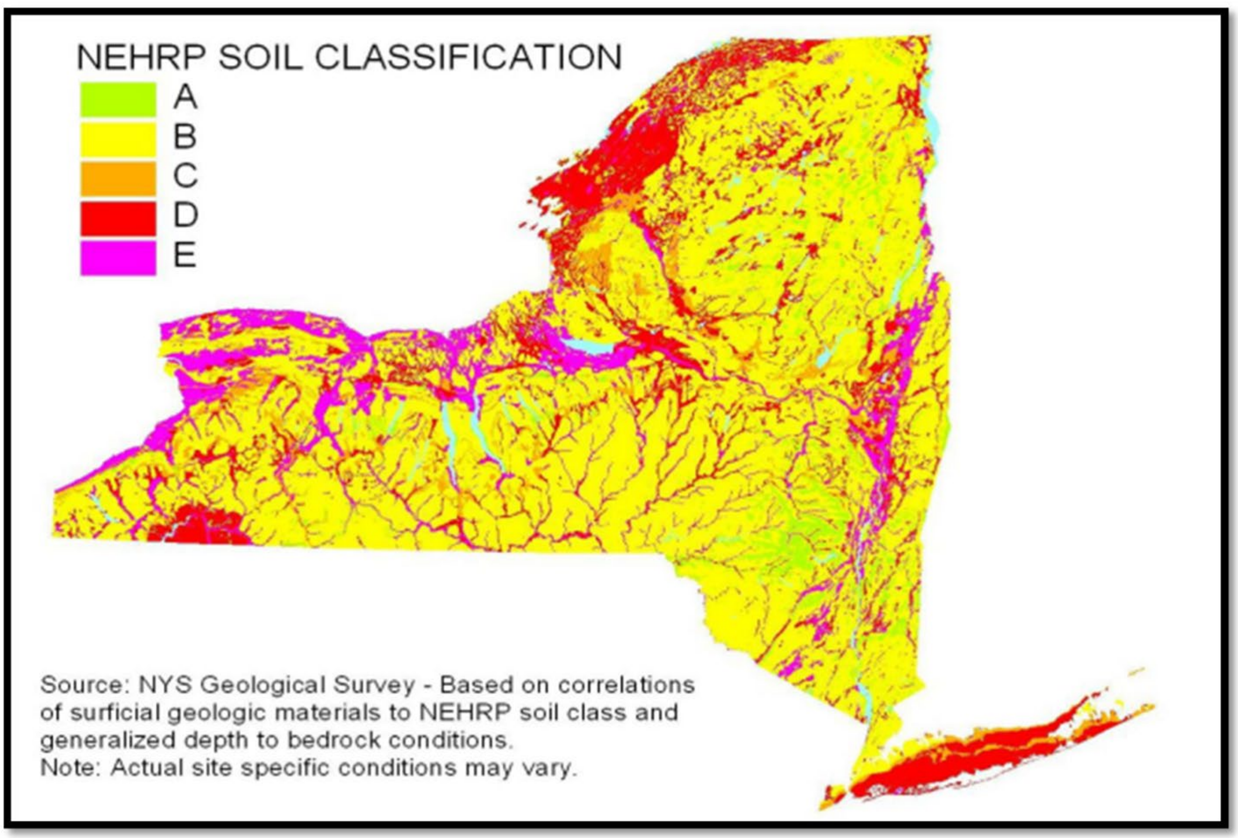

Figure 45: National Earthquake Hazard Reduction Program, New York State Geological Survey, 2014

In Figure 46, soil types and surficial materials have been combined with the baseline seismic hazards by NYS DHSES to provide an adjusted, more refined image of earthquake hazard in terms of earthquake spectral acceleration (SA), which is a better indicator of building damage. While PGA is what is experienced by a particle on the ground, SA is an approximation of what is experienced by a building, as modeled by a particle on a massless vertical rod having the same natural period of vibration as the building, according to the USGS definition.

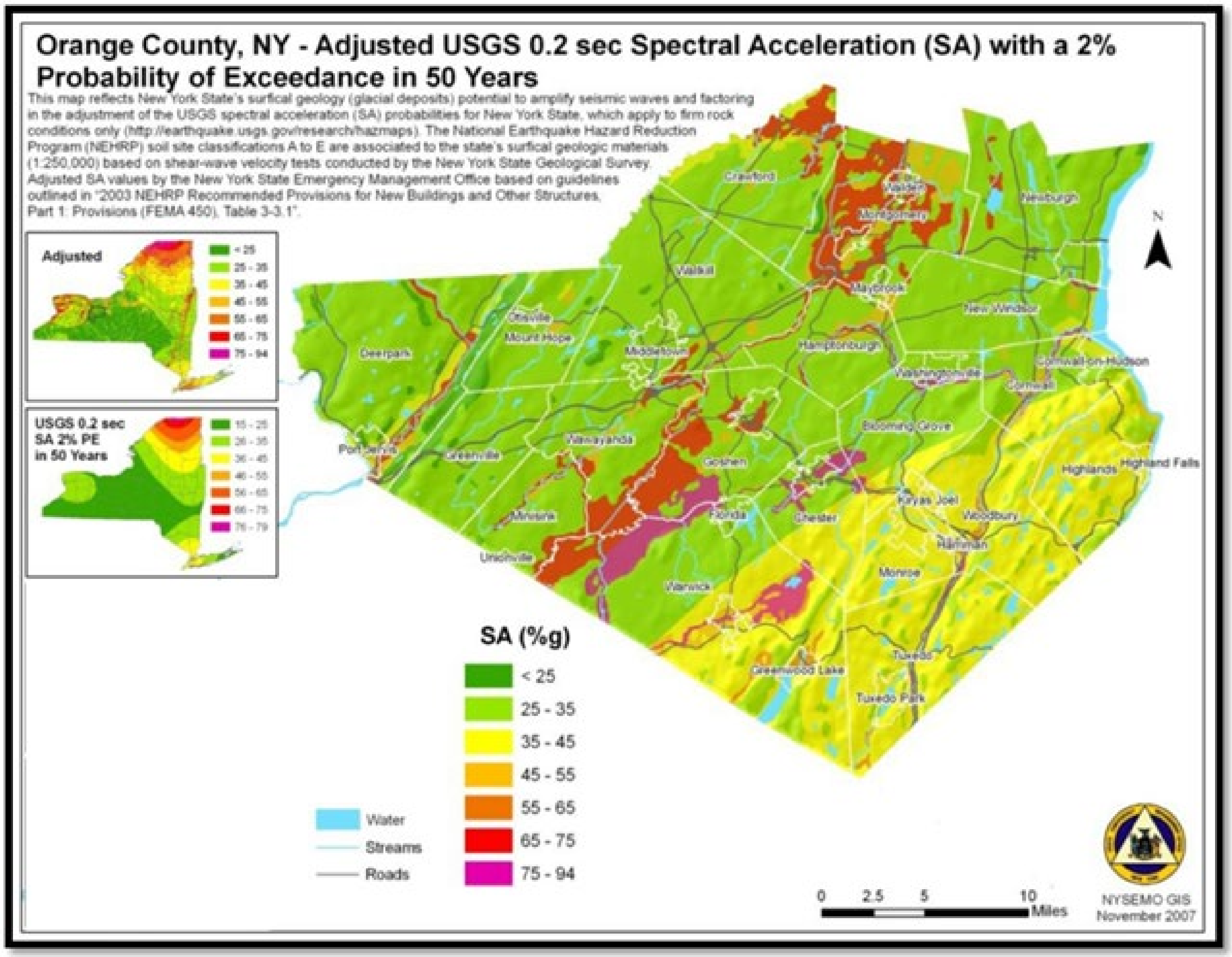

Figure 46: Adjusted USGS .2 sec Spectral Acceleration with a 2% Probability of Exceedance in 50 Years

Previous Historical Occurrence

While the probability of a damaging earthquake in New York State is relatively low, they occur regularly within the state. Since 1931, New York State has had 422 earthquakes, with an average of five per year. The following map shows the incidence of earthquakes by year since 1931.

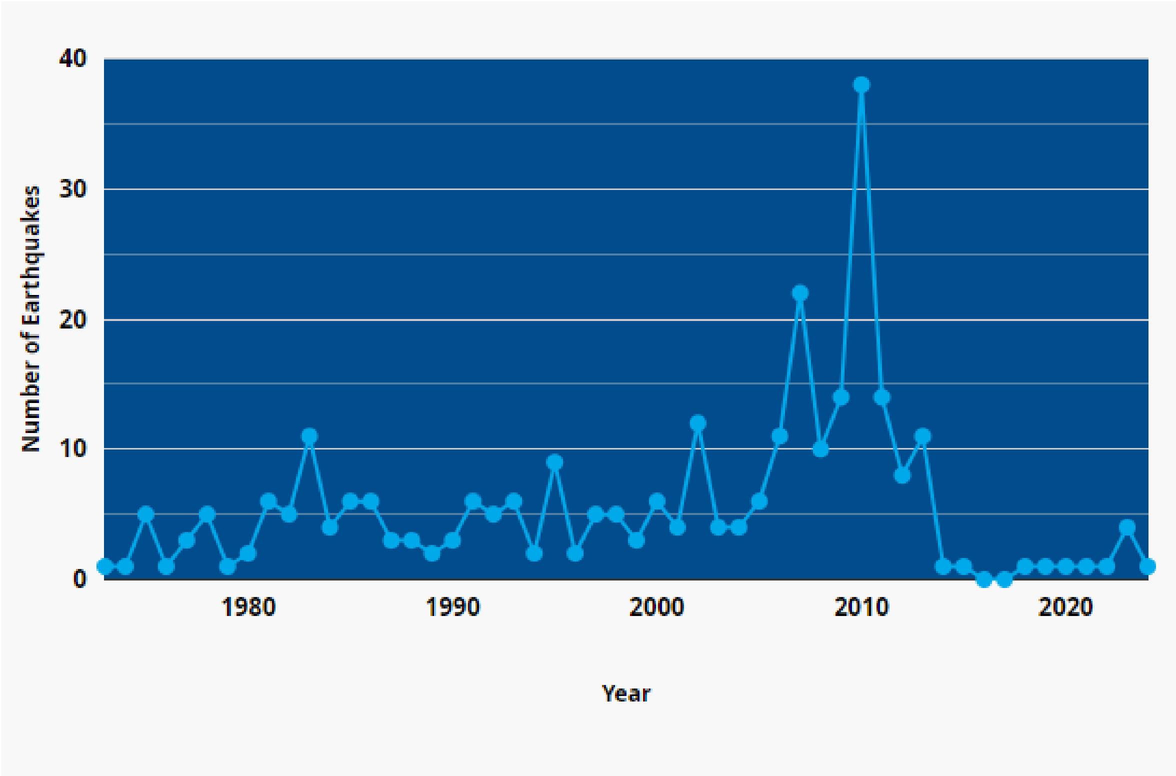

Figure 47: Earthquakes in New York by Year Since 1931[160]

Despite a significant increase in earthquakes in 2010, magnitudes are relatively low, which results in less impact on New York State and Orange County.

Table 10: Earthquake Events, 1992–2023

Affected Location	Date	Richter Scale Magnitude
Tuxedo Park	1/15/1992	2.5
Florida	4/20/2003	2.3
Warwick	3/15/2008	0.9
Warwick	3/15/2008	1.1
Tuxedo Park	9/7/2012	0.5
Highland Falls	7/5/2014	2.4

- Since 1931, Orange County has recorded six earthquakes, giving the county a 2.26% probability of a 5.0 earthquake within the next 50 years.[161] The most recent earthquake in NY over M4.0 was on April

[160] Earthquake information for Orange County, New York. Homefacts. https://www.homefacts.com/earthquakes/New-York/Orange-County.html.
[161] Ibid.

5, 2024, 34 miles from Staten Island. The earthquake measured M4.8 and was felt in Orange County, with no reported damage to infrastructure or community assets.

Future Potential Events

The probability of future events is taken from the 2022 CEPA likelihood categories. Earthquakes are ranked very low, meaning the event is not expected to occur within the county. Earthquakes cannot be predicted; they strike without warning, at any time of the year, and at any time of the day or night. According to USGS, an estimated 700 shocks occur each year with the capability of shaking homes, rattling windows, displacing objects, or even causing property damage, death, and injury.[162] Fortunately, many of these shocks occur in unpopulated areas. Forecasting earthquakes is often a difficult task. However, historical occurrences indicate that New York State experiences damaging earthquake events once every 22 years, on average. Lower-magnitude earthquakes are more common. Overall, the frequency of damaging earthquakes within and in the immediate vicinity of Orange County is low relative to other parts of the country and the world.

Impact of Climate Change

Earthquakes are unlikely to be affected by climate change. The causes of earthquakes are largely unaffected by atmospheric shifts arising from climate change. There are some indications that earthquakes became more frequent as glaciers melted thousands of years ago, and the growth in the number of earthquakes in Greenland may be connected to warming temperatures, but the links between these phenomena and anthropogenic climate change are uncertain at best and have not affected NY. Earthquakes are not discussed in local, regional, or national climate impact assessments, highlighting how climate change is not expected to impact their frequency or intensity in the U.S.[163]

Vulnerability Assessment

EXPOSURE

In order to understand its vulnerability to natural hazards, a community must determine the assets that are exposed or vulnerable in the hazard area. All of Orange County has been identified as an earthquake hazard area; thus, all assets in the county (i.e., population, structures, critical facilities, and lifelines) are vulnerable.

IMPACT ON COUNTY ASSETS

An earthquake with a 10% chance of exceedance over 50 years in Orange County would have a PGA of 3 to 4% corresponding to an intensity ranging between only IV and V, causing light to moderate perceived

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[162] USGS. "100% Chance of an Earthquake." https://www.usgs.gov/programs/earthquake-hazards/100-chance-earthquake#:~:text=It%20is%20estimated%20that%20about%20700%20shocks%20each,earthquakes%20center%20in%20unpopulated%20areas%20far%20from%20civilization.
[163] MitigateNY. "Climate Change." https://mitigateny.org/climate_change/climate_change_overview.

shaking and damage ranging from none to very light. For comparison, an earthquake of Intensity IV on the MMI would most likely cause vibrations comparable to heavy trucks driving over roads or the sensation of a jolt. Hanging objects would swing, standing cars would rock, windows, dishes and doors would rattle, and, in the upper intensity ranges, wooden walls and frames would creak. An earthquake of Intensity V on the MMI would be felt outdoors, awaken sleepers, disturb or spill liquids, displace small unstable objects, swing doors, and cause shutters and pictures to move.

Infrastructure is highly susceptible to damage from an earthquake. Ground shaking or cracking would cause utility poles to fall, snapping power or communication lines and disrupting services. Natural gas, water, and sewage lines may break, which can (at a minimum) interrupt public and private access to essential utility services and lead to several health and safety concerns, including hazardous waste contamination, gas leaks, and contaminated water.

Transportation networks are highly vulnerable to earthquake damage. Earthquakes can crack the ground, split roads, warp or break railroad tracks, and break landing strips for aircraft, rendering them unusable. Bridges can be destabilized by earthquakes creating cracks in the foundations, making them vulnerable to potential collapse. The liquefication that often occurs as a result of an earthquake can cause bridge supports to sink, causing the bridge frame to crack and collapse. Liquefication can also cause roads to sink into the ground and break apart, cutting off transportation routes and endangering occupants of vehicles on the road or bridge at the time. Damage to transportation networks can slow emergency response and may leave some residents isolated.

There are myriad cascading impacts of such infrastructure destruction. Response and recovery efforts can be prolonged, becoming more expensive and complicated to accomplish. Damages to power stations and blackouts as a result of an earthquake can cause facilities, including hospitals and wastewater treatment plants, to become limited in operability or completely shut down until road access to the power station is restored. Earthquakes can also pollute water treatment facilities and create water shortages. If the contamination goes unnoticed because the facility is unreachable for maintenance, people may drink contaminated water, leading to a public health crisis alongside limited medical and communication capabilities from power outages.

Residences and business may experience damage to structures or contents in areas where ground shaking is most intense. Older buildings tend to be more susceptible to damage from earthquakes, which may affect some neighborhoods disproportionately. Objects that fall during shaking can cause injury to building occupants. Some individuals may choose to seek public shelter or relocate temporarily while power and other utility services are restored. Businesses may be inoperable during power and utility outages, resulting in lost wages and lost business revenue.

NATIONAL RISK INDEX

RISK SCORE

Earthquakes are not particularly common in Orange County, and while their potential consequences are high, they have not historically caused significant damage. The NRI includes data on the expected annual losses to individual natural hazards, historical loss, and overall risk at the county and census tract levels. According to the NRI, Orange County has a relatively low rating for the risk index and a **78.8** score for earthquakes.

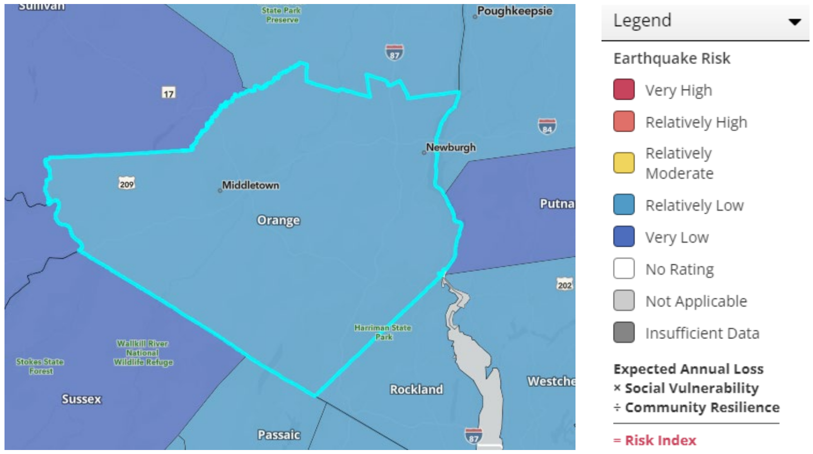


Figure 48: FEMA National Risk Index Orange County Earthquake Score, Map and Legend[8]

ESTIMATED ANNUAL LOSSES

According to the FEMA NRI, the estimated annual losses for earthquakes in Orange County amount to $866,829. The county has a relatively low risk index in terms of earthquakes. Agricultural loss is not applicable. The frequency for Orange County is a 0.045% chance per year. Historically, losses have not been recorded for the county.[164] The NYS Hazard Mitigation Plan (2023) Hazus-MH software ranks Orange County 15th out of the state's 62 counties in terms of exposure to earthquake hazard events. Figure 37 illustrates the NRI rating for the expected annual loss for Orange County from earthquakes, with a rating of relatively low.

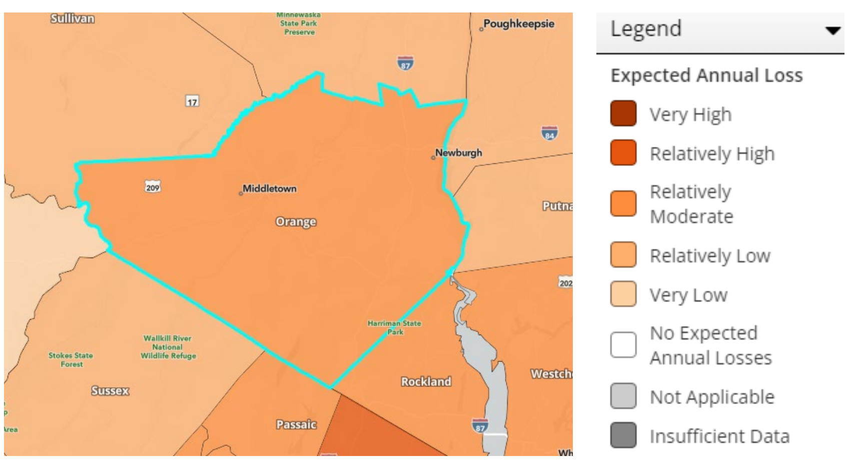


Figure 49: Earthquake National Risk Index - Expected Annual Loss

[164] FEMA National Risk Index. Earthquake. https://hazards.fema.gov/nri/map.

VULNERABLE POPULATIONS

For more information on vulnerable populations, please refer to the Orange County Profile section of this plan.

When an earthquake damages buildings and infrastructure, the people within and around them are vulnerable. Individuals and families may suffer injuries or fatalities during and after the event. Debris and damage can trap people in buildings, creating unknown survival conditions depending on the extent of building damage and the resources available. Buildings collapsing, roads cracking, or bridges being damaged can result in injuries to those in the vicinity, ranging from minor to extensive, potentially causing permanent disability or death. A severe earthquake with extensive damage can render entire communities homeless and place emergency services under stress that surpasses their capacity. This type of devastation can have lasting effects on the physical, emotional, and mental well-being of the population.

DEVELOPMENT TRENDS

A critical concern regarding development is the establishment of building codes. The population of Orange County grew by 28,502 between 2010 and 2020, increasing from 372,813 to 401,315. With population growth comes the need for more housing. In 2023, 1,445 building permits were issued for new housing. Yet, it is not clear whether the county builds to earthquake code. The Regional Housing Needs Assessment, written in 2009, has not been updated since the last plan update.

COMMUNITY LIFELINES

The extent to which an earthquake impacts community lifelines in Orange County—including safety and security, food, water, shelter, health and medical services, water systems, energy, communications, transportation, and hazardous materials management (see Figure 22)—depends largely on the earthquake's magnitude and proximity to densely populated areas. A minor earthquake might cause localized disruptions, potentially briefly impacting infrastructure, roads, or communication systems. However, a more powerful earthquake might cause more severe disruption to these lifelines, including widespread power outages, road closures, water main breaks, and structural damage to buildings, hospitals, and emergency services facilities. This level of impact would strain first responders and essential services, highlighting the importance of preparedness for varying earthquake magnitudes to effectively safeguard the community.

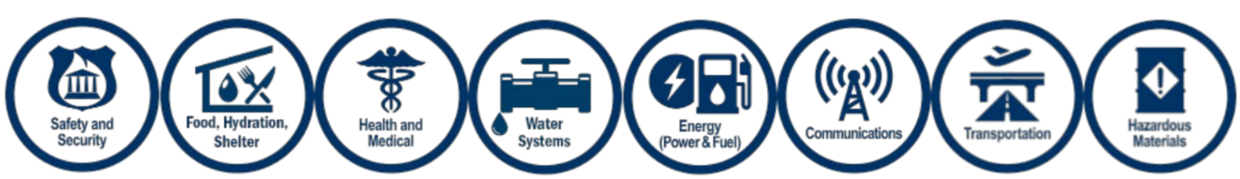


Figure 50: Community Lifelines

Extreme Temperatures

Hazard Description

Extreme temperatures refer to unusually high or low temperatures that significantly deviate from the average climate norms of a particular region. Extreme heat temperatures typically occur during heat waves, when temperatures soar above historical averages, often leading to health risks and environmental challenges. In Orange County, extreme heat is typically defined as temperatures reaching or exceeding 90°F. High humidity can make heat waves feel even hotter, increasing the risk of heat-related illnesses. Local health officials may issue heat advisories when temperatures are forecasted to be dangerously high for extended periods, especially when combined with high humidity.

Extreme cold temperatures can be seen during severe cold spells or winter storms, resulting in hazards like frostbite, hypothermia, and disruptions to daily life. In Orange County, extreme cold is generally considered to be temperatures that fall below 20°F. However, wind chill factors can make it feel even colder, pushing the threshold for what feels extreme. During winter, temperatures below 10°F (-12°C) are often considered severe. Local weather advisories may also issue warnings when temperatures drop significantly, especially when combined with high winds, which can lead to dangerous conditions. Generally, an "extreme" temperature can vary based on the local climate, seasonal expectations, and the population's adaptability to different temperature ranges.

Location and Extent

Orange County is vulnerable to extreme heat and cold. During periods of extreme temperatures, the impacts will be experienced across large areas. It is generally understood that these extreme conditions do not affect all parts of Orange County and its municipalities equally. Orange County experiences a diverse climate influenced by its varied geography, resulting in distinct zones for extreme heat and cold. The county lies in the Hudson Valley region and features urban, suburban, and rural areas. During summer, towns like Middletown and Newburgh can experience extreme heat, sometimes reaching the high 90s°F. The combination of urban heat islands and the county's population density can raise local temperatures, particularly in the more developed areas. Urban heat islands are areas where more development, infrastructure, impervious surfaces, and concrete/asphalt tent to attract and retain greater amounts of heat than rural areas. On the other hand, cooler spots can be found in the higher elevations of the Appalachian foothills, where towns like Tuxedo Park and Warwick may have slightly milder summer conditions.

In the winter months, Orange County can see significant temperature fluctuations. Areas to the north and west, such as the Village of Goshen and the hamlet of Monroe, can experience temperatures plummeting into the single digits or even lower, particularly during cold snaps. Meanwhile, the lower elevations and urban areas may have slightly warmer conditions but are not immune to severe cold spells. The coldest temperatures are often recorded at the county's higher altitudes and in its more rural regions, where the effects of wind chill can exacerbate the frigid air. These seasonal variations are crucial for residents, especially when preparing for extreme weather conditions affecting daily life and outdoor activities throughout Orange County.

HEAT EXTENT

The magnitude or intensity of an extreme heat event is measured according to temperature in relation to the percentage of humidity. According to NOAA, this relationship is referred to as the "Heat Index" and is depicted in Figure 51. This index measures how hot it feels outside when humidity is combined with high temperatures.

NWS Heat Index — Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution · Extreme Caution · Danger · Extreme Danger

Figure 51: Heat Index Chart

The Heat Index Chart in Figure 51 displays varying categories of caution depending on the relative humidity and temperature. For example, when the temperature is 90°F or lower, caution should be exercised if the humidity level is at or above 40%. Figure 2 displays information on extreme heat and its effects on the body.

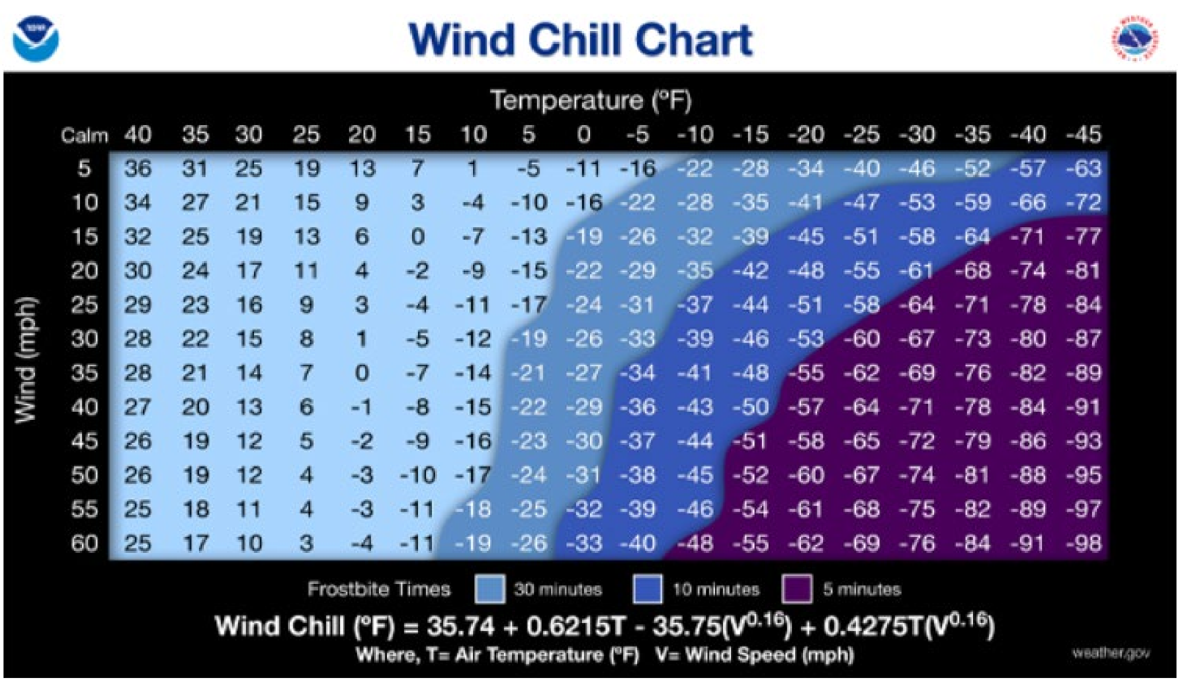
Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

Figure 52: Heat Classifications

The shaded zones on the chart in Figure 52 indicate varying symptoms or disorders that could occur depending on the magnitude or intensity of the event. The NWS initiates alerts based on the Heat Index.

COLD EXTENT

The wind chill chart is a valuable tool for understanding how temperature and wind speed interact to affect our perception of cold weather. It measures what is often referred to as the "feels-like" temperature, which can be significantly lower than the actual air temperature due to the cooling effect of wind. This chart is significant for assessing outdoor conditions, especially in winter because it helps determine the risk of frostbite and hypothermia. The wind chill calculation considers two key elements: the actual air temperature and the wind speed. When the wind blows over exposed skin, it rapidly removes the insulating layer of warm air, causing our body temperature to drop faster than when there is no wind. As a result, even a mild temperature can feel much colder if there is a substantial wind. For instance, if the temperature is 0°F and the wind speed is 15 mph, the wind chill is -19°F. Figure 53 visually represents this relationship, showing how different temperature and wind speed combinations yield varying wind chill values.



Wind Chill Chart

Temperature (°F)

Wind (mph) / Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

weather.gov

Figure 53: Wind Chill Chart

Using the wind chill chart involves finding the air temperature on the left side and locating the corresponding wind speed along the top. The point where these two factors intersect indicates the wind chill temperature—the cold our bodies experience. For instance, if the temperature is 30°F and the wind speed is 20 mph, the wind chill chart indicates that it may feel like 15°F. This understanding is crucial for anyone outdoors because it allows for better preparation and clothing choices to mitigate the risks associated with extreme cold.[165]

Previous Historical Occurrence

According to the NCEI, Orange County has experienced one extreme heat event lasting more than two days while reporting no cold or wind chill events since the previous 2018 plan.[166] No deaths, injuries, property, or crop damage were reported.

Table 11: Extreme Heat Events in Orange County, 2019-2024

Affected Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Orange County	07/21/2019	Heat	0	0	$0	$0

The events are as follows:

- On July 19, 2019, through July 21, 2019, a Bermuda High pumped a hot, humid air mass northward into the area. From 1500 to 1700 hours, the KMGJ ASOS recorded a heat index between 105 and 110. The "Bermuda High" refers to a high-pressure system across the Atlantic Ocean, named after the nearby Bermuda Islands. This system plays a crucial role in shaping the movement of tropical systems within the Atlantic. Its effects can vary based on the season and other influencing factors that significantly impact the direction and intensity of these storms. The clockwise flow around the high-pressure area helps steer tropical systems and can affect their landfall locations.[167]

Future Potential Events

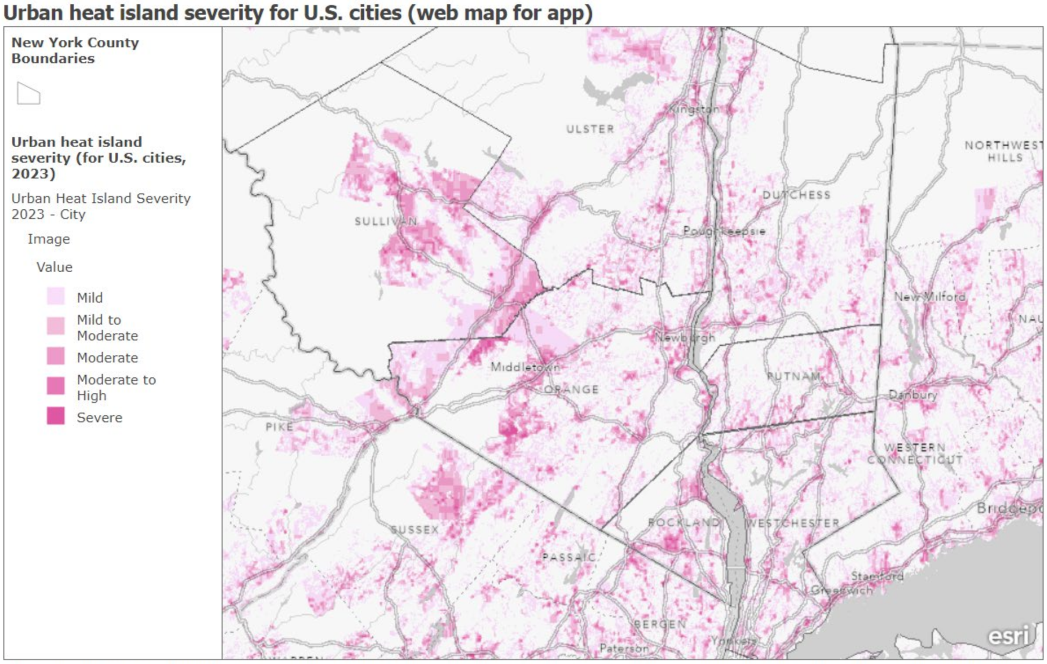
The probability of future extreme-temperature events for Orange County is pulled from the likelihood categories of the 2022 CEPA. Extreme Temperatures are ranked "high," indicating that this event could happen within the next five years. Although it is impossible to predict exact numbers, projections suggest that the frequency of extreme temperature days in Orange County, New York, could increase significantly over the next 15 years. Based on recent trends, the number of days with temperatures exceeding 90°F may rise, potentially reaching an average of several days each summer, compared to the past. Various climate models indicate that this could result in an increased occurrence of heat waves, with perhaps 10 to 20 or more days per summer exceeding 90°F in some years. Urban heat islands can contribute to the effects of future heat events in areas, as indicated in Figure 54. Winter extremes could also become more

[165] National Weather Service. "Understanding Wind Chill." https://www.weather.gov/safety/cold-wind-chill-chart.
[166] National Centers for Environmental Information. "Storm Events Database." https://tinyurl.com/3z6c6cec.
[167] First Coast News. "What is the Bermuda High, and How Does it Affect Tropical Systems?" https://www.firstcoastnews.com/article/weather/accuweather/what-is-the-bermuda-high-defined-defintion/507-b68965cb-a1a5-4ac8-8843-ee51e2273b28.

pronounced, although the specifics can vary based on future climate conditions and how they develop over time.

The future increase in extreme temperature events in Orange County could significantly impact various aspects of life in the region. Health risks may rise, particularly for vulnerable populations, due to heat-related illnesses and worsened air quality. Agriculture could suffer from heat stress, reducing crop yields and higher food prices. Water supply may be affected as evaporation rates increase and water quality degrades due to algal blooms. Infrastructure may experience greater stress, resulting in more frequent repairs and higher maintenance costs. Additionally, there could be a surge in energy demand from air conditioning, potentially straining the energy grid and increasing utility costs. Local ecosystems might face disruptions, threatening biodiversity as species struggle to adapt to changing temperatures. The economic ramifications could exacerbate inequality, particularly for those without resources to cope with extreme heat.

Urban heat island severity for U.S. cities (web map for app)



This map contains the relative heat severity for every pixel for every city in the United States. This 30-meter raster was derived from Landsat 8 imagery band 10 (ground-level thermal sensor) from the summers of 2023.

Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS | Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS | Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

Figure 54: Urban Heat Island Severity near Orange County

Impact of Climate Change

Extreme temperature events due to climate change present a range of challenges for the community of Orange County. Health risks are a primary concern, particularly for vulnerable populations, because increased temperatures can lead to heat-related illnesses and respiratory problems stemming from poor air quality. Economically, agriculture, vital to the region, may struggle as heat stress affects crop yields and livestock, ultimately impacting food prices and farmer livelihoods. Local infrastructure could also suffer, with roads and public transport at risk from heat-related damage. Water supply issues may arise as demand increases for agricultural and residential use, potentially leading to shortages during drought conditions. Additionally, ecosystems may face disruption, causing a decline in biodiversity and altering habitat conditions. The increased energy demand for cooling systems can strain local power grids, resulting in outages and higher costs. At the same time, emergency services may find their resources stretched thin in responding to heat-related emergencies. These factors underscore the urgent need for community awareness and proactive measures to mitigate the impacts of extreme temperature events.

The Orange County Climate Resilience Plan[168] identifies climate change risks across multiple sectors in the county. Figure 55 from the Climate Resilience Plan shows a projected rise in the number of hot days per year, the hottest day of the year, and the number of consecutive hot days. Cooling degree days are also projected to increase. Winters are also expected to be warmer, as indicated by the number of days below 32°F and a reduction in freeze–thaw conditions.

Heat Indicator	Recent Conditions (1976-2005)	Mid-Century (2035-2064)		End-of-Century (2070-2099)	
		+Days or +°F	Confidence interval	+Days or +°F	Confidence interval
Number of days above 90°F	9.5	29.6	(26.9 - 32.3)	60.8	(55.7 - 65.9)
Number of days above 95°F	1.1	12.6	(11.0 - 14.3)	36.1	(31.5 - 40.9)
Number of days above 100°F	0.0	3.5	(2.7 - 4.3)	14.7	(11.5 - 18.0)
Number of days above 105°F	0.0	0.6	(0.4 - 0.9)	4.7	(2.9 - 6.5)
Top 1% of hottest days per year (°F)	90.7	6.4	(5.8 - 7.0)	11.2	(10.1 - 12.3)
Maximum consecutive number of days per year above 95°F	0.8	3.7	(3.2 - 4.1)	9.5	(7.9 - 11.1)
Number of days per year below 32°F	136.4	-27.7	(-30.3 - -25.1)	-52.6	(-56.6 - -48.9)
Number of freeze-thaw days	89.2	-12.8	(-14.9 - -10.6)	-30.3	(-33.5 - -27.1)
Cooling degree days	583.0	602.3	(555.2 - 650.0)	1227.1	(1126.2 - 1327.3)

* Confidence intervals are provided for the 90th confidence interval and are based on the range across the climate models under the higher emissions scenario.

Figure 55: Future Changes in Heat Indicators for Orange County for Mid-Century and End-of-Century

Figure 56 indicates a projected increase in temperatures across the county through mid- and end-of-century. The Climate Resilience Plan notes that the eastern and middle portions of the county are projected to get hotter than other areas. This can in part be attributed to the urban heat island effect.

[168] Climate Resilience Planning, Orange County, NY. "Orange County Climate Resilience Plan." March 2023. https://www.orangecountygov.com/DocumentCenter/View/29242/Orange-County-Climate-Resilience-Plan.

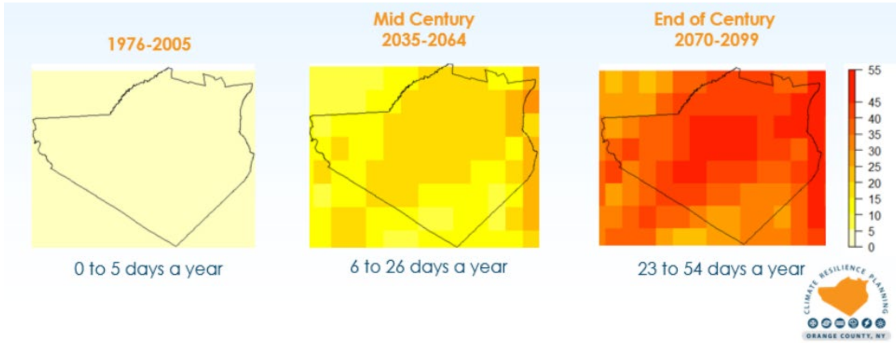


Figure 56: Number of Days Above 95°F for Recent, Mid-Century, and End-of-Century

Vulnerability Assessment

Extreme temperature events, including heat waves and unseasonably cold spells, pose significant risks to Orange County's health, safety, and infrastructure. This assessment aims to identify vulnerabilities within the community, focusing on the impacts of extreme temperatures on public health, infrastructure, and socio-economic factors.

EXPOSURE

- **Geographical Context:** Orange County is situated in the Hudson Valley region of New York, approximately 60 miles north of New York City. The county is characterized by diverse landscapes that include rolling hills, rivers, and forests, as well as urban and rural areas. Key municipalities include Middletown, Newburgh, and Warwick. The county's geographic topography significantly affects how extreme temperatures affect varying regions differently.
- **Climate Influence:** Orange County experiences a humid continental climate with four distinct seasons. Summers can be hot and moist, with average high temperatures often exceeding 85°F, while winters can be cold, with temperatures frequently dipping below freezing. Climate change is expected to exacerbate temperature extremes, with more frequent and severe heat waves in summer and increasingly unpredictable winters.
- **Historical Context:** Orange County has faced a range of temperature-related challenges. Extreme heat events have been more common in the past few decades, with notable heat waves occurring in the summers of 1999, 2006, and 2010. Winter storms have also intensified, leading to fluctuations in temperature that can affect infrastructure, agriculture, and public health. The County has invested in resources such as heat emergency response plans and public cooling centers, but the increasing frequency and intensity of temperature extremes present new challenges.

IMPACT ON COUNTY ASSETS

- **Public Health:** Extreme temperatures pose significant health risks, particularly to vulnerable populations such as the elderly and those with pre-existing health conditions. Increased heat can lead to heat exhaustion, dehydration, and heat-related illnesses. Access to healthcare services in heat emergencies can become severely strained if power outages disrupt communication and transportation. For those with inadequate housing and warming systems, exposure to extreme cold can contribute to hypothermia or other cold-weather related illnesses.

- **Infrastructure:** Roads, bridges, and public transportation systems are particularly vulnerable to temperature fluctuations. Extreme heat can cause pavement buckling, while cold snaps can lead to freeze–thaw damage, both of which degrade the integrity of roadways and public transport. Consequent increases in maintenance and repair costs can strain county budgets.
- **Energy Demand:** Higher temperatures lead to increased use of air conditioning, resulting in spikes in energy demand. This can strain the electrical grid and may lead to outages, particularly during peak usage. Increased dependence on air conditioning may have financial costs for residents and businesses. Installing innovative grid technologies and energy-efficiency programs can mitigate these impacts, but such measures require upfront investment.
- **Water Resources:** Extreme heat can exacerbate drought conditions, diminishing the supply and quality of water. The county relies on both surface and groundwater sources for drinking water. High temperatures can increase evaporation rates and reduce water availability for agriculture and recreation.
- **Agriculture:** Agriculture is a significant sector in Orange County's economy, and extreme heat impacts can reduce crop yields or adversely affect livestock health. Extreme cold, particularly during the planting or harvest seasons, can also lead to crop losses and health impacts to livestock.
- **Natural Ecosystems:** Rising temperatures can alter the habitats of local wildlife and disrupt existing ecosystems. Certain species may struggle to survive, while invasive species may thrive, leading to ecological imbalances.

CRITICAL AREAS OF CONCERN

- **Middletown:** As one of the larger urban areas, Middletown faces challenges related to public health and infrastructure strain, particularly during heat waves when energy demand spikes.
- **Newburgh:** Located on the banks of the Hudson River, Newburgh is at a heightened risk of flooding, particularly during snowfall melt associated with extreme weather events. These intense conditions can significantly increase the likelihood of flooding, leading to various public health risks such as waterborne diseases and hazardous waste exposure. Additionally, the strain on local emergency services can be profound because they are often stretched thin in responding to crises, evacuations, and assisting affected residents. The city's infrastructure may struggle to cope with the volume of water, further complicating response efforts and potentially leading to long-lasting impacts on the community.
- **Warwick:** The rural areas and agricultural lands in Warwick could be affected by heat stress on crops and livestock, as well as potential water supply challenges during drought conditions.
- **Ramapo River and Surrounding Regions:** Areas near the Ramapo River may experience increased flooding and water-quality issues during extreme weather events, impacting ecosystems and local communities.

- **Highland Lakes and Lake Anne:** Due to higher temperatures, water bodies in the county can be affected by increased evaporation and potential algae blooms, which can impact recreational water use and local wildlife.
- **Local Parks and Natural Reserves:** Rising temperatures may affect biodiversity and habitat conditions in locations like the Black Rock Forest near Cornwall and Storm King State Park near Cornwall-on-Hudson, affecting wildlife and recreational activities.
- **Vulnerable Neighborhoods:** Certain urban areas such as Newburgh, Middletown, Port Jervis, and Wallkill—particularly those lacking adequate green space or cooling centers—may face heightened risks during extreme heat events. These areas are often referred to as "urban heat islands."

NATIONAL RISK INDEX

COLD WAVE RISK SCORE

In Orange County, the NRI includes data on the expected annual losses to individual natural hazards, historical loss, and overall risk at a county and Census tract level. Based on the NRI, Orange County has a "relatively low" rating and a score of **52.5** for cold waves.

HEAT WAVE RISK SCORE

Based on the NRI, Orange County has a "relatively moderate" rating and a score of **88.8** for heat waves.

ESTIMATED ANNUAL LOSSES

According to the National Risk Index, the expected annual loss resulting from extreme temperatures is outlined in Table 12. The data is divided into two categories—cold wave and heat wave—because the NRI does not provide a combined index score for both types of extreme temperatures.

Table 12: Expected Annual Loss Extreme Cold and Heat, Orange County[169]

Hazard	Expected Annual Loss	Risk Score
Cold Wave	$72K	55.1
Heat Wave	$893K	89.3

The vulnerability score for a community experiencing extreme temperature events can be assessed by considering several key factors. With relatively moderate expected annual losses, the community does not face an overwhelming financial burden from these events. However, social vulnerability is relatively high, indicating that certain groups within the community, such as the elderly or low-income residents, may struggle more during extreme heat conditions. Despite this social vulnerability, the community exhibits relatively high resilience, suggesting that it has adequate systems and support to cope with and recover from such events. Furthermore, although the risk associated with extreme cold is low, the moderate

[169] FEMA. "National Risk Index." https://hazards.fema.gov/nri/map.

concern for extreme heat highlights ongoing challenges. These combined factors indicate that the community's vulnerability score is moderate. Resilience is present, yet the high levels of social vulnerability require attention to ensure that all residents are adequately protected during extreme temperature events.

VULNERABLE POPULATIONS

In Orange County, populations vulnerable to extreme cold conditions include the elderly, low-income families, and individuals with pre-existing health conditions. The elderly often have reduced mobility and difficulty accessing heating resources or support services. Many seniors may live alone, further intensifying their vulnerability when temperatures plummet. Low-income households are also at risk because they may struggle to afford adequate heating, making them susceptible to hypothermia and other cold-related health issues. Additionally, individuals with chronic illnesses may face heightened risks because their bodies may regulate temperature less effectively, putting them in danger during extreme cold spells.

On the flip side, extreme heat poses significant threats to vulnerable populations in Orange County, particularly children, the elderly, and those with certain health conditions. Children may not be able to recognize the signs of heat distress and also may lack access to air conditioning in their homes or reliable transportation to cooling centers. The elderly, again, are especially at risk, as their bodies may not respond adequately to heat stress, leading to serious health complications such as heat exhaustion or heat stroke. Individuals with respiratory or cardiovascular conditions may also experience exacerbated symptoms during heat waves, making access to cool environments and medical care crucial. Additionally, outdoor workers and people experiencing homelessness face heightened risks because they may be exposed to extreme temperatures without adequate protection or access to hydration.

DEVELOPMENT TRENDS

Orange County is experiencing notable development trends influenced by the increasing frequency of extreme heat and cold events. As climate change intensifies, the region is seeing a shift in urban planning and land use policies to enhance resilience. Communities are prioritizing green infrastructure, such as parks, green roofs, and urban forests, which help mitigate the heat-island effect and provide vital cooling areas for residents on sweltering summer days. Additionally, there is a growing emphasis on using sustainable materials in construction to improve energy efficiency and reduce the environmental impact of new developments.

The future land use in Orange County will likely reflect a strategic response to extreme weather patterns. For instance, planners may increasingly consider zoning regulations that promote mixed-use developments to reduce commute times and enhance local amenities, making communities more walkable and accessible. Furthermore, investment in renewable energy sources, such as solar panels and wind turbines, could become a standard in new developments, contributing to a reduction in the carbon footprint. As the population continues to grow, integrating climate-smart facilities, such as shade structures and community cooling centers, will be essential to protect residents during extreme temperature events and ensure a high quality of life.

In addressing these trends, Orange County may also see a shift in agricultural practices due to the impacts of climate variability. Farmers might adopt more resilient crop varieties that thrive in fluctuating temperatures or invest in technology that aids in efficient water management. Additionally, an increasing focus may be on preserving open spaces and wetlands to enhance biodiversity and act as natural buffers against extreme weather. These elements will complement one another to create a new landscape that adapts to climate change, ensuring that Orange County remains a vibrant and livable area in the face of environmental challenges.

COMMUNITY LIFELINES

Extreme heat and cold events can significantly impact several of FEMA's Community Lifelines (see Figure 57), posing public safety and well-being risks. During heat waves, the safety and security of communities may decline as heat-related illnesses increase and access to hydration becomes critical. Food, hydration, and shelter lifelines are challenged because higher temperatures elevate water demand, whereas extreme cold can endanger vulnerable populations by freezing essential resources. Health and medical systems also face strain, with heat worsening conditions like heatstroke and dehydration, while cold weather increases risks of hypothermia and frostbite. Energy systems are tested during these extremes: Heat waves drive up consumption for cooling while cold snaps increase heating demands, often leading to power outages. Furthermore, transportation networks may suffer as roads buckle in heat or become icy in the cold, obstructing access to services and resources. Lastly, extreme weather can create hazardous material risks because hotter temperatures may heighten chemical reactions while freezing temperatures may destabilize materials. Understanding these impacts is crucial for communities to effectively prepare for and respond to severe weather events.

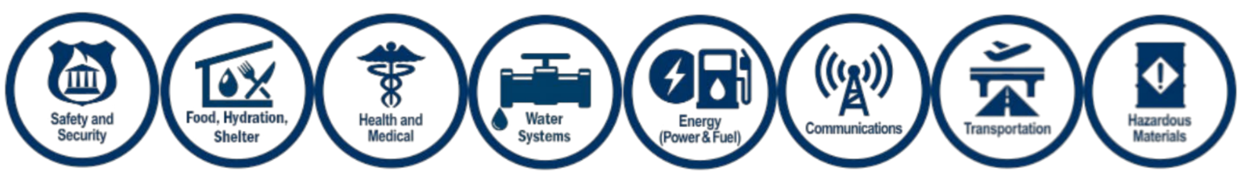


Figure 57: FEMA Community Lifelines

Floods

Hazard Description

Flooding is a general and temporary condition of partial or complete inundation of normally dry land. Floods are natural events for rivers and streams where excess water from snowmelt, rainfall, or storm surges accumulates and overflows onto the banks and adjacent floodplains of these waterbodies. Floodplains are lowland areas located adjacent to waterbodies that are subjected to recurring flood events.

Several factors determine the severity of floods, including intensity and duration of rainfall or other inflow from 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 (e.g., large parking lots, roadways, developments.). 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 flooding depends on the climate, soil, and channel slope of a particular area.

Waterbody impoundment, such as dams, poses additional, man-made hazards. Failure of this infrastructure cascades into aforementioned flooding hazards for communities downstream from the impoundment. In Orange County, there are 114 dams, including 33 with high hazard potential. More information on dams and other high impact facilities in the county can be found in the dam failure profile. Besides dam failure, there are a few different types of flooding:

- **Riverine Flooding:** During riverine flooding, streams and rivers exceed the capacity of their natural or constructed channels to accommodate water flow, whereupon water overflows the banks and spills out into adjacent low-lying, dry land.[170]
- **Pluvial Flooding:** Pluvial flooding is caused by heavy rain that triggers an independent flood event or the overflow of a waterbody.
- **Flash Flooding:** Flash floods can develop very quickly, often in just a few minutes and without any visible signs of rain. Flash floods are known to have a high velocity of water that carries rocks, mud, and other debris with it and can sweep away most objects in its path.[171] Flash flood damage tends to occur in areas immediately adjacent to a stream or arroyo (a gulch that temporarily fills with water after a heavy rain), due to a combination of heavy rain, dam failure, levee failure, rapid snowmelt, and ice jams. Additionally, heavy rain falling on steep terrain can weaken soil and cause debris flow that damages homes, roads, and property.
  - Mountains and steep hills produce rapid runoff and quick stream response. Steep narrow valleys generate rapid flowing waters that can rise quickly to a considerable depth. Rocks and clay soils do not allow much water to infiltrate the ground, and saturated soil also can lead rapidly to flash

[170] FEMA National Risk Index. “Riverine Flooding.” https://hazards.fema.gov/nri/riverine-flooding.
[171] National Weather Service. “What Is Flash Flooding?” https://www.weather.gov/phi/FlashFloodingDefinition.

flooding. Other high-risk areas include canyons, low water crossings, recent burn areas in mountains, and developed areas from pavement and roofs which concentrate rainfall runoff.[172]

- **National Flood Insurance Program (NFIP):** FEMA, which is the government entity that administers the NFIP, has mapped the known floodplains within much of the United States. When a flood study is completed for the NFIP, the information and maps are assembled into a Flood Insurance Study (FIS). A FIS compiles flood risk data for specific waters or hazard areas within specific communities and includes the main causes of flooding in these areas. The FIS delineates Special Flood Hazard Areas (SFHAs), designates flood risk zones, and establishes base flood elevations (BFEs) within certain areas for the Orange County HMP. BFEs are based on the flood event that has a 1% chance of occurring annually (also called "the 100-year flood"). At present, every individual municipality in Orange County is an active member of the NFIP except for the Village of Otisville and the Town of Woodbury.
- **1% annual chance floodplain (100-year floodplain):** The 100-year floodplain designates an area that has, on average, a 1% chance of flooding in any given year. It is important to note that a 100-year flood could occur during subsequent years or once every 10 years. The 1% annual chance flood, or base flood, is the standard that has been adopted for use in the NFIP. As indicated on Flood Insurance Rate Maps (FIRMs), BFEs indicate the elevation of surface water resulting from a flood that has a 1% chance of occurring in any given year. The BFE is the height of the base flood, normally in feet, relative to the geographic datum referenced in the FIS report (e.g., National Geodetic Vertical Datum (NGVD) of 1929, North American Vertical Datum (NAVD) of 1988).
- **0.2% annual chance floodplain (500-year floodplain):** The 500-year floodplain indicates an area that has, on average, a 0.2% change of flooding in any given year.

Location and Extent

Orange County and its jurisdictions experience several types of flooding. Although the Hudson River is tidally influenced, Orange County is sufficiently far from the open ocean to be unaffected by coastal flooding. Rather, flooding in Orange County is caused by from riverine flooding, shallow flooding resulting from urban drainage issues, and occasional ice jams.

Orange County has experienced flooding on many of the its roadways. Flooding has also impacted the county's parks, sewer treatment facilities, and pump stations. Orange County is located within the Hudson River Basin and the Delaware River Basin. The county is divided into seven primary watersheds: the Delaware River, Wallkill River, Moodna Creek, Ramapo River, Wanaque River, Upper Hudson River, and Lower Hudson River basins. The eastern portion of the county drains into the Hudson River, the Wallkill River drains the central and northern portions, the Delaware River drains western Orange County, and the county's southern corner drains into the Passaic River in New Jersey via the Ramapo and Wanaque Rivers. There are dozens of sub-watersheds in each of the river basins.

[172] NOAA, National Severe Storms Laboratory. "Severe Weather 101." https://www.nssl.noaa.gov/education/svrwx101/floods/.

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 data was used to identify the location of flood hazard areas in Orange County. According to the FIRM data, moderate to high flood risk zones exist in all Orange County municipalities. Figure 58 illustrates the mapped flood risk using FEMA zone designations, which are explained in more detail below. The FEMA FIRM for Orange County became effective on August 3, 2009. This data uses advanced engineering and refined standards to improve data quality and is regarded as FEMA's most reliable flood hazard data.

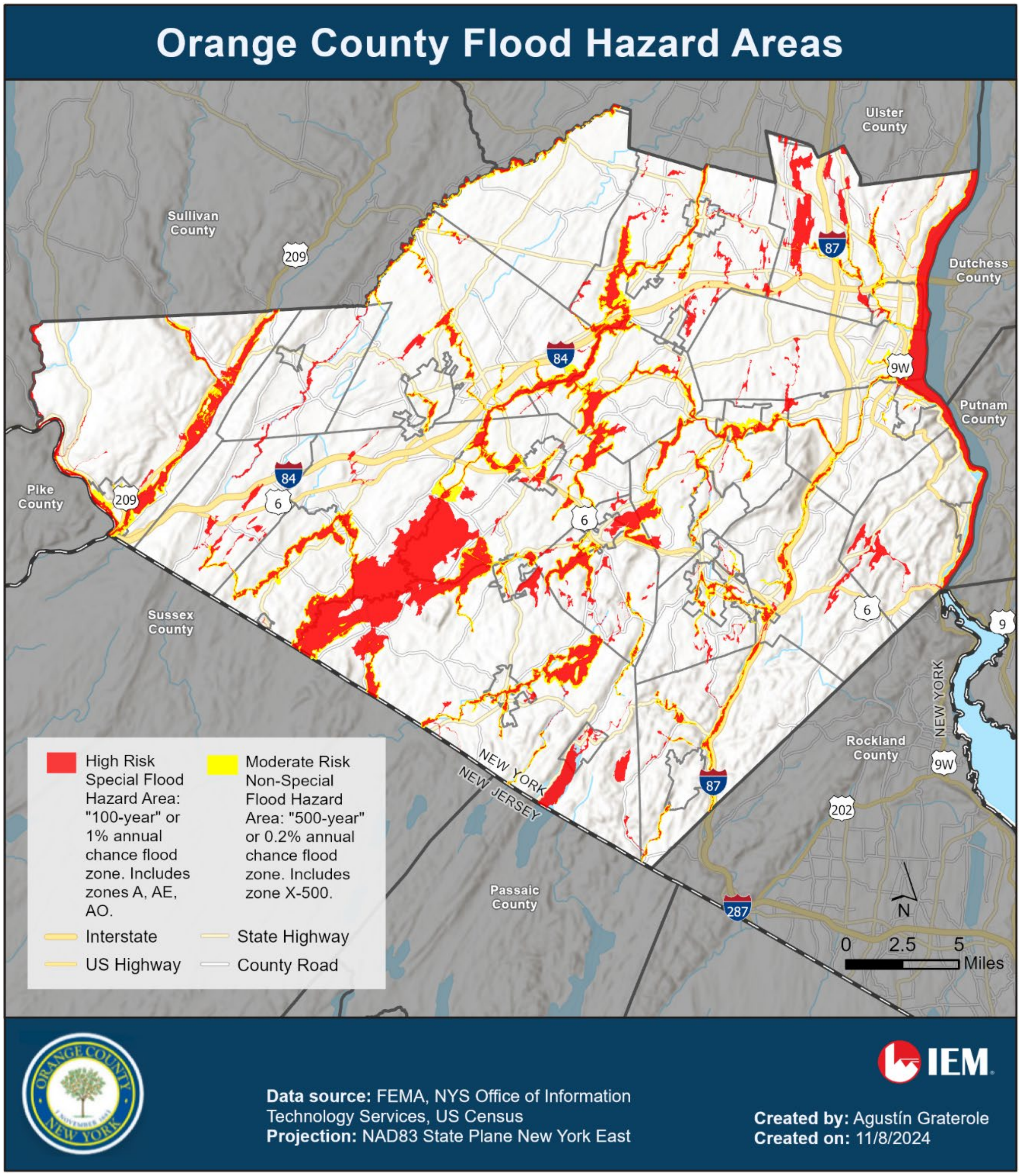


Figure 58: Orange County Flood Zones

FEMA's Digital Flood Insurance Rate Map (DFIRM) mapping was overlaid on the Orange County GIS Base Map to summarize the flood mapping and flood risk areas for all municipalities in Orange County, and the collated data is presented in Table 13 and Table 14. In total, only 11% of Orange County lies within high or moderate flood risk zones, according to current FIRM data. The Village of Greenwood Lake has the highest proportion of its area within a high flood risk zone, followed by the Town of Goshen. The City of Port Jervis has the highest proportion of land within moderate flood risk zones, followed by the Village of Washingtonville.

According to the current flood mapping, no land areas within the Village of Otisville are identified as lying within any identified floodplain, and this municipality is one of two in the county that does not currently participate in the NFIP. Although the Town of Woodbury also does not currently participate in the NFIP, the Village of Woodbury, which largely shares the same land area, has been involved since 1974.

Table 13: Summary of Land Areas in Flood Hazard Areas

Municipality	Total Land Area (Acres)	High Flood Risk (Acres)	Moderate Flood Risk (Acres)	Low Flood Risk (Acres)	Land in High Flood Risk %	Land in Moderate Flood Risk %
		A, AE, AH, AO	X500	X	A, AE, AH, AO	X500
Blooming Grove, Town of	21,051	1,854	277	18,919	9%	1%
Chester, Town of	14,698	2,405	213	12,079	16%	1%
Chester, Village of	1,393	897	42	1,022	64%	3%
Cornwall, Town of	16,446	892	83	15,447	5%	1%
Cornwall-on-Hudson, Village of	1,565	304	3	1,258	19%	0%
Crawford, Town of	25,696	388	76	25,097	2%	0%
Deerpark, Town of	43,382	3,395	416	39,433	8%	1%
Florida, Village of	1,175	164	21	990	14%	2%
Goshen, Town of	25,990	7,144	642	18,204	27%	2%
Goshen, Village of	2,032	365	20	1,647	18%	1%
Greenville, Town of	19,449	783	30	18,635	4%	0%
Greenwood Lake, Village of	1,388	387	0	1,001	28%	0%
Hamptonburgh, Town of	17,063	3,087	536	13,439	18%	3%
Harriman, Village of	638	153	31	454	24%	5%
Highland Falls, Village of	695	24	0	670	3%	0%
Highlands, Town of	20,740	1,700	0	18,996	8%	0%
Kiryas Joel, Village of	727	36	0	691	5%	0%
Maybrook, Village of	828	649	0	179	78%	0%
Middletown, City of	3,171	31	43	3,098	1%	1%

Municipality	Total Land Area (Acres)	High Flood Risk (Acres)	Moderate Flood Risk (Acres)	Low Flood Risk (Acres)	Land in High Flood Risk %	Land in Moderate Flood Risk %
		A, AE, AH, AO	X500	X	A, AE, AH, AO	X500
Minisink, Town of	14,847	1,559	316	12,959	11%	2%
Monroe, Town of	10,410	393	147	9,869	4%	1%
Monroe, Village of	2,211	267	59	1,884	12%	3%
Montgomery, Town of	29,670	3,156	435	26,037	11%	1%
Montgomery, Village of	932	179	39	714	19%	4%
Mount Hope, Town of	15,901	502	0	15,392	3%	0%
New Windsor, Town of	23,742	1,426	84	22,229	6%	0%
Newburgh, City of	3,034	661	41	2,302	22%	1%
Newburgh, Town of	30,144	4,701	93	25,302	16%	0%
Otisville, Village of	417	0	0	417	0%	0%
Port Jervis, City of	1,716	425	262	1,010	25%	15%
South Blooming Grove, Village of*	Data not available	Data not available	Data not available	Data not available	Data not available	Data not available
Tuxedo, Town of	29,206	994	80	28,130	3%	0%
Tuxedo Park, Village of	2,076 1,960	1,822 850	1 101	253 28,089	88% 3%	0% 0%
Unionville, Village of	171	4	0	168	2%	0%
Walden, Village of	1,259	73	4	1,182	6%	0%
Wallkill, Town of	40,070	4,736	351	34,922	12%	1%
Warwick, Town of	63,531	9,992	750	52,625	16%	1%
Warwick, Village of	1,384	157	25	1,203	11%	1%
Washingtonville, Village of	1,636 2,293	240 321	150 141	1,246 1,181	15% 20%	9% 9%
Wawayanda, Town of	22,520	3,541	322	18,658	16%	1%
Woodbury, Town and Village	23,404 23,511	676 771	66 79	22,662 22,594	3% 3%	0% 0%
Orange County Total	**536,408**	**62,104**	**5,979**	**522,287**	**12%**	**1%**

Table 14: Summary of Improved Values in Flood Hazard Areas

Municipality	Total Improved Value	Improved Value in High Flood Risk Areas Zones A, AE, AH, AO		Improved Value in Moderate Flood Risk Areas Zone X500		Improved Value in Low Flood Risk Areas Zone X	
		$	%	$	%	$	%
Blooming Grove, Town of	$1,518,225,074	$180,829,863	12%	$171,325,901	11%	$1,166,069,310	77%
Chester, Town of	$1,747,842,949	$451,473,007	26%	$173,039,888	10%	$1,123,330,054	64%
Chester, Village of	$1,077,375,658	$428,417,400	40%	$454,008,858	42%	$194,949,400	18%
Cornwall, Town of	$1,579,952,280	$79,888,462	5%	$72,610,200	5%	$1,427,453,618	90%
Cornwall-on-Hudson, Village of	$603,393,591	$39,139,700	6%	$5,412,800	1%	$558,841,091	93.0%
Crawford, Town of	$1,656,829,358	$45,369,677	3%	$30,730,848	2%	$1,580,728,833	95%
Deerpark, Town of	$1,154,522,117	$329,356,035	29%	$142,368,850	12%	$682,797,232	59%
Florida, Village of	$430,314,934	$31,283,900	7%	$27,425,867	6%	$371,605,167	86%
Goshen, Town of	$2,221,930,996	$522,368,078	24%	$235,616,109	11%	$1,463,946,809	66%
Goshen, Village of	$1,235,894,280	$257,691,038	21%	$29,807,300	2%	$948,395,942	77%
Greenville, Town of	$506,025,959	$40,021,800	8%	$8,310,800	2%	$457,693,359	90%
Greenwood Lake, Village of	$437,701,567	$99,564,600	23%	$0	0%	$338,136,967	77%
Hamptonburgh, Town of	$1,469,012,700	$246,653,000	17%	$226,452,400	15%	$995,907,300	68%
Harriman, Village of	$546,800,400	$111,397,100	20%	$85,750,800	16%	$349,652,500	64%
Highland Falls, Village of	$478,055,001	$50,110,498	10%	$0	0%	$427,944,503	90%

Municipality	Total Improved Value	Improved Value in High Flood Risk Areas Zones A, AE, AH, AO		Improved Value in Moderate Flood Risk Areas Zone X500		Improved Value in Low Flood Risk Areas Zone X	
		$	%	$	%	$	%
Highlands, Town of	$428,407,352	$36,145,358	8%	$0	0%	$392,261,994	92%
Kiryas Joel, Village of	$604,989,203	$53,892,233	9%	$0	0%	$551,096,970	91%
Maybrook, Village of	$16,245,200	$0	0%	$0	0%	$16,245,200	100%
Middletown, City of	$2,669,850,991	$254,743,900	10%	$134,695,100	5%	$2,280,411,991	85%
Minisink, Town of	$622,312,400	$74,397,300	12%	$64,905,200	10%	$483,009,900	78%
Monroe, Town of	$1,745,902,809	$99,541,200	6%	$54,159,300	3%	$1,592,202,309	91%
Monroe, Village of	$1,379,302,405	$122,102,500	9%	$129,616,700	9%	$1,127,583,205	82%
Montgomery, Town	$2,252,774,427	$250,927,500	11%	$1,861,732,327	83%	$140,114,600	6%

Table 15: Summary of Improved Values in Flood Hazard Areas, 2016

Municipality	Total Improved Value	Improved Value in High Flood Risk Areas Zones A, AE, AH, AO		Improved Value in Moderate Flood Risk Areas Zone X500		Improved Value in Low Flood Risk Areas Zone X	
		$	%	$	%	$	%
Montgomery, Village of	$451,808,300	$33,341,700	7%	$30,995,000	7%	$387,471,600	86%
Mount Hope, Town of	$1,568,367,606	$80,535,584	5%	$820,200	0%	$1,487,011,822	95%
New Windsor, Town of	$3,034,886,997	$140,822,280	5%	$37,745,000	1%	$2,856,319,717	94%
Newburgh, City of	$1,770,065,120	$187,149,750	11%	$153,014,400	9%	$153,014,400	9%

Municipality	Total Improved Value	Improved Value in High Flood Risk Areas Zones A, AE, AH, AO		Improved Value in Moderate Flood Risk Areas Zone X500		Improved Value in Low Flood Risk Areas Zone X	
		$	%	$	%	$	%
Newburgh, Town of	$4,057,973,972	364,280,996	9%	$146,008,638	4%	$3,547,684,338	87%
Otisville, Village of	$18,434,147	$0	0%	$0	0%	$18,434,147	100%
Port Jervis, City of	$749,932,929	$173,876,774	23%	$230,214,818	31%	$345,841,337	46%
South Blooming Grove, Village of	$355,649,153	$30,323,900	9%	$39,946,900	11%	$285,378,353	80%
Tuxedo, Town of	$2,154,634,232	$345,809,538	16%	$265,115,922	12%	$1,543,708,772	72%
Tuxedo Park, Village of	$75,764,300	$11,995,400	16%	$0	0%	$63,768,900	84%
Unionville, Village of	$63,762,900	$7,300,000	11%	$0	0%	$56,462,900	89%
Walden, Village of	$562,132,000	$38,440,000	7%	$5,893,500	1%	$517,798,500	92%
Wallkill, Town of	$4,852,726,776	$451,701,974	9%	$697,326,712	14%	$3,703,698,090	76%
Warwick, Town of	$4,282,219,148	$507,560,765	12%	$345,964,900	8%	$3,428,693,483	80%
Warwick, Village of	$1,054,106,301	$93,157,766	9%	$105,358,600	10%	$855,589,935	81%
Washingtonville, Village of	$653,163,432	$106,611,700	16%	$123,024,700	19%	$423,527,032	65%
Wawayanda, Town of	$949,951,457	$77,674,816	8%	$22,907,100	2%	$849,369,541	89%
Woodbury, Town and Village	$3,370,777,742	$442,779,342	13%	$98,238,025	3%	$2,829,760,375	84%
Orange County Total	**$56,410,018,163**	**$6,898,676,434**	**12%**	**$6,210,543,663**	**11%**	**$42,023,911,496**	**74%**

Previous Historical Occurrences

Floods have occurred before in Orange County's communities and will continue to occur in the future. Orange County and its component municipalities have been impacted most often by riverine flooding and shallow flooding. A picture of the flooding history of Orange County in terms of damage to private property over the last three decades or so can be derived from the recorded flood losses and payments data from the NFIP. This data is presented in the National Flood Insurance Program section of this plan, along with the total number of current policies and the total coverage values. At the time of writing, no Orange County municipalities were eligible for participation in FEMA's Community Rating System (CRS), under which municipalities implementing and enforcing floodplain management measures above and beyond the NFIP minimum requirements are rewarded with discounted flood insurance premiums.

Table 16 show that Orange County NFIP insured flood losses have totaled just more than $23.5 million since 1978, or more than $600,000 per year. This has jumped significantly since the 2011 Orange County Hazard Mitigation Plan, when the average annual NFIP payment to Orange County was approximately $300,000. It was found that approximately $14 million in NFIP losses were incurred in Orange County between September 2010 and July 2015. Actual community-wide property losses due to flood are likely to be higher, because this value includes only NFIP claims for which payments were made, excluding losses incurred on properties whose owners do not participate in the NFIP, losses for which a claim was not submitted, or losses for which payment on a claim was denied. For Orange County overall, the average NFIP payment was approximately $13,000 per individual loss. more than 40% of all NFIP losses in Orange County (in terms of dollar loss amounts) have occurred in three municipalities: the Town of Deerpark, the Town of Blooming Grove, and the Village of Washingtonville. The highest average payment per loss in any single municipality is in the Town of Tuxedo, where payments have been nearly $40,000 per loss. Of the 41 municipalities participating in the NFIP, only the Town of Greenville has not experienced any flood damage resulting in NFIP payments.

Table 16: NFIP Claims Table

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Blooming Grove, Town Of	360608	Monroe	8/28/2011	4010.23	361.35	0.00
Blooming Grove, Town Of	360608	Monroe	9/16/1999	12170.54	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	9/16/1999	11341.11	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	1/19/1996	15142.06	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	8/29/2011	22163.91	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Blooming Grove, Town Of	360608	Salisbury Mills	8/29/2011	174748.36	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	8/28/2011	111591.69	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	4/16/2007	12050.59	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	9/16/1999	4787.02	0.00	0.00
Blooming Grove, Town Of	360608	Blooming Grove	8/28/2011	37179.53	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	9/16/1999	3503.23	0.00	0.00
Blooming Grove, Town Of	360608	Blooming Grove	9/16/1999	14304.96	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	4/15/2007	3345.10	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	3/2/2007	9517.35	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	8/28/2011	37913.62	11628.73	0.00
Blooming Grove, Town Of	360608	Washingtonvle	8/28/2011	7388.83	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvle	9/16/1999	3480.31	0.00	0.00
Blooming Grove, Town Of	360608	Salisbury Mills	8/29/2011	3761.67	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	8/29/2011	24621.40	28833.62	0.00
Blooming Grove, Town Of	360608	Salisbury Mills	8/28/2011	6218.06	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	8/28/2011	44067.32	7578.75	0.00
Blooming Grove, Town Of	360608	Salisbury Mills	8/28/2011	6766.44	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	8/26/2011	5800.74	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Blooming Grove, Town Of	360608	Salisbury Mills	4/16/2007	4439.79	258.05	0.00
Blooming Grove, Town Of	360608	Monroe	10/8/2005	1631.98	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	3/22/2001	5408.39	5289.30	0.00
Blooming Grove, Town Of	360608	Washingtonville	9/16/1999	4025.55	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	9/16/1999	13554.96	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	9/16/1999	680.10	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	9/16/1999	7363.06	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	9/16/1999	1074.02	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	1/7/1998	1595.58	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	1/19/1996	334.38	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	7/12/1987	805.00	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	8/29/2011	15856.42	439.16	0.00
Blooming Grove, Town Of	360608	Salisbury Mills	8/28/2011	16274.91	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	8/28/2011	8149.50	0.00	0.00
Blooming Grove, Town Of	360608	Salisbury Mills	8/28/2011	50000.00	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	8/28/2011	27586.20	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	8/28/2011	45492.02	20430.23	0.00
Blooming Grove, Town Of	360608	Washingtonville	8/28/2011	47628.84	35000.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Blooming Grove, Town Of	360608	Washingtonville	8/28/2011	68348.31	54262.71	0.00
Blooming Grove, Town Of	360608	Salisbury Mill	8/28/2011	27648.45	0.00	0.00
Blooming Grove, Town Of	360608	Salisbury Mills	8/28/2011	20263.00	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	8/28/2011	50406.01	14832.70	0.00
Blooming Grove, Town Of	360608	Salisbury Mills	8/28/2011	66357.64	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	8/27/2011	42564.10	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	8/27/2011	13405.26	5602.37	0.00
Blooming Grove, Town Of	360608	Washingtonville	8/27/2011	18499.04	24293.75	0.00
Blooming Grove, Town Of	360608	Washingtonville	3/7/2011	25112.83	2590.89	0.00
Blooming Grove, Town Of	360608	New Windsor	7/19/2010	27872.30	27936.15	0.00
Blooming Grove, Town Of	360608	Salisbury Mills	12/27/2009	9069.64	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	4/16/2007	30918.55	0.00	0.00
Blooming Grove, Town Of	360608	Chester	4/14/2007	4582.62	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	10/12/2005	8316.73	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	4/2/2005	12502.92	911.18	0.00
Blooming Grove, Town Of	360608	Washingtonville	4/2/2005	32208.51	6092.50	0.00
Blooming Grove, Town Of	360608	Washingtonville	9/16/1999	6791.04	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonville	1/19/1996	4013.56	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Blooming Grove, Town Of	360608	Washingtonvill e	1/19/1996	1046.29	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	8/28/2011	5636.68	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	8/28/2011	8502.95	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	4/15/2007	10596.68	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	8/28/2011	14031.24	0.00	0.00
Blooming Grove, Town Of	360608	Salisbury Mills	8/28/2011	28550.95	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	8/28/2011	14007.59	8161.24	0.00
Blooming Grove, Town Of	360608	Blooming Grove	4/15/2007	7599.02	1914.25	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	9/16/1999	4034.39	0.00	0.00
Blooming Grove, Town Of	360608	Blooming Grove	9/16/1999	8696.76	10000.00	0.00
Blooming Grove, Town Of	360608	Monroe	4/15/2007	9112.48	1458.25	0.00
Blooming Grove, Town Of	360608	Blooming Grove	12/17/200 0	1324.99	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvle	9/16/1999	3503.29	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	1/9/1996	249.50	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	9/16/1999	10586.74	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	1/19/1996	0.00	3911.98	0.00
Blooming Grove, Town Of	360608	Monroe	7/12/1987	1193.20	610.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	9/8/2011	0.00	10319.95	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Blooming Grove, Town Of	360608	Washingtonvle	8/29/2011	14691.59	2000.00	0.00
Blooming Grove, Town Of	360608	Salisbury Mills	8/28/2011	52618.62	0.00	0.00
Blooming Grove, Town Of	360608	Salisbury Mills	8/28/2011	10871.02	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	8/27/2011	60958.36	20800.00	0.00
Blooming Grove, Town Of	360608	Salisbury Mills	8/27/2011	6753.80	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	9/16/1999	13805.06	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	9/16/1999	14131.40	18000.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	1/19/1996	6881.69	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	1/19/1996	13883.88	0.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	1/19/1996	373.88	5803.35	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	11/12/199 5	10411.36	2439.87	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	4/5/1984	700.00	347.00	0.00
Blooming Grove, Town Of	360608	Monroe	4/5/1984	458.00	801.00	0.00
Blooming Grove, Town Of	360608	Monroe	4/5/1984	1010.66	2220.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	4/24/1983	0.00	794.00	0.00
Blooming Grove, Town Of	360608	Monroe	5/12/1981	1600.00	995.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	3/21/1980	482.29	1116.80	0.00
Blooming Grove, Town Of	360608	Monroe	3/21/1980	125.00	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Blooming Grove, Town Of	360608	Monroe	3/21/1980	724.75	305.44	0.00
Blooming Grove, Town Of	360608	Monroe	3/21/1980	453.82	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	9/6/1979	478.00	195.00	0.00
Blooming Grove, Town Of	360608	Monroe	9/6/1979	735.00	0.00	0.00
Blooming Grove, Town Of	360608	Blooming Gr Ora	5/23/1979	0.00	512.00	0.00
Blooming Grove, Town Of	360608	Monroe	2/26/1979	0.00	250.00	0.00
Blooming Grove, Town Of	360608	Blooming Grove	1/26/1979	0.00	277.00	0.00
Blooming Grove, Town Of	360608	Blooming Grove	1/25/1979	78.75	166.40	0.00
Blooming Grove, Town Of	360608	Monroe	1/24/1979	0.00	962.28	0.00
Blooming Grove, Town Of	360608	Monroe	1/24/1979	0.00	126.00	0.00
Blooming Grove, Town Of	360608	Monroe	1/24/1979	37.12	170.75	0.00
Blooming Grove, Town Of	360608	Chester	1/24/1979	85.00	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	1/24/1979	170.56	1367.50	0.00
Blooming Grove, Town Of	360608	Blooming Grove	1/24/1979	0.00	750.00	0.00
Blooming Grove, Town Of	360608	Washingtonvill e	1/24/1979	269.00	476.00	0.00
Blooming Grove, Town Of	360608	Blooming Grove	1/24/1979	286.45	1491.85	0.00
Blooming Grove, Town Of	360608	Town Of Bloomin	1/24/1979	212.91	1164.90	0.00
Blooming Grove, Town Of	360608	Monroe	1/22/1979	0.00	1075.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Blooming Grove, Town Of	360608	Blooming Grove	1/21/1979	515.00	40.00	0.00
Blooming Grove, Town Of	360608	Monroe	1/21/1979	592.00	356.00	0.00
Blooming Grove, Town Of	360608	Monroe	1/21/1979	391.45	0.00	0.00
Blooming Grove, Town Of	360608	Monroe	1/21/1979	1093.42	1092.25	0.00
Blooming Grove, Town Of	360608	Blooming Gr Ora	5/15/1978	0.00	828.35	0.00
Blooming Grove, Town Of	360608	Monroe	3/14/1978	0.00	192.00	0.00
Blooming Grove, Town Of	360608	Monroe	1/26/1978	131.50	43.90	0.00
Blooming Grove, Town Of	360608	Monre	1/25/1978	467.67	0.00	0.00
Blooming Grove, Town Of	360608	Town Of Bloomin	11/8/1977	0.00	800.00	0.00
Blooming Grove, Town Of	360608	Blooming Grove	11/8/1977	486.27	84.19	0.00
Chester, Town Of	360870	Chester	8/27/2011	6423.27	0.00	0.00
Chester, Town Of	360870	Chester	5/17/2002	6747.58	1425.00	0.00
Chester, Town Of	360870	Chester	9/16/1999	18948.04	9953.07	0.00
Chester, Town Of	360870	Chester	1/19/1996	21541.78	0.00	0.00
Chester, Town Of	360870	Monroe	8/28/2011	41436.37	21646.99	0.00
Chester, Town Of	360870	Monroe	8/28/2011	8929.49	0.00	0.00
Chester, Town Of	360870	Chester	9/16/1999	9943.01	2721.78	0.00
Chester, Town Of	360870	Chester	8/28/2011	36023.20	60122.36	0.00
Chester, Town Of	360870	Chester	8/28/2011	9410.93	0.00	0.00
Chester, Town Of	360870	Chester	8/28/2011	20000.00	0.00	0.00
Chester, Town Of	360870	Chester	8/28/2011	5509.37	0.00	0.00
Chester, Town Of	360870	Chester	8/28/2011	35002.72	11000.00	0.00
Chester, Town Of	360870	Chester	8/28/2011	33754.84	12117.87	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Chester, Town Of	360870	Chester	8/27/2011	3623.03	0.00	0.00
Chester, Town Of	360870	Chester	4/17/2011	1654.83	0.00	0.00
Chester, Town Of	360870	Chester	3/13/2010	18799.62	7623.70	0.00
Chester, Town Of	360870	Chester	4/16/2007	24554.69	4048.76	0.00
Chester, Town Of	360870	Chester	4/15/2007	3031.61	0.00	0.00
Chester, Town Of	360870	Chester	4/3/2005	12877.16	442.45	0.00
Chester, Town Of	360870	Chester	9/16/1999	7527.58	0.00	0.00
Chester, Town Of	360870	Chester	1/19/1996	5951.01	0.00	0.00
Chester, Town Of	360870	Monroe	8/28/2011	21901.37	0.00	0.00
Chester, Town Of	360870	Chester	3/13/2010	9739.88	0.00	0.00
Chester, Town Of	360870	Chester	4/16/2007	9704.96	9327.51	0.00
Chester, Town Of	360870	Chester	4/16/2007	16767.83	0.00	0.00
Chester, Town Of	360870	Chester	4/2/2005	11712.53	3128.10	0.00
Chester, Town Of	360870	Chester	4/2/2005	42671.19	13149.66	0.00
Chester, Town Of	360870	Chester	9/16/1999	10984.78	0.00	0.00
Chester, Town Of	360870	Chester	1/9/1996	5990.51	0.00	0.00
Chester, Town Of	360870	Chester	8/28/2011	19304.98	0.00	0.00
Chester, Town Of	360870	Chester	8/28/2011	23901.06	0.00	0.00
Chester, Town Of	360870	Chester	8/27/2011	40703.93	15000.00	0.00
Chester, Town Of	360870	Chester	3/14/2010	9815.76	0.00	0.00
Chester, Town Of	360870	Chester	3/13/2010	26452.31	15000.00	0.00
Chester, Town Of	360870	Chester	9/18/2004	8573.55	0.00	0.00
Chester, Town Of	360870	Chester	9/16/1999	14402.80	0.00	0.00
Chester, Town Of	360870	Chester	10/12/1996	215.75	903.59	0.00
Chester, Town Of	360870	Chester	1/19/1996	10687.58	0.00	0.00
Chester, Town Of	360870	Monroe	1/28/1994	4597.77	1267.40	0.00
Chester, Town Of	360870	Monroe	4/4/1987	310.46	0.00	0.00
Chester, Town Of	360870	Chester	4/5/1984	294.52	0.00	0.00
Chester, Town Of	360870	Monroe	4/5/1984	1954.96	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Chester, Town Of	360870	Chester	4/5/1984	519.10	294.06	0.00
Chester, Town Of	360870	Chester	12/13/1983	0.00	535.94	0.00
Chester, Town Of	360870	Chester	3/21/1980	677.56	95.19	0.00
Chester, Town Of	360870	Chester	9/6/1979	260.00	0.00	0.00
Chester, Town Of	360870	Chester	8/15/1979	0.00	547.13	0.00
Chester, Town Of	360870	Chester	1/24/1979	1121.80	0.00	0.00
Chester, Village Of	361541	Chester	7/15/2000	271.80	0.00	0.00
Chester, Village Of	361541	Chester	8/28/2011	9519.44	0.00	0.00
Chester, Village Of	361541	Chester	8/28/2011	73241.00	0.00	0.00
Chester, Village Of	361541	Chester	8/28/2011	1077.70	0.00	0.00
Chester, Village Of	361541	Chester	8/27/2011	6139.28	0.00	0.00
Chester, Village Of	361541	Chester	9/16/1999	1464.50	5919.00	0.00
Chester, Village Of	361541	Chester	9/11/1997	7950.73	0.00	0.00
Chester, Village Of	361541	Chester	1/9/1996	401.20	0.00	0.00
Chester, Village Of	361541	Chester	9/16/1999	196.15	0.00	0.00
Chester, Village Of	361541	Chester	8/22/1996	1229.10	0.00	0.00
Chester, Village Of	361541	Chester	9/15/1979	190.78	0.00	0.00
Chester, Village Of	361541	Chester	1/21/1979	489.00	0.00	0.00
Cornwall On The Hudson, Village Of	360610	Cornwall On Hud	9/29/2011	786.08	0.00	0.00
Cornwall On The Hudson, Village Of	360610	Cornwall On Hud	8/28/2011	11260.39	0.00	0.00
Cornwall On The Hudson, Village Of	360610	Cornwll On Hdsn	4/5/1984	420.00	450.00	0.00
Cornwall On The Hudson, Village Of	360610	Cornwll On Hdsn	3/21/1980	749.81	0.00	0.00
Cornwall On The Hudson, Village Of	360610	Cornwall	3/21/1980	8080.00	0.00	0.00
Cornwall On The Hudson, Village Of	360610	Cornwall On Hud	3/21/1980	346.13	0.00	0.00
Cornwall On The Hudson, Village Of	360610	Cornwll On Hdsn	2/24/1979	543.05	451.38	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Cornwall On The Hudson, Village Of	360610	Cornwall On Hud	1/22/1979	480.06	328.25	0.00
Cornwall On The Hudson, Village Of	360610	Camillus	10/18/1977	1066.88	0.00	0.00
Cornwall, Town Of	360611	New Windsor	8/28/2011	84694.48	8391.30	0.00
Cornwall, Town Of	360611	Cornwall	8/28/2011	693.40	0.00	0.00
Cornwall, Town Of	360611	Cornwall	8/28/2011	13634.23	0.00	0.00
Cornwall, Town Of	360611	New Windsor	8/28/2011	3754.96	4884.65	0.00
Cornwall, Town Of	360611	Cornwall	8/28/2011	0.00	250000.00	0.00
Cornwall, Town Of	360611	Mountainville	4/15/2007	10737.72	3733.77	0.00
Cornwall, Town Of	360611	Cornwall	9/16/1999	1391.13	0.00	0.00
Cornwall, Town Of	360611	Cornwall	8/28/2011	4054.33	0.00	0.00
Cornwall, Town Of	360611	Cornwall	8/28/2011	26573.52	2176.09	0.00
Cornwall, Town Of	360611	Cornwall	4/15/2007	2120.58	0.00	0.00
Cornwall, Town Of	360611	Cornwall	10/13/2005	26100.00	0.00	0.00
Cornwall, Town Of	360611	Cornwall	1/19/1996	8227.13	1626.77	0.00
Cornwall, Town Of	360611	Cornwall	8/28/2011	7602.41	0.00	0.00
Cornwall, Town Of	360611	Cornwall	2/26/1979	2200.00	0.00	0.00
Cornwall, Town Of	360611	Newburgh	1/21/1979	160.07	0.00	0.00
Cornwall, Town Of	360611	Newburgh	3/22/1977	1000.00	2000.00	0.00
Crawford, Town Of	361250	Bloomingburg	8/28/2011	5638.88	0.00	0.00
Crawford, Town Of	361250	Bloomingburg	8/28/2011	12823.84	2071.03	0.00
Crawford, Town Of	361250	Bloomingburg	8/30/2011	65600.56	8000.00	10800.00
Crawford, Town Of	361250	Pine Bush	8/28/2011	6925.76	0.00	0.00
Crawford, Town Of	361250	Bloomingburg	8/28/2011	42283.31	0.00	24818.00
Crawford, Town Of	361250	Bloomingburg	4/16/2007	3598.09	2631.58	0.00
Crawford, Town Of	361250	Bloomingburg	4/15/2007	5729.19	3312.50	0.00
Crawford, Town Of	361250	Bloomingburg	8/28/2011	84407.55	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	12253.71	452.65	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Deer Park, Town Of	360612	Port Jervis	4/16/2007	13561.86	576.04	0.00
Deer Park, Town Of	360612	Port Jervis	6/28/2006	11090.27	1481.95	0.00
Deer Park, Town Of	360612	Port Jervis	4/2/2005	38180.59	0.00	0.00
Deer Park, Town Of	360612	Cuddebackville	4/3/2005	41752.29	0.00	0.00
Deer Park, Town Of	360612	Sparrowbush	7/1/2013	1371.90	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	8/28/2011	11772.28	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	4112.95	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/4/2005	50963.66	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/4/2005	42047.92	0.00	0.00
Deer Park, Town Of	360612	Sparrowbush	9/15/1999	2322.89	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	8/28/2011	4455.99	0.00	0.00
Deer Park, Town Of	360612	Cuddebackville	8/28/2011	12633.37	912.27	0.00
Deer Park, Town Of	360612	Cuddebackwille	4/2/2005	10577.88	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	8/28/2011	7974.74	0.00	0.00
Deer Park, Town Of	360612	Cuddebackville	4/6/2005	11951.79	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	4/3/2005	7864.80	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	4/3/2005	8768.81	0.00	0.00
Deer Park, Town Of	360612	Cuddebackville	9/9/2011	4812.37	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	9/9/2011	65995.53	0.00	0.00
Deer Park, Town Of	360612	Huguenot	9/8/2011	995.27	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	8/30/2011	27947.91	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	8/28/2011	8633.30	9225.27	0.00
Deer Park, Town Of	360612	Huguenot	8/28/2011	2429.10	0.00	0.00
Deer Park, Town Of	360612	Huguenot	8/28/2011	664.87	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	8/28/2011	32409.55	9185.88	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	11035.52	139.97	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	19582.44	5354.00	0.00
Deer Park, Town Of	360612	Huguenot	8/28/2011	22240.95	4798.51	0.00
Deer Park, Town Of	360612	Cuddebackville	8/28/2011	9033.51	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	8/28/2011	40616.60	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Deer Park, Town Of	360612	Port Jervis	8/27/2011	8297.87	0.00	0.00
Deer Park, Town Of	360612	Huguenot	4/16/2007	20484.51	9324.60	0.00
Deer Park, Town Of	360612	Port Jervis	6/28/2006	17851.09	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	6/28/2006	4691.46	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	6/28/2006	1679.12	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	4/3/2005	27452.89	11000.00	0.00
Deer Park, Town Of	360612	Godeffroy	4/3/2005	38433.56	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/3/2005	53600.00	34300.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/3/2005	22000.00	9309.34	22914.03
Deer Park, Town Of	360612	Godeffroy	4/2/2005	25801.71	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	4/2/2005	1945.22	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/2/2005	24389.91	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	9/18/2004	21688.86	5011.76	0.00
Deer Park, Town Of	360612	Port Jervis	9/18/2004	22000.00	25727.55	0.00
Deer Park, Town Of	360612	Deer Park	6/11/1998	2321.48	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	1/20/1996	2411.24	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	8/29/2011	43641.62	0.00	0.00
Deer Park, Town Of	360612	Cuddebackville	8/28/2011	7853.15	0.00	0.00
Deer Park, Town Of	360612	Huguenot	8/28/2011	2937.68	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	8/28/2011	36744.64	0.00	0.00
Deer Park, Town Of	360612	Port Jervs	8/28/2011	8147.71	5127.79	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	44700.42	8553.15	0.00
Deer Park, Town Of	360612	Huguenot	8/28/2011	24004.09	61042.36	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	0.00	627.63	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	32720.84	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/16/2007	8236.55	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/15/2007	13261.57	0.00	0.00
Deer Park, Town Of	360612	Port Jervs	6/28/2006	31434.94	27797.71	0.00
Deer Park, Town Of	360612	Port Jervis	6/28/2006	11863.56	8100.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Deer Park, Town Of	360612	Port Jervis	6/28/2006	0.00	11725.95	0.00
Deer Park, Town Of	360612	Port Jervis	6/28/2006	26651.04	5093.75	0.00
Deer Park, Town Of	360612	Port Jervis	6/27/2006	27132.89	1863.63	0.00
Deer Park, Town Of	360612	Port Jervis	4/3/2005	24200.00	7700.00	0.00
Deer Park, Town Of	360612	Godefroy	4/3/2005	4620.48	0.00	0.00
Deer Park, Town Of	360612	Cuddbackville	4/2/2005	100000.00	40000.00	0.00
Deer Park, Town Of	360612	Godeffroy	4/2/2005	19402.93	10000.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/2/2005	51149.17	12000.00	0.00
Deer Park, Town Of	360612	Port Jervis	9/18/2004	5856.28	6983.99	0.00
Deer Park, Town Of	360612	Port Jervis	9/17/2004	108811.98	12000.00	30000.00
Deer Park, Town Of	360612	Port Jeruis	1/19/1996	38788.44	10000.00	0.00
Deer Park, Town Of	360612	Godeffroy	4/2/2005	5006.28	466.50	0.00
Deer Park, Town Of	360612	Cuddebackville	8/28/2011	2160.21	667.99	0.00
Deer Park, Town Of	360612	Deer Park	6/28/2006	0.00	599.14	0.00
Deer Park, Town Of	360612	Port Jervis	4/3/2005	47683.11	20000.00	26830.94
Deer Park, Town Of	360612	Godeffroy	4/2/2005	6227.70	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	8/28/2011	2095.15	0.00	0.00
Deer Park, Town Of	360612	Cuddebackvlle	6/26/2009	3825.65	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/16/2007	4285.47	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	4/16/2007	2746.56	0.00	0.00
Deer Park, Town Of	360612	Huguenot	4/16/2007	5470.84	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/16/2007	43020.14	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	6/28/2006	4050.62	671.43	0.00
Deer Park, Town Of	360612	Port Jervis	6/28/2006	38515.38	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	6/28/2006	8379.17	3038.07	0.00
Deer Park, Town Of	360612	Port Jervis	4/3/2005	57823.98	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/3/2005	25650.16	0.00	0.00
Deer Park, Town Of	360612	Sparrow Bush	4/3/2005	11364.25	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/3/2005	51043.63	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Deer Park, Town Of	360612	Cuddebackvlle	4/3/2005	0.00	7001.70	0.00
Deer Park, Town Of	360612	Godeffroy	4/3/2005	5378.62	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/3/2005	54807.23	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/3/2005	127790.08	0.00	5500.00
Deer Park, Town Of	360612	Godeffroy	4/3/2005	31000.00	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/3/2005	96673.39	25000.00	17909.21
Deer Park, Town Of	360612	Port Jervis	4/3/2005	32832.81	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/3/2005	64500.00	0.00	20828.23
Deer Park, Town Of	360612	Port Jervis	4/2/2005	28886.92	6273.05	0.00
Deer Park, Town Of	360612	Godeffroy	4/2/2005	21489.18	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	4/1/2005	28000.00	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	9/18/2004	4352.83	0.00	0.00
Deer Park, Town Of	360612	Westbrookvlle	8/30/2004	4509.69	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	8/28/2011	8721.57	5600.00	0.00
Deer Park, Town Of	360612	Port Jervis	1/19/1996	448.67	191.00	0.00
Deer Park, Town Of	360612	Port Jervis	9/7/2011	4000.00	0.00	0.00
Deer Park, Town Of	360612	Cuddebackville	8/30/2011	1812.74	0.00	0.00
Deer Park, Town Of	360612	Cuddebackville	8/29/2011	13275.66	1820.47	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	3058.56	3916.92	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	14412.31	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	11512.83	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	20889.47	1422.62	0.00
Deer Park, Town Of	360612	Huguenot	8/28/2011	18561.33	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	17161.50	4386.24	0.00
Deer Park, Town Of	360612	Port Jervis	8/28/2011	16098.51	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	3/11/2011	1609.94	0.00	0.00
Deer Park, Town Of	360612	Cuddebackville	4/16/2007	4862.18	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	6/28/2006	10649.66	0.00	0.00
Deer Park, Town Of	360612	Huguenot	4/3/2005	8997.59	9218.49	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Deer Park, Town Of	360612	Godeffroy	4/3/2005	33344.44	0.00	0.00
Deer Park, Town Of	360612	Bus Garage	4/3/2005	150100.00	119000.00	0.00
Deer Park, Town Of	360612	Cuddebackville	4/2/2005	9623.62	10819.07	0.00
Deer Park, Town Of	360612	Deerpark	4/2/2005	26000.00	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	4/2/2005	60586.16	0.00	30000.00
Deer Park, Town Of	360612	Godeffroy	4/2/2005	31500.00	4000.00	0.00
Deer Park, Town Of	360612	Bus Garage	9/18/2004	26888.67	26059.49	0.00
Deer Park, Town Of	360612	Cuddebackville	9/17/1999	3391.36	0.00	0.00
Deer Park, Town Of	360612	Goddefroy	9/27/1994	1565.94	0.00	0.00
Deer Park, Town Of	360612	Pt Jervis	3/15/1986	1504.10	0.00	0.00
Deer Park, Town Of	360612	Godeffroy	4/5/1984	248.54	0.00	0.00
Deer Park, Town Of	360612	Westbrookville	4/5/1984	4000.00	6601.59	0.00
Deer Park, Town Of	360612	Pt Jervis	4/5/1984	2428.50	0.00	0.00
Deer Park, Town Of	360612	Pt Jervis	4/17/1983	511.00	0.00	0.00
Deer Park, Town Of	360612	Westbrookville	4/16/1983	467.15	435.75	0.00
Deer Park, Town Of	360612	Deer Pk	4/10/1983	1361.90	968.00	0.00
Deer Park, Town Of	360612	Deer Park	4/10/1983	3248.74	13.33	0.00
Deer Park, Town Of	360612	Deer Pk	9/12/1981	51.45	0.00	0.00
Deer Park, Town Of	360612	Deer Pk	7/4/1981	187.46	0.00	0.00
Deer Park, Town Of	360612	Westbrookville	5/15/1981	766.16	0.00	0.00
Deer Park, Town Of	360612	Westbrookville	2/22/1981	2780.38	1437.88	0.00
Deer Park, Town Of	360612	Pt Jervis Ny	2/12/1981	3300.00	2565.00	0.00
Deer Park, Town Of	360612	Port Jervis	2/12/1981	6100.00	3650.00	0.00
Deer Park, Town Of	360612	Pt Jervis	2/12/1981	12100.00	5000.00	0.00
Deer Park, Town Of	360612	Port Jervis	2/12/1981	4118.25	0.00	0.00
Deer Park, Town Of	360612	Pt Jervis	2/12/1981	5334.15	4041.75	0.00
Deer Park, Town Of	360612	Cuddebackville	2/12/1981	305.00	0.00	0.00
Deer Park, Town Of	360612	Port Jervis	2/12/1981	4100.00	0.00	0.00
Deer Park, Town Of	360612	Pt Jervis	2/12/1981	17177.88	5000.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Deer Park, Town Of	360612	Pt Jervis	2/12/1981	7800.00	5000.00	0.00
Deer Park, Town Of	360612	Pt Jervis	2/12/1981	9413.51	2000.00	0.00
Deer Park, Town Of	360612	Pt Jervis	2/12/1981	2560.00	2096.00	0.00
Deer Park, Town Of	360612	Port Jervis	2/12/1981	14600.00	10000.00	0.00
Deer Park, Town Of	360612	Pt Jervis	2/12/1981	280.00	295.00	0.00
Deer Park, Town Of	360612	Pt Jervis	3/22/1980	0.00	500.00	0.00
Deer Park, Town Of	360612	Deer Park	3/21/1980	0.00	560.00	0.00
Deer Park, Town Of	360612	Deer Pk	3/21/1980	4662.00	2400.00	0.00
Deer Park, Town Of	360612	Sparrowbush	4/20/1979	0.00	94.67	0.00
Deer Park, Town Of	360612	Deer Pk	1/21/1979	292.16	0.00	0.00
Deer Park, Town Of	360612	Deer Pk	1/20/1979	40.95	31.00	0.00
Deer Park, Town Of	360612	Deer Pk	8/12/1978	15.95	0.00	0.00
Florida, Village Of	360613	Florida	8/28/2011	47689.00	23617.88	0.00
Florida, Village Of	360613	Florida	8/28/2011	93032.49	30888.18	0.00
Florida, Village Of	360613	Florida	8/28/2011	8850.15	0.00	0.00
Florida, Village Of	360613	Florida	4/3/2005	3985.56	269.81	0.00
Florida, Village Of	360613	Florida	8/28/2011	50033.21	150000.00	0.00
Florida, Village Of	360613	Florida	4/3/2005	3930.92	2795.30	0.00
Florida, Village Of	360613	Florida	9/16/1999	21362.96	0.00	0.00
Florida, Village Of	360613	Florida	1/19/1996	19763.28	10000.00	0.00
Florida, Village Of	360613	Florida	1/19/1996	2075.29	0.00	0.00
Florida, Village Of	360613	Florida	9/16/1999	24825.95	25504.75	0.00
Florida, Village Of	360613	Amsterdam	4/4/1987	6014.28	1075.00	0.00
Florida, Village Of	360613	Town Of Florida	4/4/1987	6831.85	4301.00	0.00
Florida, Village Of	360613	Warwick	3/5/1984	443.03	140.00	0.00
Florida, Village Of	360613	Warwick	3/21/1980	215.62	0.00	0.00
Florida, Village Of	360613	Florida	3/21/1980	0.00	798.00	0.00
Goshen, Town Of	360614	Goshen	9/28/2004	3316.97	0.00	0.00
Goshen, Town Of	360614	Goshen	6/1/1998	138.41	2351.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Goshen, Town Of	360614	Goshen	7/13/1996	5969.61	5944.00	0.00
Goshen, Town Of	360614	Goshen	1/19/1996	12663.83	2437.50	0.00
Goshen, Town Of	360614	New Hampton	8/29/2011	14695.06	0.00	0.00
Goshen, Town Of	360614	Goshen	9/16/1999	6228.07	0.00	0.00
Goshen, Town Of	360614	New Hampton	8/28/2011	11771.32	0.00	0.00
Goshen, Town Of	360614	New Hampton	8/28/2011	47080.32	0.00	0.00
Goshen, Town Of	360614	New Hampton	4/18/2007	548.33	796.90	0.00
Goshen, Town Of	360614	New Hampton	4/17/2007	1692.02	0.00	0.00
Goshen, Town Of	360614	New Hampton	4/17/2007	9382.75	0.00	0.00
Goshen, Town Of	360614	Goshen	10/8/2005	5852.33	0.00	0.00
Goshen, Town Of	360614	Goshen	3/11/2002	6909.02	0.00	0.00
Goshen, Town Of	360614	New Hampton	9/8/2011	3372.74	0.00	0.00
Goshen, Town Of	360614	New Hampton	9/8/2011	37606.99	0.00	0.00
Goshen, Town Of	360614	New Hampton	9/8/2011	6332.73	10000.00	0.00
Goshen, Town Of	360614	New Hampton	8/31/2011	2067.08	0.00	0.00
Goshen, Town Of	360614	New Hampton	8/30/2011	16716.41	0.00	0.00
Goshen, Town Of	360614	New Hampton	8/29/2011	4856.75	0.00	0.00
Goshen, Town Of	360614	New Hampton	8/28/2011	68195.14	7184.61	0.00
Goshen, Town Of	360614	New Hampton	8/28/2011	22325.87	1536.14	0.00
Goshen, Town Of	360614	Goshen	8/28/2011	27047.28	0.00	0.00
Goshen, Town Of	360614	New Hampton	3/28/2011	0.00	5000.00	0.00
Goshen, Town Of	360614	Goshen	12/27/2008	18113.98	0.00	0.00
Goshen, Town Of	360614	New Hampton	4/17/2007	9144.75	0.00	0.00
Goshen, Town Of	360614	New Hampton	4/16/2007	10683.32	891.09	0.00
Goshen, Town Of	360614	Goshen	9/28/2004	9452.55	1496.99	0.00
Goshen, Town Of	360614	Goshen	9/16/1999	8847.23	0.00	0.00
Goshen, Town Of	360614	Goshen	8/28/2011	31159.94	0.00	0.00
Goshen, Town Of	360614	Goshen	4/3/2005	0.00	2099.13	0.00
Goshen, Town Of	360614	New Hampton	4/16/2007	3445.84	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Goshen, Town Of	360614	Goshen	3/23/1999	0.00	998.02	0.00
Goshen, Town Of	360614	Goshen	9/7/2011	1814.70	0.00	0.00
Goshen, Town Of	360614	Goshen	8/28/2011	96479.71	0.00	0.00
Goshen, Town Of	360614	Middletown	4/5/1984	1520.00	452.00	0.00
Goshen, Town Of	360614	Goshen	3/21/1980	3489.00	500.00	0.00
Goshen, Town Of	360614	Goshen	3/21/1980	26.00	400.00	0.00
Goshen, Town Of	360614	New Hampton	1/26/1979	876.00	663.00	0.00
Goshen, Town Of	360614	Goshen	11/8/1977	230.80	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	4619.05	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	17733.70	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	26206.88	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	9555.21	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	11483.46	2270.38	0.00
Goshen, Village Of	361571	Goshen	9/8/2011	815.96	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	352533.00	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	9799.49	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	1738.30	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	3698.71	0.00	0.00
Goshen, Village Of	361571	Goshen	8/27/2011	16930.72	0.00	0.00
Goshen, Village Of	361571	Goshen	8/27/2011	30300.00	0.00	0.00
Goshen, Village Of	361571	Goshen	8/29/2011	37915.86	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	132.68	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	4563.52	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	4984.64	0.00	0.00
Goshen, Village Of	361571	Goshen	7/7/2011	737.49	0.00	0.00
Goshen, Village Of	361571	Goshen	4/16/2007	29244.16	0.00	0.00
Goshen, Village Of	361571	Goshen	4/4/2005	4887.18	1053.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	36591.96	0.00	0.00
Goshen, Village Of	361571	Goshen	4/16/2007	1751.35	0.00	0.00
Goshen, Village Of	361571	Goshen	4/16/2007	1906.06	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Goshen, Village Of	361571	Goshen	4/2/2005	1966.27	0.00	0.00
Goshen, Village Of	361571	Goshen	1/9/1996	1234.16	0.00	0.00
Goshen, Village Of	361571	Goshen	8/29/2011	44535.60	0.00	0.00
Goshen, Village Of	361571	Goshen	8/29/2011	57272.71	0.00	0.00
Goshen, Village Of	361571	Goshen	8/28/2011	32440.51	4380.76	0.00
Goshen, Village Of	361571	Goshen	3/7/2008	8013.98	4194.53	0.00
Goshen, Village Of	361571	Goshen	7/25/1996	19800.15	0.00	0.00
Goshen, Village Of	361571	Goshen	6/23/1989	1816.48	1926.63	0.00
Goshen, Village Of	361571	Goshen	10/27/1987	0.00	5514.63	0.00
Goshen, Village Of	361571	Goshen	2/25/1979	339.45	125.63	0.00
Goshen, Village Of	361571	Goshen	1/24/1979	331.00	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	4/3/2005	6738.75	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	8/29/2011	29923.05	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	8/28/2011	323.24	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	8/28/2011	7227.13	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	3/13/2011	4602.06	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwod Lake	1/19/1996	3151.72	675.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	8/30/2011	2979.57	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	8/29/2011	12150.35	2648.61	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	8/28/2011	6019.84	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	3/7/2011	6448.40	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	3/14/2010	26905.01	2172.99	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Greenwood Lake, Village Of	360616	Greenwood Lake	3/14/2010	4722.24	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	4/2/2005	3857.62	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	9/16/1999	2729.02	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	9/8/2011	15042.76	1000.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	8/28/2011	14177.95	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	4/15/2007	3825.23	758.85	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	9/17/1999	1666.18	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	4/15/2007	4930.61	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	10/13/2005	7583.21	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	9/16/1999	1816.82	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	9/16/1999	3419.28	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	8/28/2011	101124.75	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	8/28/2011	25841.15	23246.82	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	8/15/2011	25841.15	23246.82	0.00
Greenwood Lake, Village Of	360616	Twn Of Warwick	1/27/1996	2509.93	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	4/4/1987	762.40	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	4/5/1984	586.72	1049.38	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	4/5/1984	210.00	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Greenwood Lake, Village Of	360616	Greenwood Lk	4/5/1984	2778.61	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	4/5/1984	2282.25	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	4/5/1984	564.20	218.80	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	4/5/1984	1924.20	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	12/13/1983	112.91	931.56	0.00
Greenwood Lake, Village Of	360616	Blauvelt	3/26/1980	2390.50	1440.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	3/21/1980	1800.00	0.00	0.00
Greenwood Lake, Village Of	360616	Monroe	3/21/1980	0.00	886.00	0.00
Greenwood Lake, Village Of	360616	Greenwood	3/21/1980	113.40	307.01	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	3/21/1980	0.00	1519.00	0.00
Greenwood Lake, Village Of	360616	Greewood Lake	9/6/1979	399.40	4003.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	9/6/1979	1230.00	1383.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	9/6/1979	760.05	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	9/6/1979	952.00	1601.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	9/6/1979	435.00	1700.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lk	2/26/1979	0.00	250.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	11/8/1977	832.00	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	11/8/1977	1024.00	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Greenwood Lake, Village Of	360616	Greenwood Lake	11/8/1977	1528.00	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	11/8/1977	808.00	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	11/8/1977	8500.00	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	11/8/1977	484.00	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	11/8/1977	916.00	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	11/8/1977	1084.00	0.00	0.00
Greenwood Lake, Village Of	360616	Greenwood Lake	11/8/1977	1298.00	0.00	0.00
Hamptonburgh, Town Of	360617	Campbell Hall	8/28/2011	27164.38	0.00	0.00
Hamptonburgh, Town Of	360617	Campbell Hall	8/27/2011	9369.84	0.00	0.00
Hamptonburgh, Town Of	360617	Campbell Hall	4/10/2001	1364.43	248.50	0.00
Hamptonburgh, Town Of	360617	Campbell Hall	8/28/2011	117110.07	26206.62	0.00
Hamptonburgh, Town Of	360617	Campbell Hall	4/16/2007	11805.56	0.00	0.00
Hamptonburgh, Town Of	360617	Middletown	9/8/2011	34716.79	2900.00	0.00
Hamptonburgh, Town Of	360617	Middletown	8/28/2011	2582.10	2267.30	0.00
Hamptonburgh, Town Of	360617	Washingtonvill e	8/28/2011	15999.24	5582.03	0.00
Hamptonburgh, Town Of	360617	Middletown	8/28/2011	9429.77	0.00	0.00
Hamptonburgh, Town Of	360617	Middletown	8/28/2011	8860.17	0.00	0.00
Hamptonburgh, Town Of	360617	Middletown	4/15/2007	7935.82	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Hamptonburgh, Town Of	360617	Campbell Hall	11/25/1996	3836.87	0.00	0.00
Hamptonburgh, Town Of	360617	Campbell Hall	8/28/2011	5358.98	0.00	0.00
Hamptonburgh, Town Of	360617	Middletown	8/28/2011	11492.49	0.00	0.00
Hamptonburgh, Town Of	360617	Middletown	8/27/2011	4701.58	0.00	0.00
Hamptonburgh, Town Of	360617	Campbell Hall	8/28/2011	10736.00	0.00	0.00
Hamptonburgh, Town Of	360617	Middletown	3/6/2011	17622.28	7900.00	0.00
Hamptonburgh, Town Of	360617	Middletown	3/14/2010	11365.31	7900.00	0.00
Hamptonburgh, Town Of	360617	Middletown	3/8/2008	8994.09	857.98	0.00
Hamptonburgh, Town Of	360617	Middletown	10/15/2005	11020.42	4083.92	0.00
Hamptonburgh, Town Of	360617	Middletown	4/3/2005	10410.29	2459.97	0.00
Hamptonburgh, Town Of	360617	Middletown	3/17/2003	2692.45	580.00	0.00
Hamptonburgh, Town Of	360617	Middletown	1/20/1996	5000.00	0.00	0.00
Hamptonburgh, Town Of	360617	Rock Tavern	3/13/2010	4782.68	5112.55	0.00
Hamptonburgh, Town Of	360617	Rock Tavern	4/15/2007	3955.95	3138.73	0.00
Hamptonburgh, Town Of	360617	Rock Tavern	4/2/2005	2749.22	10314.38	0.00
Hamptonburgh, Town Of	360617	Middletown	5/1/2014	3074.13	5320.52	0.00
Hamptonburgh, Town Of	360617	Middletown	9/8/2011	37743.48	7900.00	0.00
Hamptonburgh, Town Of	360617	Rock Tavern	8/28/2011	8574.00	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Hamptonburgh, Town Of	360617	Campbell Hall	8/28/2011	6208.86	0.00	0.00
Hamptonburgh, Town Of	360617	Middletown	8/28/2011	38243.48	7900.00	0.00
Hamptonburgh, Town Of	360617	Rock Tavern	3/7/2011	16910.86	9532.95	0.00
Hamptonburgh, Town Of	360617	Middletown	4/5/1984	0.00	799.32	0.00
Hamptonburgh, Town Of	360617	Campbell Hall	12/13/1983	0.00	1599.34	0.00
Hamptonburgh, Town Of	360617	Middletown	4/16/1983	0.00	475.00	0.00
Harriman, Village Of	360618	Harriman	8/30/2011	47092.03	0.00	0.00
Harriman, Village Of	360618	Cortland	1/19/1996	2550.85	0.00	0.00
Highland Falls, Village Of	361453	Highland Falls	9/16/1999	22370.57	8700.00	0.00
Highland Falls, Village Of	361453	Highland Mills	3/21/1980	197.31	0.00	0.00
Highland Falls, Village Of	361453	Highland Mills	1/24/1979	309.05	55.28	0.00
Highlands, Township Of	361251	Highland Mills	1/24/1979	270.05	0.00	0.00
Kiryas Joel, Village Of	361610	Monroe	8/28/2011	1465.51	0.00	0.00
Middletown, City Of	360619	Middletown	8/9/2013	7150.01	1012.53	0.00
Middletown, City Of	360619	Middletown	8/28/2011	14070.20	0.00	0.00
Middletown, City Of	360619	Middletown	6/29/2009	520.57	0.00	0.00
Middletown, City Of	360619	Middletown	8/27/2011	7062.10	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	19160.48	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	5774.75	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	19405.56	1860.62	0.00
Middletown, City Of	360619	Middletown	8/28/2011	11160.34	1488.87	0.00
Middletown, City Of	360619	Middletown	8/28/2011	6184.10	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	11406.31	2954.48	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Middletown, City Of	360619	Middletown	8/28/2011	30030.53	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	3291.95	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	13290.30	289.97	0.00
Middletown, City Of	360619	Middletown	8/9/2013	7358.30	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	13686.22	62447.20	0.00
Middletown, City Of	360619	Middletown	8/28/2011	9303.13	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	14203.25	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	10175.08	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	4758.74	0.00	0.00
Middletown, City Of	360619	Middletown	3/7/2011	6969.69	22955.22	0.00
Middletown, City Of	360619	Middletown	3/6/2011	4277.44	0.00	0.00
Middletown, City Of	360619	Middletown	8/30/2010	699.70	3858.74	0.00
Middletown, City Of	360619	Middletown	10/12/2005	9320.24	0.00	0.00
Middletown, City Of	360619	Middletown	9/8/2011	2414.96	0.00	0.00
Middletown, City Of	360619	Middletown	9/7/2011	10667.17	0.00	0.00
Middletown, City Of	360619	Middletown	8/31/2011	3133.74	28.63	0.00
Middletown, City Of	360619	Middletown	8/29/2011	10789.48	2744.17	0.00
Middletown, City Of	360619	Middletown	8/29/2011	3653.14	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	13939.41	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	3167.56	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	1367.54	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	2526.05	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	14026.14	0.00	0.00
Middletown, City Of	360619	Middletown	8/6/2011	6749.41	0.00	0.00
Middletown, City Of	360619	Middletown	6/26/2009	7164.95	0.00	0.00
Middletown, City Of	360619	Middletown	3/8/2008	2292.08	0.00	0.00
Middletown, City Of	360619	Middletown	4/15/2007	10446.04	0.00	0.00
Middletown, City Of	360619	Middletown	9/8/2011	944.60	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	1746.42	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Middletown, City Of	360619	Middletown	8/28/2011	4420.43	0.00	0.00
Middletown, City Of	360619	Middletown	8/27/2011	1673.37	0.00	0.00
Middletown, City Of	360619	Middletown	4/2/2005	4422.24	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	9183.50	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	5261.46	0.00	0.00
Middletown, City Of	360619	Middletown	8/27/2011	5946.15	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	7468.86	0.00	0.00
Middletown, City Of	360619	Middletown	6/23/2009	2187.20	0.00	0.00
Middletown, City Of	360619	Middletown	8/9/2013	1753.87	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	9961.90	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	36190.75	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	7037.27	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	1160.29	0.00	0.00
Middletown, City Of	360619	Middletown	8/28/2011	18138.05	0.00	0.00
Middletown, City Of	360619	Middletown	8/19/1991	1022.00	0.00	0.00
Middletown, City Of	360619	Middletown	3/29/1984	773.25	1600.00	0.00
Middletown, City Of	360619	De Riv	3/20/1981	500.00	0.00	0.00
Middletown, City Of	360619	Middletown	9/5/1979	0.00	1983.83	0.00
Middletown, City Of	360619	Middletown	1/24/1979	0.00	749.78	0.00
Minisink, Town Of	360620	Johnson	8/28/2011	14582.38	0.00	0.00
Minisink, Town Of	360620	Westtown	8/28/2011	7108.51	0.00	0.00
Minisink, Town Of	360620	Westtown	4/16/1983	1590.00	1030.00	0.00
Minisink, Town Of	360620	Westtown	1/20/1979	2850.94	210.00	0.00
Minisink, Town Of	360620	Westtown	1/26/1978	1290.36	309.17	0.00
Minisink, Town Of	360620	Westown	11/8/1977	826.08	336.00	0.00
Monroe, Town Of	360621	Monroe Ny	9/16/1999	4428.88	1203.71	0.00
Monroe, Town Of	360621	Monroe	9/17/1999	343.60	0.00	0.00
Monroe, Town Of	360621	Monroe	10/30/2012	8409.96	0.00	0.00
Monroe, Town Of	360621	Monroe	8/28/2011	12634.87	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Monroe, Town Of	360621	Monroe	8/28/2011	25743.09	0.00	0.00
Monroe, Town Of	360621	Monroe	8/28/2011	24720.19	0.00	0.00
Monroe, Town Of	360621	Monroe	8/28/2011	14322.47	2476.31	0.00
Monroe, Town Of	360621	Monroe	3/13/2010	17848.26	150.25	0.00
Monroe, Town Of	360621	Monroe	4/15/2007	10941.14	1393.24	0.00
Monroe, Town Of	360621	Monroe	4/2/2005	20326.11	2044.75	0.00
Monroe, Town Of	360621	Monroe	9/16/1999	4222.94	0.00	0.00
Monroe, Town Of	360621	Monroe	8/28/2011	164852.67	0.00	0.00
Monroe, Town Of	360621	Monroe	8/27/2011	5277.31	0.00	0.00
Monroe, Town Of	360621	Monroe	4/17/2007	2659.74	0.00	0.00
Monroe, Town Of	360621	Monroe	9/16/1999	3747.08	0.00	0.00
Monroe, Town Of	360621	Monroe	9/16/1999	6799.76	0.00	0.00
Monroe, Town Of	360621	Monroe	9/16/1999	13100.00	5400.00	0.00
Monroe, Town Of	360621	Monroe	9/16/1999	13614.45	0.00	0.00
Monroe, Town Of	360621	Monroe	1/19/1996	4288.49	4179.18	0.00
Monroe, Town Of	360621	Monroe	8/28/2011	42117.75	0.00	0.00
Monroe, Town Of	360621	Monroe	10/9/2005	2229.00	0.00	0.00
Monroe, Town Of	360621	Monroe	9/16/1999	9430.01	0.00	0.00
Monroe, Town Of	360621	Salisbury Mills	11/16/1989	1300.00	0.00	0.00
Monroe, Town Of	360621	Monroe	4/4/1987	638.02	0.00	0.00
Monroe, Town Of	360621	Monroe	4/5/1984	2687.92	0.00	0.00
Monroe, Town Of	360621	Monroe	2/20/1981	1761.44	355.00	0.00
Monroe, Town Of	360621	Monroe	4/9/1980	1363.98	376.00	0.00
Monroe, Town Of	360621	Monroe	3/22/1980	610.00	700.00	0.00
Monroe, Town Of	360621	Monroe	3/21/1980	160.33	164.73	0.00
Monroe, Town Of	360621	Monroe	3/21/1980	333.00	1264.38	0.00
Monroe, Town Of	360621	Monroe	3/21/1980	0.00	345.10	0.00
Monroe, Town Of	360621	Monroe	3/21/1980	400.00	0.00	0.00
Monroe, Town Of	360621	Monroe	9/6/1979	900.00	1500.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Monroe, Town Of	360621	Monroe	9/6/1979	1546.00	1115.00	0.00
Monroe, Town Of	360621	Monroe	9/6/1979	0.00	75.00	0.00
Monroe, Town Of	360621	Monroe	9/6/1979	0.00	644.00	0.00
Monroe, Town Of	360621		9/6/1979	0.00	196.00	0.00
Monroe, Town Of	360621	Monroe	9/6/1979	0.00	225.00	0.00
Monroe, Town Of	360621	Monroe	9/6/1979	0.00	108.00	0.00
Monroe, Town Of	360621	Monroe	9/6/1979	600.00	1300.00	0.00
Monroe, Town Of	360621	Monroe	1/25/1979	0.00	1000.00	0.00
Monroe, Town Of	360621	Monroe	1/25/1979	1422.98	1253.00	0.00
Monroe, Town Of	360621	Monroe	1/24/1979	0.00	300.00	0.00
Monroe, Town Of	360621	Monroe	1/24/1979	262.00	140.00	0.00
Monroe, Town Of	360621	Monroe	1/24/1979	461.60	0.00	0.00
Monroe, Town Of	360621	Monroe	1/24/1979	520.34	2089.25	0.00
Monroe, Town Of	360621	Monroe	1/24/1979	2177.44	0.00	0.00
Monroe, Town Of	360621	Monroe Ny 10950	1/24/1979	1351.50	0.00	0.00
Monroe, Town Of	360621	Monroe	1/21/1979	440.80	345.70	0.00
Monroe, Town Of	360621	Monroe	1/21/1979	443.68	835.00	0.00
Monroe, Town Of	360621	Monroe	1/21/1979	0.00	150.00	0.00
Monroe, Town Of	360621	Monroe	1/21/1979	175.00	796.00	0.00
Monroe, Town Of	360621	Montoe	1/26/1978	2025.00	0.00	0.00
Monroe, Town Of	360621	Monroe	11/8/1977	1016.09	1368.50	0.00
Monroe, Town Of	360621	Monroe	11/8/1977	711.70	0.00	0.00
Monroe, Town Of	360621	Twn Of Monroe O	11/8/1977	932.36	0.00	0.00
Monroe, Village Of	360622	Monroe	4/16/2007	11806.82	862.60	0.00
Monroe, Village Of	360622	Monroe	8/27/2011	40140.87	8561.52	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	34945.82	11000.00	0.00
Monroe, Village Of	360622	Monroe	4/15/2007	6516.78	443.30	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	82966.89	25000.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	14434.67	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Monroe, Village Of	360622	Monroe	8/28/2011	2632.55	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	29951.61	0.00	0.00
Monroe, Village Of	360622	Monroe	3/13/2010	2577.91	5750.00	0.00
Monroe, Village Of	360622	Monroe	7/11/2006	913.21	0.00	0.00
Monroe, Village Of	360622	Monroe	10/8/2005	10595.12	0.00	0.00
Monroe, Village Of	360622	Monroe	8/21/2004	8755.27	16084.29	0.00
Monroe, Village Of	360622	Monroe	9/16/1999	5647.17	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	11927.21	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	25586.46	4155.99	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	23330.87	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	4703.18	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	15539.26	5501.52	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	12458.24	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	32572.05	14564.74	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	6715.90	2455.48	0.00
Monroe, Village Of	360622	Monroe	8/4/2003	1940.22	0.00	0.00
Monroe, Village Of	360622	Monroe	10/15/1999	3054.82	0.00	0.00
Monroe, Village Of	360622	Monroe	9/16/1999	8568.18	9127.81	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	32354.28	0.00	0.00
Monroe, Village Of	360622	Monroe	8/27/2011	16924.13	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	6169.60	181.01	0.00
Monroe, Village Of	360622	Monroe	1/18/1996	5629.97	0.00	0.00
Monroe, Village Of	360622	Monroe	11/12/1995	4256.47	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	33548.21	18496.67	0.00
Monroe, Village Of	360622	Monroe	3/14/2010	4663.67	0.00	0.00
Monroe, Village Of	360622	Monroe	9/16/1999	5297.30	0.00	0.00
Monroe, Village Of	360622	Monroe	9/16/1999	1229.60	0.00	0.00
Monroe, Village Of	360622	Monroe	1/9/1996	1191.18	0.00	0.00
Monroe, Village Of	360622	Monroe	1/9/1996	499.22	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Monroe, Village Of	360622	Monroe	1/9/1996	834.00	0.00	0.00
Monroe, Village Of	360622	Monroe	11/11/1995	5043.77	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	18987.03	0.00	0.00
Monroe, Village Of	360622	Monroe Village	9/16/1999	8409.40	5810.27	0.00
Monroe, Village Of	360622	Monroe	9/16/1999	10574.69	2881.62	0.00
Monroe, Village Of	360622	Monroe	9/18/2012	4222.68	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	23379.50	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	65818.94	42770.57	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	11201.79	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	56423.87	0.00	0.00
Monroe, Village Of	360622	Monroe	8/28/2011	54102.35	59676.36	0.00
Monroe, Village Of	360622	Monroe	9/16/1999	9308.16	5300.30	0.00
Monroe, Village Of	360622	Monroe	9/16/1999	11388.29	8512.57	0.00
Monroe, Village Of	360622	Monroe	1/20/1996	17210.39	9514.58	0.00
Monroe, Village Of	360622	Monroe	1/19/1996	6117.90	4600.00	0.00
Monroe, Village Of	360622	Monroe	11/11/1995	4154.29	0.00	0.00
Monroe, Village Of	360622	Monroe Ny 10950	7/12/1987	1934.42	1723.81	0.00
Monroe, Village Of	360622	Monroe	4/5/1984	2118.40	4910.10	0.00
Monroe, Village Of	360622	Monroe	4/5/1984	770.00	440.00	0.00
Monroe, Village Of	360622	Monroe	4/5/1984	0.00	4002.66	0.00
Monroe, Village Of	360622	Monroe Ny 10950	4/5/1984	1866.29	1637.75	0.00
Monroe, Village Of	360622	Monroe	4/5/1983	889.30	0.00	0.00
Monroe, Village Of	360622	Monroe	3/27/1983	576.11	0.00	0.00
Monroe, Village Of	360622	Monroe	2/1/1982	4128.73	0.00	0.00
Monroe, Village Of	360622	Monroe	2/12/1981	447.00	0.00	0.00
Monroe, Village Of	360622	Monroe	2/4/1981	0.00	204.96	0.00
Monroe, Village Of	360622	Monroe	4/9/1980	1200.00	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Monroe, Village Of	360622	Monroe	3/21/1980	0.00	317.61	0.00
Monroe, Village Of	360622	Montoe	3/21/1980	0.00	1307.25	0.00
Monroe, Village Of	360622	Monroe	3/21/1980	0.00	973.91	0.00
Monroe, Village Of	360622	Monroe	9/6/1979	1343.20	0.00	0.00
Monroe, Village Of	360622	Greenwood Lake	9/6/1979	3090.00	2000.00	0.00
Monroe, Village Of	360622	Monroe	9/6/1979	76.00	0.00	0.00
Monroe, Village Of	360622	Monroe	2/24/1979	232.50	271.80	0.00
Monroe, Village Of	360622	Monroe	1/25/1979	550.12	0.00	0.00
Monroe, Village Of	360622	Monroe	1/24/1979	270.00	0.00	0.00
Monroe, Village Of	360622	Monrroe	1/24/1979	0.00	98.90	0.00
Monroe, Village Of	360622	Monroe	1/24/1979	191.80	510.53	0.00
Monroe, Village Of	360622	Monroe	1/24/1979	451.60	0.00	0.00
Monroe, Village Of	360622	Monroe	1/24/1979	0.00	4008.10	0.00
Monroe, Village Of	360622	Monroe	1/21/1979	2010.00	0.00	0.00
Monroe, Village Of	360622	Monroe	11/8/1977	0.00	7391.10	0.00
Monroe, Village Of	360622	Monroe Ny 10950	5/6/1977	1175.00	0.00	0.00
Montgomery, Town Of	360623	Montgomery	8/28/2011	10710.89	0.00	0.00
Montgomery, Town Of	360623	Montgomery	3/9/2008	1224.01	0.00	0.00
Montgomery, Town Of	360623	Rock Tavern	4/15/2007	12242.80	3289.37	0.00
Montgomery, Town Of	360623	Montgomery	8/27/2011	14540.21	409.93	0.00
Montgomery, Town Of	360623		3/22/1980	316.00	0.00	0.00
Montgomery, Village Of	360624	Montgomery	9/7/2011	4292.68	0.00	0.00
Montgomery, Village Of	360624	Montgomery	8/28/2011	1934.50	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Montgomery, Village Of	360624	Montgomery	8/28/2011	3828.50	0.00	0.00
Montgomery, Village Of	360624	Montgomery	9/8/2011	789.69	0.00	0.00
Montgomery, Village Of	360624	Montgomery	8/28/2011	4637.04	0.00	0.00
Montgomery, Village Of	360624	Montgomery	1/20/1996	29416.47	53988.87	0.00
Montgomery, Village Of	360624		2/21/1981	115.77	1999.96	0.00
Montgomery, Village Of	360624	Sprakers	3/21/1980	958.00	0.00	0.00
Montgomery, Village Of	360624		3/6/1979	642.07	834.47	0.00
Montgomery, Village Of	360624	Montgomery	1/12/1979	18684.90	6006.24	0.00
Montgomery, Village Of	360624	Montgomery	1/12/1979	97705.83	97624.07	0.00
Montgomery, Village Of	360624	Montgomery	1/15/1978	17919.25	72390.64	0.00
Montgomery, Village Of	360624	Montgomery	2/24/1977	12000.00	0.00	0.00
Mount Hope, Town Of	360625	Middletown	8/31/2011	2000.00	0.00	0.00
Mount Hope, Town Of	360625	Middletown	8/28/2011	6709.08	0.00	0.00
Mount Hope, Town Of	360625	Otisville	6/27/2009	6198.38	315.98	0.00
Mount Hope, Town Of	360625	Middletown	8/28/2011	7814.55	0.00	0.00
Mount Hope, Town Of	360625	Middletown	4/16/2007	7653.68	2874.13	0.00
New Windsor, Town Of	360628	New Windsor	8/28/2011	709.80	0.00	0.00
New Windsor, Town Of	360628	New Windsor	8/28/2011	12794.67	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
New Windsor, Town Of	360628	New Windsor	8/9/2013	4158.55	0.00	0.00
New Windsor, Town Of	360628	New Windsor	9/8/2011	8793.35	0.00	0.00
New Windsor, Town Of	360628	New Windsor	8/28/2011	53185.36	0.00	0.00
New Windsor, Town Of	360628	New Windsor	8/28/2011	8800.00	1400.00	0.00
New Windsor, Town Of	360628	New Windsor	1/19/1996	1511.82	0.00	0.00
New Windsor, Town Of	360628	New Windsor	10/8/2005	0.00	12705.80	0.00
New Windsor, Town Of	360628	New Windsor	10/8/2005	59088.15	0.00	0.00
New Windsor, Town Of	360628	New Windsor	12/7/2011	18277.77	0.00	0.00
New Windsor, Town Of	360628	New Windsor	8/28/2011	7584.74	0.00	0.00
New Windsor, Town Of	360628	New Windsor	8/27/2011	34314.18	0.00	0.00
New Windsor, Town Of	360628	New Windsor	2/26/2010	6485.54	0.00	0.00
New Windsor, Town Of	360628	New Windsor	4/15/2007	11082.84	2453.67	0.00
New Windsor, Town Of	360628	New Windsor	11/17/2002	1556.40	0.00	0.00
New Windsor, Town Of	360628	New Windsor	8/28/2011	0.00	96695.09	0.00
New Windsor, Town Of	360628	New Windsor	8/28/2011	6753.08	0.00	0.00
New Windsor, Town Of	360628	Salisbury Mills	9/19/2000	6790.05	5852.55	0.00
New Windsor, Town Of	360628	New Windsor	10/13/2005	8685.09	1571.43	0.00
New Windsor, Town Of	360628	New Windsor	1/19/1996	580.40	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
New Windsor, Town Of	360628	New Windsor	8/28/2011	9095.45	0.00	0.00
New Windsor, Town Of	360628	New Windsor	4/5/1984	56.12	0.00	0.00
New Windsor, Town Of	360628	New Windsor	3/19/1983	388.50	618.35	0.00
New Windsor, Town Of	360628	New Windsor	3/21/1980	930.37	434.49	0.00
New Windsor, Town Of	360628	New Wondsor	9/6/1979	0.00	353.54	0.00
New Windsor, Town Of	360628	New Windsor	2/23/1979	515.45	2400.59	0.00
Newburgh, City Of	360626	Newburgh	10/29/2012	117840.99	70269.21	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	5516.52	0.00	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	33827.43	0.00	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	16933.27	0.00	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	16977.42	0.00	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	13183.73	0.00	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	39286.74	0.00	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	18338.24	0.00	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	7791.94	0.00	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	16962.42	0.00	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	35931.83	0.00	0.00
Newburgh, City Of	360626	Newburgh	4/16/2007	0.00	1382.20	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	7346.74	0.00	0.00
Newburgh, City Of	360626	Newburgh	8/27/2011	8221.15	0.00	0.00
Newburgh, City Of	360626	Newburgh	10/29/2012	17081.75	0.00	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	3860.31	0.00	0.00
Newburgh, City Of	360626	Newburgh	4/16/2007	2097.15	0.00	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	7387.37	2500.00	0.00
Newburgh, City Of	360626	Newburgh	8/28/2011	28205.72	1000.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Newburgh, City Of	360626	Newburgh	11/8/2006	3324.44	1956.78	0.00
Newburgh, City Of	360626	Newburgh	5/29/1984	724.65	0.00	0.00
Newburgh, City Of	360626	Newburgh	4/5/1984	2092.95	0.00	0.00
Newburgh, City Of	360626	Newburgh	4/5/1984	16100.00	0.00	0.00
Newburgh, City Of	360626	Newburgh	4/5/1984	4895.10	0.00	0.00
Newburgh, City Of	360626	Newburgh	3/29/1984	14159.64	0.00	0.00
Newburgh, City Of	360626	Newburgh	4/9/1980	0.00	640.00	0.00
Newburgh, Town Of	360627	Newburgh	8/28/2011	3148.55	0.00	0.00
Newburgh, Town Of	360627	Newburgh	9/8/2011	20354.14	0.00	0.00
Newburgh, Town Of	360627	Newburgh	2/24/2010	5408.07	0.00	0.00
Newburgh, Town Of	360627	Newburgh	7/13/1996	4376.53	0.00	0.00
Newburgh, Town Of	360627	Newburgh	7/13/1996	12909.42	0.00	0.00
Newburgh, Town Of	360627	Newburgh	1/19/1996	5867.50	0.00	0.00
Newburgh, Town Of	360627	Newburgh	1/19/1996	5961.63	0.00	0.00
Newburgh, Town Of	360627	Newburgh	1/19/1996	4858.20	0.00	0.00
Newburgh, Town Of	360627	Newburgh	11/11/1995	16789.39	0.00	0.00
Newburgh, Town Of	360627	Newburgh	11/11/1995	22531.09	0.00	0.00
Newburgh, Town Of	360627	Newburgh	9/7/2011	1575.70	0.00	0.00
Newburgh, Town Of	360627	Newburgh	8/28/2011	4830.35	0.00	0.00
Newburgh, Town Of	360627	Newburgh	8/28/2011	21705.12	0.00	0.00
Newburgh, Town Of	360627	Newburgh	8/28/2011	18261.33	0.00	0.00
Newburgh, Town Of	360627	Newburgh	8/28/2011	13292.92	757.48	0.00
Newburgh, Town Of	360627	Newburgh	12/12/2008	1657.63	475.05	0.00
Newburgh, Town Of	360627	Newburgh	10/8/2005	681.00	0.00	0.00
Newburgh, Town Of	360627	Wallkill	1/14/2005	2578.94	79.04	0.00
Newburgh, Town Of	360627	Newburgh	3/29/1993	1927.91	0.00	0.00
Newburgh, Town Of	360627	Newburgh	8/9/2013	8544.74	751.24	0.00
Newburgh, Town Of	360627	Newburgh	8/28/2011	6265.29	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Newburgh, Town Of	360627	Newburgh	8/28/2011	4825.37	0.00	0.00
Newburgh, Town Of	360627	Newburgh	8/28/2011	21139.35	3052.20	0.00
Newburgh, Town Of	360627	Newburgh	1/6/2010	5361.85	0.00	0.00
Newburgh, Town Of	360627	Newburgh	1/15/1999	650.00	0.00	0.00
Newburgh, Town Of	360627	Newburgh	8/28/2011	0.00	47596.06	0.00
Newburgh, Town Of	360627	Newburgh	3/6/2011	434.04	0.00	0.00
Newburgh, Town Of	360627	Newburgh	10/15/2005	9849.57	0.00	0.00
Newburgh, Town Of	360627	Wallkill	4/16/2007	1350.92	0.00	0.00
Newburgh, Town Of	360627	Newburgh	8/28/2011	1238.42	0.00	0.00
Newburgh, Town Of	360627	Breakahon Ny	4/4/1987	5718.74	0.00	0.00
Newburgh, Town Of	360627	Newburgh	2/3/1982	451.06	0.00	0.00
Newburgh, Town Of	360627	Breakahon Ny	4/9/1980	4142.54	0.00	0.00
Newburgh, Town Of	360627	Newburg	3/21/1980	1070.00	0.00	0.00
Newburgh, Town Of	360627	Newburgh	2/24/1979	0.00	457.00	0.00
Newburgh, Town Of	360627	Newburgh	2/15/1979	1400.00	0.00	0.00
Newburgh, Town Of	360627	Newburgh	1/21/1979	0.00	379.20	0.00
Newburgh, Town Of	360627	Newburgh	1/21/1979	215.57	87.75	0.00
Port Jervis, City Of	360976	Port Jervis	9/9/2011	2025.09	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	44437.28	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	18806.03	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	10/14/2005	21957.97	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/2/2005	10436.95	1020.48	0.00
Port Jervis, City Of	360976	Port Jervis	8/28/2011	9567.06	123.20	0.00
Port Jervis, City Of	360976	Port Jervis	8/28/2011	7876.77	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	8/28/2011	6135.92	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	8/28/2011	5998.11	929.97	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	6445.29	0.00	0.00
Port Jervis, City Of	360976	Port Jarvis	6/28/2006	8145.55	189.02	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	6743.01	1126.17	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Port Jervis, City Of	360976	Port Jervis	4/3/2005	15336.54	0.00	0.00
Port Jervis, City Of	360976	Port Jarvis	4/3/2005	10333.28	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	5556.31	1345.86	0.00
Port Jervis, City Of	360976	Port Jervis	4/2/2005	12926.93	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/2/2005	14424.36	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/2/2005	8309.46	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	9/18/2004	42400.00	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	9/18/2004	3014.82	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	7/8/1996	5139.47	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	1/20/1996	735.99	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	8/28/2011	10755.48	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	3/22/2010	4467.07	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	7257.80	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	16340.98	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	8127.08	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	2694.11	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	14509.44	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	19626.01	605.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	7416.96	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	14085.23	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	4/3/2005	14428.91	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/2/2005	35628.48	5871.10	0.00
Port Jervis, City Of	360976	Port Jervis	4/2/2005	27908.29	9721.25	0.00
Port Jervis, City Of	360976	Port Jervis	4/2/2005	21812.32	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/2/2005	15424.26	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	8/28/2011	865.62	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	4155.68	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	1871.26	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	4/3/2005	39896.73	39257.70	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	9380.87	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Port Jervis, City Of	360976	Port Jervis	4/3/2005	2739.10	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	9/18/2004	22107.08	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	10598.71	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	9/8/2011	7755.64	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	9093.57	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	7572.13	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	850.78	425.57	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	5111.68	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	6/28/2006	5641.96	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	6/28/2006	7653.73	9892.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	15639.69	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	8668.18	1013.22	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	5333.45	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	4303.99	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	3468.71	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	4593.53	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	13617.20	850.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	50312.61	5772.71	0.00
Port Jervis, City Of	360976	Pt Jervis	4/3/2005	54841.98	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	10878.19	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	11254.41	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	9/18/2004	11906.48	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	1/9/1996	4215.63	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	1/9/1996	521.99	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	8/28/2011	404.93	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	6/28/2006	10539.33	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	4/3/2005	4992.11	22.26	0.00
Port Jervis, City Of	360976	Pt Jervis	4/3/2005	3742.90	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	4/3/2005	12849.72	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/3/2005	14071.60	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Port Jervis, City Of	360976	Pt Jervis	4/3/2005	14135.98	0.00	0.00
Port Jervis, City Of	360976	Port Jervis	4/2/2005	26200.00	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	9/18/2004	573.70	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	1/19/1996	455.96	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	1/13/1996	3841.74	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	4/5/1984	2601.56	0.00	0.00
Port Jervis, City Of	360976	Port Jarvis	4/5/1984	0.00	21000.00	0.00
Port Jervis, City Of	360976	Sparrowbush	4/16/1983	1000.00	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	0.00	5000.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	4087.50	2794.05	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	11000.00	8000.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	6600.00	3000.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	6100.00	9200.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	5601.80	3621.84	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	737.35	0.00	0.00
Port Jervis, City Of	360976	Pt Jerico	2/12/1981	3600.00	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	10000.00	10000.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	4746.18	5000.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	30300.00	25000.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	6722.63	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	11723.00	8500.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	20034.00	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	13840.46	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	7607.59	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	7300.00	4000.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	340.00	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	18050.00	6941.04	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	10000.00	4000.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	6700.00	5000.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	18200.00	1100.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	7400.00	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	7400.00	5300.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	10174.73	10000.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/12/1981	4232.73	5000.00	0.00
Port Jervis, City Of	360976	Pt Jerus	2/11/1981	3247.73	0.00	0.00
Port Jervis, City Of	360976	Pt Jervis	2/11/1981	4140.00	10000.00	0.00
Port Jervis, City Of	360976	Huntington	4/7/1980	0.00	325.00	0.00
Port Jervis, City Of	360976	Pt Jervis	1/24/1978	102.00	0.00	0.00
South Blooming Grove, Village Of	360194	Monroe	8/28/2011	22993.26	0.00	0.00
South Blooming Grove, Village Of	360194	Monroe	8/28/2011	1843.72	0.00	0.00
South Blooming Grove, Village Of	360194	Monroe	8/28/2011	6646.93	0.00	0.00
Tuxedo Park, Village Of	361595	Tuxedo Park	10/29/2012	3479.46	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	8/28/2011	78500.00	5900.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	8/28/2011	84530.39	50625.43	0.00
Tuxedo, Town Of	360631	Tuxedo Park	3/13/2010	5241.43	2411.06	0.00
Tuxedo, Town Of	360631	Tuxedo Park	4/16/2007	884.31	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	8/15/2005	236.94	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	9/16/1999	1182.28	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	8/27/2011	39154.17	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	3/13/2010	2169.07	275.93	0.00
Tuxedo, Town Of	360631	Tuxedo Park	3/13/2010	5544.30	171.98	0.00
Tuxedo, Town Of	360631	Tuxedo Park	4/15/2007	6634.34	2091.99	0.00
Tuxedo, Town Of	360631	Tuxedo	8/28/2011	7645.95	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo	8/28/2011	13673.31	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	8/28/2011	49314.30	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo	8/28/2011	18987.60	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	3/14/2010	59000.76	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Tuxedo, Town Of	360631	Tuxedo	3/14/2010	36742.52	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo	9/17/1999	2308.47	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	8/28/2011	109278.51	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	3/13/2010	8105.64	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	9/16/1999	6043.78	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	9/16/1999	110.98	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Park	8/28/2011	23788.96	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo	8/28/2011	220000.00	105000.00	0.00
Tuxedo, Town Of	360631	Tuxedo	4/16/2007	99132.14	57975.98	0.00
Tuxedo, Town Of	360631	Tuxedo	9/16/1999	63898.64	83417.12	0.00
Tuxedo, Town Of	360631	Tuxedo	4/5/1984	815.66	0.00	0.00
Tuxedo, Town Of	360631	Tuxedo Ny 10987	4/5/1984	40956.99	10000.00	0.00
Tuxedo, Town Of	360631	Tuxedo	4/5/1984	4711.89	2917.30	0.00
Tuxedo, Town Of	360631	Tuxedo	12/16/1983	520.90	0.00	0.00
Unionville, Village Of	360633	Washingtonville	8/28/2011	23100.00	4200.00	0.00
Unionville, Village Of	360633	Washingtonville	4/15/2007	14400.00	355.00	0.00
Unionville, Village Of	360633	Washingtonville	1/19/1996	200.52	1582.70	0.00
Unionville, Village Of	360633	Unionville	9/8/2011	40561.53	0.00	0.00
Unionville, Village Of	360633	Unionville	8/29/2011	9174.98	0.00	0.00
Walden, Village Of	360635	Walden	9/8/2011	9405.00	0.00	0.00
Walden, Village Of	360635	Walden	8/19/1991	28908.87	0.00	0.00
Walden, Village Of	360635	Walden	8/28/2011	13607.65	0.00	0.00
Walden, Village Of	360635	Walden	3/21/1980	2100.00	0.00	0.00
Wallkill, Town Of	360634	Middletown	8/28/2011	1792.84	0.00	0.00
Wallkill, Town Of	360634	Middletown	8/27/2011	27700.00	11200.00	0.00
Wallkill, Town Of	360634	Middletown	3/10/2011	2179.90	0.00	0.00
Wallkill, Town Of	360634	Middletown	3/3/2008	5832.41	283.72	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Wallkill, Town Of	360634	Middletown	4/15/2007	3469.28	183.62	0.00
Wallkill, Town Of	360634	Middletown	10/14/2005	6064.58	0.00	0.00
Wallkill, Town Of	360634	Middletown	4/2/2005	13369.87	2619.92	0.00
Wallkill, Town Of	360634	Middletown	10/29/2012	3850.93	0.00	0.00
Wallkill, Town Of	360634	Middletown	8/27/2011	18058.63	0.00	0.00
Wallkill, Town Of	360634	Middletown	8/9/2013	564.19	0.00	0.00
Wallkill, Town Of	360634	Middletown	8/9/2013	8702.50	3601.18	0.00
Wallkill, Town Of	360634	Middletown	8/28/2011	986.96	0.00	0.00
Wallkill, Town Of	360634	Middletown	9/17/2011	11661.54	2844.37	0.00
Wallkill, Town Of	360634	Middletown	9/7/2011	2312.61	0.00	0.00
Wallkill, Town Of	360634	Middletown	9/7/2011	4287.02	0.00	0.00
Wallkill, Town Of	360634	Middletown	8/28/2011	1418.18	0.00	0.00
Wallkill, Town Of	360634	Middletown	3/31/2010	8134.72	2115.65	0.00
Wallkill, Town Of	360634	Middletown	10/30/2012	30824.06	50000.00	0.00
Wallkill, Town Of	360634	Middletown	8/28/2011	5516.83	0.00	0.00
Wallkill, Town Of	360634	Middletown	8/28/2011	8713.39	0.00	0.00
Wallkill, Town Of	360634	Middletown	8/28/2011	19931.19	18602.01	0.00
Wallkill, Town Of	360634	Middletown	4/15/2007	5452.65	0.00	0.00
Wallkill, Town Of	360634	Middletown	6/28/2006	2284.49	0.00	0.00
Wallkill, Town Of	360634	Middletown	10/9/2005	25181.38	1098.43	0.00
Wallkill, Town Of	360634	Middletown	8/28/2011	60549.38	0.00	0.00
Wallkill, Town Of	360634	Middletown	4/18/2007	14644.27	0.00	0.00
Wallkill, Town Of	360634	Middletown	8/2/2013	16632.61	0.00	0.00
Wallkill, Town Of	360634	Middletown	8/9/2013	3922.38	0.00	0.00
Wallkill, Town Of	360634	Middletown	8/7/2000	1361.77	0.00	0.00
Wallkill, Town Of	360634	Middletown	8/28/2011	3198.49	520.75	0.00
Wallkill, Town Of	360634	Middletown	8/28/2011	18917.34	0.00	0.00
Wallkill, Town Of	360634	Middletown	4/15/2007	5995.96	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Wallkill, Town Of	360634	Middletown	4/2/2005	11414.19	0.00	0.00
Wallkill, Town Of	360634	Circleville	4/5/1984	522.25	0.00	0.00
Wallkill, Town Of	360634	Circleville	4/5/1984	400.00	0.00	0.00
Wallkill, Town Of	360634	Circleville	4/17/1983	2107.98	0.00	0.00
Wallkill, Town Of	360634	Circleville	4/16/1983	982.46	2100.00	0.00
Wallkill, Town Of	360634	Middletown	2/3/1982	246.15	0.00	0.00
Wallkill, Town Of	360634	Middletown	3/22/1980	117.73	127.86	0.00
Wallkill, Town Of	360634	Walkill	9/6/1979	330.81	0.00	0.00
Wallkill, Town Of	360634	Warwick	9/6/1979	0.00	158.00	0.00
Wallkill, Town Of	360634	Middletown	1/26/1978	860.64	0.00	0.00
Warwick, Town Of	360636	Warwick	9/16/1999	3254.55	0.00	0.00
Warwick, Town Of	360636	Warwick	8/28/2011	3495.77	0.00	0.00
Warwick, Town Of	360636	Greenwood Lake	8/28/2011	30357.98	617.78	0.00
Warwick, Town Of	360636	Greenwood Lake	8/28/2011	13901.95	0.00	0.00
Warwick, Town Of	360636	Greenwood Lake	8/28/2011	43136.50	13641.89	0.00
Warwick, Town Of	360636	Pine Island	8/28/2011	7266.54	0.00	0.00
Warwick, Town Of	360636	Warwick	8/28/2011	12851.19	0.00	0.00
Warwick, Town Of	360636	Warwick	1/27/1996	793.50	0.00	0.00
Warwick, Town Of	360636	Warwick	8/28/2011	13322.05	855.02	0.00
Warwick, Town Of	360636	Greenwood Lake	8/28/2011	14206.63	0.00	0.00
Warwick, Town Of	360636	Greenwood Lake	8/28/2011	6108.23	418.68	0.00
Warwick, Town Of	360636	Washingtonville	8/28/2011	47295.37	0.00	0.00
Warwick, Town Of	360636	New Milford	8/28/2011	22202.51	5362.35	0.00
Warwick, Town Of	360636	Pine Island	4/3/2005	60.41	490.00	0.00
Warwick, Town Of	360636	Warwick	4/3/2005	1025.97	0.00	0.00
Warwick, Town Of	360636	Warwick	1/9/1996	243.98	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Warwick, Town Of	360636	Warwick	1/9/1996	1302.85	0.00	0.00
Warwick, Town Of	360636	New Milford	8/28/2011	7785.97	445.69	0.00
Warwick, Town Of	360636	Greenwood Lake	8/28/2011	1436.96	0.00	0.00
Warwick, Town Of	360636	Greenwood Lk	8/28/2011	8307.93	0.00	0.00
Warwick, Town Of	360636	New Milford	4/2/2005	4989.94	0.00	0.00
Warwick, Town Of	360636	Greenwood Lks	4/4/1987	620.80	0.00	0.00
Warwick, Town Of	360636	Warwick	4/5/1984	938.00	0.00	0.00
Warwick, Town Of	360636	Greenwood Lake	4/5/1984	326.00	25.00	0.00
Warwick, Town Of	360636	Warwick	4/5/1984	0.00	4592.55	0.00
Warwick, Town Of	360636	Warwick	4/5/1984	2468.28	0.00	0.00
Warwick, Town Of	360636	Orange Co Ny	4/4/1984	854.69	0.00	0.00
Warwick, Town Of	360636	Orange City	4/4/1984	854.69	0.00	0.00
Warwick, Town Of	360636	Greenwood Lk	12/13/1983	0.00	785.00	0.00
Warwick, Town Of	360636	Greenwood Lk	3/21/1980	2620.00	1600.00	0.00
Warwick, Town Of	360636	Greenwood Lk	3/21/1980	3651.00	1000.00	0.00
Warwick, Town Of	360636	Warwick	3/21/1980	0.00	1355.88	0.00
Warwick, Town Of	360636	Monroe	3/20/1980	0.00	1450.00	0.00
Warwick, Town Of	360636	Orange Co Ny	9/6/1979	360.00	0.00	0.00
Warwick, Town Of	360636	Warwick	9/6/1979	0.00	137.74	0.00
Warwick, Town Of	360636	Warwick	9/6/1979	1995.00	0.00	0.00
Warwick, Town Of	360636	Bellvale	9/6/1979	844.00	230.00	0.00
Warwick, Town Of	360636	Warwick	1/21/1979	170.00	0.00	0.00
Warwick, Town Of	360636	Warwick	11/8/1977	666.90	0.00	0.00
Warwick, Village Of	360637	Warwick	8/28/2011	5080.71	0.00	0.00
Warwick, Village Of	360637	Warwick	8/28/2011	67900.88	0.00	0.00
Warwick, Village Of	360637	Warwick	8/28/2011	0.00	11917.30	0.00
Warwick, Village Of	360637	Warwick	8/28/2011	39712.59	0.00	0.00
Warwick, Village Of	360637	Warwick	8/28/2011	18000.00	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Warwick, Village Of	360637	Warwick	8/29/2011	61932.35	0.00	0.00
Warwick, Village Of	360637	Warwick	8/27/2011	24116.03	0.00	0.00
Warwick, Village Of	360637	Warwick	3/14/2010	8654.78	0.00	0.00
Warwick, Village Of	360637	Warwick	3/22/1999	1525.44	400.00	0.00
Warwick, Village Of	360637	Warwick	9/1/2011	19289.48	0.00	0.00
Warwick, Village Of	360637	Warwick	8/28/2011	1618.22	0.00	0.00
Warwick, Village Of	360637	Warwick	8/28/2011	7981.01	0.00	0.00
Warwick, Village Of	360637	Warwick	8/27/2011	4947.64	0.00	0.00
Warwick, Village Of	360637	Warwick	3/14/2011	1882.66	0.00	0.00
Warwick, Village Of	360637	Warwick	3/13/2010	11964.36	0.00	0.00
Warwick, Village Of	360637	Warwick	4/16/2007	1051.54	0.00	0.00
Warwick, Village Of	360637	Warwick	4/16/2007	8583.52	0.00	0.00
Warwick, Village Of	360637	Warwick	10/14/2005	4813.62	0.00	0.00
Warwick, Village Of	360637	Warwick	4/3/2005	13693.38	0.00	0.00
Warwick, Village Of	360637	Warwick	4/3/2005	17252.71	0.00	0.00
Warwick, Village Of	360637	Warwick	8/28/2011	766.58	0.00	0.00
Warwick, Village Of	360637	Warwick	3/14/2010	4289.47	0.00	0.00
Warwick, Village Of	360637	Warwick	4/15/2007	4916.13	943.21	0.00
Warwick, Village Of	360637	Warwick	10/12/2005	6019.51	2120.20	0.00
Warwick, Village Of	360637	Warwick	9/4/2004	1146.28	0.00	0.00
Warwick, Village Of	360637	Warwick	10/31/2011	1988.04	0.00	0.00
Warwick, Village Of	360637	Warwick	8/28/2011	20834.86	0.00	0.00
Warwick, Village Of	360637	Warwick	1/19/1996	6890.02	7170.39	0.00
Warwick, Village Of	360637	Warwick	5/17/1989	0.00	5328.85	0.00
Warwick, Village Of	360637	Monroe	3/21/1980	0.00	106.00	0.00
Warwick, Village Of	360637	Warwick	1/24/1979	261.00	507.60	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	10665.68	14565.42	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonville	4/20/2007	3989.99	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	40748.92	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/15/2007	19354.00	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/29/2011	88329.88	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	75475.35	75152.17	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	15000.00	0.00	0.00
Washingtonville, Village Of	360638	Blooming Grove	8/28/2011	26706.49	1331.20	0.00
Washingtonville, Village Of	360638	Blooming Grove	8/28/2011	18177.92	4102.07	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	19472.45	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	37232.12	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/16/2007	8179.94	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	38226.30	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvle	4/15/2007	1115.03	1307.15	0.00
Washingtonville, Village Of	360638	Washingtonville	4/15/2007	18388.97	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/29/2011	89209.07	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	15716.83	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	8951.51	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	29321.61	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	19070.71	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	15370.73	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	30000.00	5737.42	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	24234.01	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	4284.08	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	65313.28	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	66499.12	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/27/2011	37667.08	396.09	0.00
Washingtonville, Village Of	360638	Washingtonville	3/7/2011	1671.54	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	3/13/2010	11017.53	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	12/12/2008	320.25	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	3/8/2008	13489.41	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/16/2007	4804.75	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/16/2007	30928.67	12200.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/16/2007	17549.52	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/16/2007	2006.33	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/16/2007	22219.47	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/16/2007	10813.08	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonville	10/13/2005	11404.02	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/2/2005	336.04	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/2/2005	3516.27	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	9/16/1999	7845.65	0.00	0.00
Washingtonville, Village Of	360638	New York	9/16/1999	34280.69	18900.00	0.00
Washingtonville, Village Of	360638	Washingtonville	9/16/1999	27986.66	10000.00	0.00
Washingtonville, Village Of	360638	Washingtonville	9/16/1999	11647.13	3655.80	0.00
Washingtonville, Village Of	360638	New York	5/11/1998	19327.16	993.88	0.00
Washingtonville, Village Of	360638	Washingtonville	5/10/1998	2663.00	0.00	0.00
Washingtonville, Village Of	360638	New York	7/13/1996	17460.08	2875.07	0.00
Washingtonville, Village Of	360638	Washingtonville	7/13/1996	2498.66	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	1/21/1996	0.00	895.20	0.00
Washingtonville, Village Of	360638	Washingtonville	1/19/1996	13207.13	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	1/19/1996	275.86	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	1/19/1996	12134.74	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	1/19/1996	8868.76	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	1/19/1996	1230.49	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	1/19/1996	7853.03	4108.04	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonville	1/13/1996	2272.19	5150.00	0.00
Washingtonville, Village Of	360638	New York	3/28/1993	14771.17	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	3/3/1993	11051.14	0.00	0.00
Washingtonville, Village Of	360638	New York	5/15/1989	8338.38	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/29/2011	25500.00	9300.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	22470.02	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	31258.95	26734.36	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	38698.82	37236.72	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	15304.59	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	57362.26	11613.20	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	13707.85	11883.86	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	64998.62	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	17127.98	4527.72	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	37223.30	12200.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	22916.25	10000.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	26014.66	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	50847.14	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/27/2011	44801.02	33656.60	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonvill e	3/14/2010	65259.72	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	3/13/2010	4180.23	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	3/13/2010	5852.36	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/16/2007	37582.70	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/16/2007	0.00	509.98	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/16/2007	6856.16	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/15/2007	10773.67	5372.57	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/15/2007	2926.40	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/3/2005	17794.24	4692.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	7/11/1989	0.00	456.25	0.00
Washingtonville, Village Of	360638	Washingtonvill e	5/16/1989	0.00	1168.34	0.00
Washingtonville, Village Of	360638	Washingtonvill e	5/16/1989	2196.52	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	8/28/2011	35092.32	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	10/13/200 5	9200.06	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/2/2005	14350.86	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	8/28/2011	49589.24	3496.53	0.00
Washingtonville, Village Of	360638	Washingtonvill e	8/28/2011	7087.97	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	8/28/2011	25185.16	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonvill e	8/27/2011	92018.09	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	8/27/2011	13813.48	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/15/2007	6432.94	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	10/14/200 5	11410.77	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	1/19/1996	0.00	1067.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	8/29/2011	18554.59	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	8/28/2011	27976.36	16635.12	0.00
Washingtonville, Village Of	360638	Washingtonvill e	8/28/2011	11202.17	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	8/28/2011	18829.61	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	8/28/2011	115847.94	25500.00	30000.0 0
Washingtonville, Village Of	360638	Washingtonvill e	8/28/2011	14394.77	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	8/28/2011	11497.24	1304.07	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/16/2007	7689.89	1412.33	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/16/2007	8214.97	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/16/2007	51161.64	25500.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/15/2007	3326.01	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	4/5/1987	719.60	127.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	8/28/2011	17874.83	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonvle	3/15/2010	5391.87	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	3/14/2010	1354.47	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvle	3/14/2010	1081.42	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvle	3/12/2010	6539.51	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvle	4/17/2007	5841.35	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvle	4/17/2007	3402.23	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/16/2007	866.37	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvle	4/16/2007	4686.39	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvle	4/16/2007	5818.06	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvle	4/16/2007	2469.76	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvle	4/16/2007	7992.91	372.18	0.00
Washingtonville, Village Of	360638	Washingtonvle	4/16/2007	7778.97	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvle	4/15/2007	18874.45	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	9/16/1999	16272.15	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	9/16/1999	7360.97	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	1/18/1996	1424.72	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	1/9/1996	7629.72	1892.20	0.00
Washingtonville, Village Of	360638	Washingtonville	1/9/1996	481.55	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonville	1/9/1996	15888.54	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	1/9/1996	544.95	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	1/9/1996	4012.47	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	1/9/1996	0.00	2776.89	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	45831.45	15258.43	0.00
Washingtonville, Village Of	360638	Washingtonville	8/29/2011	8070.34	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	3/13/2010	1335.33	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/15/2007	12084.88	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	9/16/1999	14854.71	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	1/19/1996	14606.55	10000.00	0.00
Washingtonville, Village Of	360638	Washingtonville	9/16/1999	12242.38	11263.03	0.00
Washingtonville, Village Of	360638	Washingtonville	1/19/1996	29532.88	16700.00	0.00
Washingtonville, Village Of	360638	Washingtonville	10/29/2012	29936.53	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	9/8/2011	9662.50	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	15587.78	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	16591.79	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	8902.15	2092.40	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	36319.36	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonvle	8/28/2011	58700.47	35635.67	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	117463.25	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	36693.96	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	53669.94	11403.45	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	26662.12	10331.94	0.00
Washingtonville, Village Of	360638	Washingtonvle	8/28/2011	45242.78	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	22097.74	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	31565.40	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	119271.45	30280.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/28/2011	76164.87	17400.00	0.00
Washingtonville, Village Of	360638	Washingtonville	8/27/2011	13144.75	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	3/7/2011	11300.62	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvle	3/7/2011	5300.96	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	3/7/2011	22644.79	431.66	0.00
Washingtonville, Village Of	360638	Washingtonville	3/7/2011	16068.01	2488.15	0.00
Washingtonville, Village Of	360638	Washingtonville	3/14/2010	5407.09	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	3/13/2010	5081.68	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	12/12/2008	8326.88	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonville	12/12/2008	3069.45	2437.70	0.00
Washingtonville, Village Of	360638	Washingtonville	3/10/2008	13351.52	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	3/8/2008	18436.43	4157.91	0.00
Washingtonville, Village Of	360638	Washingtonville	4/16/2007	6577.51	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/16/2007	7940.30	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/16/2007	133457.56	22900.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/15/2007	82132.44	16600.00	0.00
Washingtonville, Village Of	360638	Washingtonville	10/12/2005	8761.14	2993.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/3/2005	7467.05	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/2/2005	7500.00	848.66	0.00
Washingtonville, Village Of	360638	Washingtonville	4/2/2005	699.16	3864.05	0.00
Washingtonville, Village Of	360638	Washingtonville	1/14/2005	6452.67	1162.32	0.00
Washingtonville, Village Of	360638	Washingtonville	1/14/2005	6095.69	143.91	0.00
Washingtonville, Village Of	360638	Washingtonville	12/11/2003	20267.36	171.17	0.00
Washingtonville, Village Of	360638	Washingtonville	12/11/2003	820.88	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	9/16/1999	2623.62	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	9/16/1999	5227.17	198.70	0.00
Washingtonville, Village Of	360638	Washingtonville	1/21/1996	9752.38	0.89	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonville	4/4/1987	1558.73	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/4/1987	3191.70	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/4/1987	0.00	1155.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/4/1987	0.00	1277.83	0.00
Washingtonville, Village Of	360638	Monroe	4/4/1987	2626.35	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/4/1987	1576.24	1254.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/5/1984	4983.91	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/5/1984	270.95	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/5/1984	62.13	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/5/1984	495.49	757.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/5/1984	0.00	2966.60	0.00
Washingtonville, Village Of	360638	Washingtonville	4/5/1984	0.00	1034.75	0.00
Washingtonville, Village Of	360638	Washingtonville	4/5/1984	0.00	630.92	0.00
Washingtonville, Village Of	360638	Washingtonville	4/5/1984	1020.00	900.00	0.00
Washingtonville, Village Of	360638	Washingtonville	4/5/1984	4008.90	545.00	0.00
Washingtonville, Village Of	360638	Washingtonvil	4/5/1984	1727.30	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	3/29/1984	932.35	0.00	0.00
Washingtonville, Village Of	360638	Washingtonville	5/12/1981	1359.44	2329.80	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonvill e	3/21/1980	0.00	1337.82	0.00
Washingtonville, Village Of	360638	Washingtonvill e	3/21/1980	0.00	3299.05	0.00
Washingtonville, Village Of	360638	Washingtonvill e	3/21/1980	4748.22	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	3/21/1980	364.98	293.00	0.00
Washingtonville, Village Of	360638	Monroe	9/6/1979	1306.80	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	9/6/1979	0.00	630.50	0.00
Washingtonville, Village Of	360638	Washingtonvill e	6/2/1979	2636.00	2065.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	1/25/1979	3431.68	2102.65	0.00
Washingtonville, Village Of	360638	Washingtonvill e	1/24/1979	219.80	93.60	0.00
Washingtonville, Village Of	360638	Washingtonvill e	1/24/1979	0.00	11497.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	1/24/1979	372.81	0.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	1/24/1979	0.00	2498.50	0.00
Washingtonville, Village Of	360638	Washingtonvill e	1/24/1979	1311.82	3627.03	0.00
Washingtonville, Village Of	360638	Washingtonvil	1/24/1979	4665.29	3722.35	0.00
Washingtonville, Village Of	360638	Washingtonvil	1/24/1979	3312.58	3244.33	0.00
Washingtonville, Village Of	360638	Washingtonvill e	1/21/1979	0.00	1655.00	0.00
Washingtonville, Village Of	360638	Washingtonvill e	11/8/1977	1350.00	1650.00	0.00
Washingtonville, Village Of	360638	Washingtonvil	11/8/1977	4700.00	3800.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Washingtonville, Village Of	360638	Washingtonvil	11/8/1977	4682.60	1802.85	0.00
Wawayanda, Town Of	360639	Slate Hill	4/15/2007	3925.67	0.00	0.00
Wawayanda, Town Of	360639	Slate Hill	6/28/2006	785.85	0.00	0.00
Wawayanda, Town Of	360639	Middletown	8/28/2011	1937.19	0.00	0.00
Wawayanda, Town Of	360639	New Hampton	4/16/2007	1137.92	0.00	0.00
Wawayanda, Town Of	360639	Slate Hill	6/28/2006	9788.23	908.05	0.00
Wawayanda, Town Of	360639	Slate Hill	8/29/2011	28263.97	0.00	0.00
Wawayanda, Town Of	360639	Middletown	8/28/2011	8386.62	0.00	0.00
Wawayanda, Town Of	360639	Middletown	8/28/2011	35172.64	21822.57	0.00
Wawayanda, Town Of	360639	Middletown	3/27/1978	0.00	470.00	0.00
Wawayanda, Town Of	360639	Middletown	11/8/1977	0.00	1650.00	0.00
Woodbury, Village Of	360640	Central Valley	8/28/2011	6597.27	0.00	0.00
Woodbury, Village Of	360640	Monroe	8/28/2011	131969.41	0.00	0.00
Woodbury, Village Of	360640	Highland Mills	11/1/2012	8135.28	609.48	0.00
Woodbury, Village Of	360640	Central Valley	8/28/2011	12464.15	0.00	0.00
Woodbury, Village Of	360640	Central Valley	8/28/2011	8539.09	0.00	0.00
Woodbury, Village Of	360640	Highland Mills	8/28/2011	6905.27	0.00	0.00
Woodbury, Village Of	360640	Central Valley	8/27/2011	6110.16	0.00	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Woodbury, Village Of	360640	Highland Mills	8/15/2011	2046.19	0.00	0.00
Woodbury, Village Of	360640	Woodbury	6/25/2012	13874.47	0.00	0.00
Woodbury, Village Of	360640	Central Valley	8/28/2011	42965.47	57387.25	0.00
Woodbury, Village Of	360640	Highland Mls	8/28/2011	25165.99	0.00	0.00
Woodbury, Village Of	360640	Highland Mills	9/16/1999	7776.44	4530.50	0.00
Woodbury, Village Of	360640	Highland Mills	10/29/2012	17774.62	0.00	0.00
Woodbury, Village Of	360640	Highland Mills	8/28/2011	47746.19	0.00	0.00
Woodbury, Village Of	360640	Highland Mills	12/12/2008	2170.12	0.00	0.00
Woodbury, Village Of	360640	Highland Mills	9/17/1999	5348.15	1995.76	0.00
Woodbury, Village Of	360640	Highland Mills	8/28/2011	34522.25	10608.60	0.00
Woodbury, Village Of	360640	Highland Mills	8/28/2011	38154.32	2786.78	0.00
Woodbury, Village Of	360640	Highland Mills	8/28/2011	23542.44	0.00	0.00
Woodbury, Village Of	360640	Highland Mills	8/28/2011	17698.75	2885.80	0.00
Woodbury, Village Of	360640	Central Vly	8/28/2011	10847.99	0.00	0.00
Woodbury, Village Of	360640	Central Vly	8/28/2011	6057.53	0.00	0.00
Woodbury, Village Of	360640	Woodbury	10/20/1989	0.00	808.00	0.00
Woodbury, Village Of	360640	Monroe	4/4/1987	2116.96	0.00	0.00
Woodbury, Village Of	360640	Monroe	4/5/1984	897.23	769.06	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Woodbury, Village Of	360640	Central Vly	3/20/1983	360.94	0.00	0.00
Woodbury, Village Of	360640	Highland Mills	3/20/1983	345.20	373.45	0.00
Woodbury, Village Of	360640	Woodbury	10/27/1981	0.00	1940.00	0.00
Woodbury, Village Of	360640	Woodbury	4/28/1980	891.43	1393.00	0.00
Woodbury, Village Of	360640	Highland Mills	3/21/1980	564.16	50.84	0.00
Woodbury, Village Of	360640	Highland Mills	3/21/1980	0.00	57.64	0.00
Woodbury, Village Of	360640	Woodbury	9/15/1979	79.24	0.00	0.00
Woodbury, Village Of	360640	Highland Mills	9/6/1979	7.12	0.00	0.00
Woodbury, Village Of	360640	Highland Mills	9/6/1979	800.00	1000.00	0.00
Woodbury, Village Of	360640	Woodbury	8/12/1979	2175.77	2025.00	0.00
Woodbury, Village Of	360640	Highland	5/24/1979	167.60	0.00	0.00
Woodbury, Village Of	360640	New Windsor	1/24/1979	0.00	40.00	0.00
Woodbury, Village Of	360640	Ctl Vly	1/24/1979	246.58	0.00	0.00
Woodbury, Village Of	360640	Central Vly	1/24/1979	230.56	185.64	0.00
Woodbury, Village Of	360640	Highland Mills	1/24/1979	41.38	0.00	0.00
Woodbury, Village Of	360640	Highland Mills	1/24/1979	2.80	546.37	0.00
Woodbury, Village Of	360640	Woodbury	1/21/1979	1200.00	0.00	0.00
Woodbury, Village Of	360640	Woodbury	8/12/1978	0.00	2658.52	0.00

Community Name	CID	Jurisdiction	Date of Loss	Building Pay	CONT Pay	Pay ICC
Woodbury, Village Of	360640	Highland Mills	2/1/1978	0.00	640.00	0.00
Woodbury, Village Of	360640	Woodbury	1/26/1978	0.00	2000.00	0.00

REPETITIVE AND SEVERE REPETITIVE LOSSES

FEMA defines a Repetitive Loss (RL) property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period since 1978. A Severe Repetitive Loss (SRL) property is a property that has received four or more separate claim payments exceeding $5,000 each, or two or more separate flood insurance claims where the total payment for the building is greater than the property's current value.

FLOOD DISASTER DECLARATIONS

According to MitigateNY, Orange County has experienced eight Presidential Disaster Declarations that included flooding. Table 17 summarizes the occurrence and causes of these disaster declarations, including total damages (where recorded) and which form of post-disaster assistance the County became eligible for after the declaration.

Through the Public Assistance (PA) Program, FEMA provides supplemental federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Non-Profit (PNP) organizations. The Individual Assistance (IA) Program provides money or other direct assistance to individuals and families in areas whose property has been damaged or destroyed and whose losses are not covered by insurance. It is meant to assist with critical expenses that cannot be covered in other ways, rather than to restore damaged property to its condition before the disaster.

Table 17: Orange County Declared Disaster Events[173]

Year	Disaster Number	Estimated Damages
2021	Remnants of Hurricane Ida (4615)	$10,000,000
2012	Hurricane Sandy (4085)	$179,576,445
2011	Remnants of Tropical Storm Lee (4031)*	$6,300,000
2011	Remnants of Tropical Storm Lee (4031)*	$6,401,909
2011	Hurricane Irene (4020)	$98,471,581

[173] MitigateNY. Flood – Hazard History. https://hazardmitigation.ny.gov/hazards_of_concern/flood/flood_hazard_history.

Year	Disaster Number	Estimated Damages
2007	Severe Storms and Inland and Coastal Flooding (1692)	$9,008,067
2005	Severe Storms and Flooding (1589)	$11,621,155
2004	Severe Storms and Flooding (1564)	$4,000,000
**Two events with the same name/date listed on MitigateNY as-is*		

The NCEI Storm Events Database has recorded 150 events between January 1950 and November 2024. Since the last mitigation plan was updated in 2018, there have been 53 events reported across 11 days of flooding. These events resulted in estimated damages over $10 million, including $1 million in individual damages and $9 million in public assistance, due to remnants of Hurricane Ida. Table 18 presents selected significant flood events recorded for Orange County in the NCDC database for which some detailed information was available.

Table 18: Selected Flood Events in Orange County, 1993–2021[174]

Date	Affected Areas	Description	Reported Property Damage(2)
4/16/1993	Not recorded	Showers and thunderstorms deposited between 1 and 2 inches of rain across the area. Localized but significant urban flooding resulted from these torrential rains.	Not recorded
1/28/1994	Not recorded	Melting snow and heavy rains caused significant and widespread urban flooding. Many roads were closed for hours during this event. Numerous cars stalled attempting to cross some of these flooded roads and several drivers had to be rescued from their vehicles.	Not recorded
1/24/1996	Countywide	Orange County was among the counties in New York State that became eligible for Individual and Public Assistance under Federal Disaster Declaration DR-1095, which resulted from the occurrence of severe storms and flooding across the region. Sample county records from this event show post-disaster repairs of county roads at 32 locations with costs totaling almost $330,000. Other major post-disaster costs included in these records were $473,000 for repairs of the Delaware and Ohio Canal, $149,000 for the repair of a sewage pumping station, and $19,000 for debris removal at four locations.	$1.07 million

174 NOAA Storm Events Database, Orange County, New York. 2024. https://tinyurl.com/mr44a3xb.

Date	Affected Areas	Description	Reported Property Damage(2)
7/13/1996	New Windsor	As Tropical Storm Bertha moved northeast, passing east of Atlantic City, NJ, it produced torrential rain and strong gusty winds. The rain caused flooding of low-lying and poor-drainage areas, as well as streams and rivers across the area. The heaviest rain fell in a band to the northwest of Bertha's track over the Lower Hudson Valley. Measured rainfall totals in Orange County included 3.3 inches at Ridgebury and 4.5 inches at Greenwood Lake.	Not recorded
7/25/1996	Goshen, Washingtonville	Clusters of strong thunderstorms deposited from 2 to 4 inches of rain across central parts of Orange County. Torrential rain caused flash flooding of numerous roads, small streams, and basements throughout this area. Total rainfall of 4 inches was measured in Goshen, where significant basement flooding occurred.	Not recorded
9/8/1996	Port Jervis	Thunderstorms produced torrential rain that caused significant flash flooding of low-lying and poor-drainage areas, including many streets.	Not recorded
10/19/1996	Cornwall, Highland Falls	Heavy rains along with minor to major coastal flooding occurred. More than 3 inches of rain fell, with 3.5 inches measured at Port Jervis. The rain caused serious widespread street and poor-drainage flooding: Route 218 between Cornwall and Highland Falls was closed due to flooding.	Not recorded
5/10/1998	Monroe	With wet antecedent conditions during the previous 11 days, bands of heavy rainfall caused flash flooding. In Orange County, the police reported flooded basements and roads countywide, and a section of Route 17M in Monroe was closed by flooding.	Not recorded
5/31/1998	Countywide	Severe thunderstorms formed in lines and clusters moved over the Lower Hudson Valley. They produced high winds, large hail, torrential rain, and frequent lightning. Up to 6 inches of rain caused flash flooding of roads and basements across Orange County, resulting in $200K in property damage.	$200,000

Date	Affected Areas	Description	Reported Property Damage[2]
9/16/1999	Countywide	Torrential record rainfall, which caused serious widespread urban, small stream, and river flooding, preceded the remnants of Hurricane Floyd. Orange, Putnam, Rockland, and Westchester Counties were declared Disaster Areas. For these four counties, the damage estimates were $14.6 million. These figures represent eligible costs for disaster payments, and represent a "fraction" of the costs that were actually incurred. Serious widespread flooding of low-lying and poor-drainage areas resulted in the closure of many roads and basement flooding across the entire region. Several roads were closed due to flooding, and the Grove Drive Bridge in Tuxedo Park was overtopped by floodwaters.	$1.7 million
8/3/2000	Western and Northern Orange County	A slow-moving thunderstorm produced torrential rain. Radar-estimated rainfall rates of 2.5 to 3 inches per hour caused a creek in Deerpark to overflow and flood Peenpack Trail Road, just north of Port Jervis. A line of thunderstorms also produced torrential rain that caused localized flooding of low-lying and poor-drainage areas across northern Orange County.	Not recorded
9/1/2000	Cornwall, Highland Falls	Slow-moving thunderstorms produced periods of torrential rain that caused flash flooding of many low-lying and poor-drainage areas. Staff from *The Times Herald Record* reported significant serious street flooding along with some basement flooding in Cornwall. A spotter from New Windsor measured 2.75 inches of rainfall and National Weather Service radar estimated that up to 6 inches of rain fell in the vicinity of Highland Falls, where numerous reports of flash flooding were received. Ninety-four of 100 houses surveyed showed at least minor flood damage. There were many flash flooding reports of basements, low-lying and poor drainage areas, and small streams.	$500,000

Date	Affected Areas	Description	Reported Property Damage[2]
12/17/2000	Crawford, Port Jervis, Blooming Grove	Heavy rain caused significant flooding in Orange and Rockland counties. The axis of the heaviest rain extended from western New Jersey northeast across Orange County, where 3 to 4 inches of rain fell, mainly across western and northern Orange County. Widespread flash flooding of low-lying and poor-drainage areas occurred at several locations throughout Orange County, where rainfall amounts ranged from 2.11 inches at Gardnerville to 2.8 inches at Sterling Forest. In Pine Bush, 15 cars had to be moved when the back parking lot of the Schuyler Crossing Senior Citizen Complex flooded. In Port Jervis, flooding caused the closure of Jersey Avenue between Owen and Cole Streets. Serious flooding occurred in parts of Mountain Lodge Park in Blooming Grove, where some trails were partially washed away.	Not recorded
5/28/2002	New Windsor	Slow-moving clusters of heavy showers and thunderstorms produced widespread flash flooding of poor-drainage areas and streets in New Windsor.	Not recorded
8/22/2003	Harriman	Scattered showers and thunderstorms developed along a pre-frontal trough and moved east across the region, producing areas of torrential rain and resulting in flash flooding as well as wind damage from a severe thunderstorm. The Harriman Police Department reported significant street flooding and several knocked-down trees in Harriman.	Not recorded
8/11/2003	Goshen, Montgomery	Heavy showers developed from a persistent low-pressure trough. Radar estimated maximum rainfall rates of 2 to 3 inches per hour for three hours between Montgomery and Maybrook. The heavy rainfall resulted in street flooding in Goshen and along Interstate 84 in Montgomery.	Not recorded
9/23/2003	Goshen, Florida	Widespread, heavy rain of 1 to 2 inches created flooding problems across the Lower Hudson Valley, where several roads became impassable due to flooding and had to be at least partially closed. These included the Pine Island Turnpike in Orange County, which was partially washed out near Goshen and Florida.	Not recorded

Date	Affected Areas	Description	Reported Property Damage(2)
8/30/2004	Port Jervis, Deerpark	The remnants of a tropical system, combined with a stalled frontal boundary, ignited slow-moving thunderstorms over western Orange County for several hours. Radar estimates of rainfall rates reached as high as 3 to 5 inches per hour. The hardest-hit areas were Port Jervis and Deerpark, where flooding was severe enough to initiate states of emergencies. Houses were damaged, roads were destroyed, and buildings collapsed throughout western Orange County. Damage estimates were $2.2 million in public and $1.8 million in private property.	$4 million
9/8/2004	Deerpark	The remnants of Hurricane Frances produced torrential rainfall across southeastern New York. The rains caused flash flooding in areas of Cuddebackville including Deerpark Manor. Firefighters and other volunteers spent hours laying sandbags to protect homes from the floodwaters. Rainfall from 1 to 6 inches was common across the area, causing extensive flash flooding across the region and necessitating the rescue of people from homes and cars.	Not recorded
9/18/2004	Port Jervis	The remnants of Hurricane Ivan produced torrential rains across southeast New York. Storm total rainfall reports exceeded five inches in some areas. This caused extensive flash flooding of roads and highways across the region. The rains resulted in flash flooding on nearly all roads in Port Jervis, where a state of Emergency was declared by the Mayor.	Not recorded
4/2/2005	Port Jervis Deerpark	Widespread urban flooding was caused by heavy rain along with embedded heavy showers and thunderstorms. Most small streams and rivers overflowed their banks, and the Delaware River flooded in the Port Jervis-Deerpark area. The Orange County Division of Emergency Management reported 100 basements flooded ($1 million in damage) in Port Jervis and 160 houses damaged ($16 million) in Deerpark. Port Jervis officials issued a mandatory evacuation order for people living along the Delaware River. The Town of Deerpark was placed under a State of Emergency.	$17 million

Date	Affected Areas	Description	Reported Property Damage(2)
6/16/2005	Newburgh	Thunderstorms and torrential rain caused flash flooding that closed many roads in the Newburgh area. Some roads were inundated by 4 feet of water.	Not recorded
10/8/2005	Highlands, Highland Falls, Monroe	Heavy rain fell north of New York City and across the Lower Hudson Valley. The rain resulted in significant flooding of some rivers, most small brooks and streams, and throughout urban areas in low-lying and poor-drainage areas. More than 12 inches of rain was recorded at New Windsor. Spotters reported flash flooding of many roads throughout Orange County. A State of Emergency was declared for the Town of Highlands, where up to 4 feet of water covered Routes 293 and 9W.	Not recorded
10/28/2006	Middletown	Heavy rain caused flash flooding of urban areas with poor drainage, and numerous basements were flooded in Howells in the Town of Wallkill, where more than 2.5 inches of rain was recorded.	Not recorded
4/15/2007	Countywide	High winds, heavy rain, and high water tables produced widespread flooding across parts of the New York City region. Orange County rainfall ranged from 4.26 inches in Westtown to 8.00 inches at Cornwall. The Orange County Department of Emergency Services reported emergency declarations in the towns of Deerpark and Blooming Grove as well as in the villages of Washingtonville, Greenwood Lake, and South Blooming Grove. Many road closures were reported in the towns of Newburgh, Blooming Grove, Cornwall, Crawford, Deerpark, Wallkill, as well as in many other towns and villages throughout the county. Evacuations occurred in the towns of Woodbury, Tuxedo, Deerpark, and Washingtonville. Among the highways closed by flooding were County Roads 26, 53, and 67.	Not recorded
3/8/2008	Middletown, Washingtonville	Numerous flooded basements had to be pumped out in residential areas of Middletown and Washingtonville. Route 78 near Aspin Road/Wisner Avenue was also closed due to flooding.	Not recorded

Date	Affected Areas	Description	Reported Property Damage(2)
7/23/2008	Cornwall-on-Hudson	Torrential rainfall and flash flooding resulted from the combination of several waves of low pressure interacting with a tropical air mass. A car was submerged in water on Hudson Street (Rte. 218) in Cornwall on Hudson. A water rescue was performed by the local fire department.	Not recorded
8/11/2008	Warwick	An anomalous low-pressure system over southeast New York produced numerous thunderstorms with torrential rainfall that led to flash flooding in the Lower Hudson Valley. Main Street and Railroad Avenue in Warwick were impassable due to flooding.	Not recorded
9/6/2008	Cornwall	Periods of torrential rain from heavy showers and thunderstorms caused flash flooding in many locations, which included urban, small-stream and river flooding. Storm total rainfall ranged from 1.66 inches at Port Jervis to 5.92 inches at New City. State Highway 218 was closed in both directions between Cornwall and West Point due concerns that the heavy rain would cause rockslides.	Not recorded
7/26/2009	Goshen	A cluster of thunderstorms producing heavy rainfall moved across Orange County during the late evening hours, which resulted in flash flooding. Route 17 in Goshen was closed due to flooding.	Not recorded
8/12/2009	Cornwall-on-Hudson	Slow-moving thunderstorms developed in a tropical air mass, which caused very heavy rain and flash flooding in Orange County. All southbound lanes on NY 218 were closed between Cornwall-on-Hudson and West Point due to concerns that the heavy rain would cause rockslides.	Not recorded
3/7/2011	Tuxedo Park, Washingtonville	Several waves of low pressure tracked north along a slow-moving cold front that extended from the Gulf Coast to Maine. The combination of this slow-moving boundary and a sub-tropical moisture feed aided in the production of heavy rainfall that resulted in moderate to major flooding across portions of southeastern New York. Moodna Creek overflowed its banks, causing flooding of first-floor residents and businesses on Route 208 as well as Route 94 near Washingtonville High School.	Not recorded

Date	Affected Areas	Description	Reported Property Damage(2)
3/11/2011	Huguenot, Otisville, Deer Park, Port Jervis	Low pressure over the upper Midwest slowly tracked across the Great Lakes into southeastern Canada. Very wet antecedent conditions were already in place from heavy rain a few days earlier. This, in combination with a slow-moving frontal boundary and a sub-tropical moisture feed from a deep southerly wind flow, aided in the production of heavier rainfall that caused widespread flooding across the Lower Hudson Valley. Route 17 between the Harriman Train Station and the NY State Thruway in Tuxedo Park was impassable due to flooding. In Otisville, US 209 was closed in both directions at Oakland Valley Road due to flooding. Evacuations were performed due to flooding on Hobson Road in the Deer Park community of Port Jervis.	Not recorded
8/28/2011	County-wide	Hurricane Irene produced torrential rains, high winds, and flooding from the Bahamas all the way to northern New England. Orange County reported between 6 and 10 or more inches of rain.	Not recorded
9/8/2011	Country-wide	The combination of showers and thunderstorms, in association with a slow-moving cold front and deep tropical moisture moving up the East Coast from the remnants of Tropical Storm Lee, produced a prolonged period of rainfall, which led to flooding across portions of the Lower Hudson Valley. Cardinal Drive was closed at Peacock Circle in Washingtonville due to flooding. In Mt. Hope, Seybolt Avenue was washed out and 2 feet of water infiltrated numerous homes in the Hidden Valley development off of Guymard Turnpike. Total reported rainfall amounts in Orange County ranged from 4.56 inches in Port Jervis to 8.30 inches in Warwick.	$6.3 million
12/8/2011	Chester, Newburgh, Harriman	Exit 127 on Route 17 in Sugar Loaf was closed due to flooding. Storm total measured rainfall amounts ranged from 1.22 inches in Newburgh to 3.25 inches in Harriman. Several waves of low pressure tracked south to north along a slow-moving frontal boundary, which led to a prolonged period of heavy rain and resulted in widespread flooding across the Lower Hudson Valley.	Not recorded

Date	Affected Areas	Description	Reported Property Damage(2)
7/15/2012	Crawford	Cransmill Road in Pine Bush was closed due to a sinkhole created by flash flooding. The combination of an upper-level shortwave trough and a surface trough produced scattered showers and thunderstorms across the area. Some thunderstorms produced torrential rainfall that caused flash flooding in Orange County.	Not recorded
7/28/2012	Newburgh, New Windsor	A stream overflowed its banks and sent water rushing down Union Avenue in New Windsor. A few weak areas of low pressure moved along a nearly stationary frontal boundary just south of Long Island. This, in combination with an upper-level trough also tracking through the area, resulted in scattered thunderstorms that produced heavy rainfall and flash flooding in Orange, Putnam, and Suffolk counties.	Not recorded
9/4/2012	Port Jervis	Heavy rain resulted in ponding of water 1.5 to 2.5 feet high in the streets of the Fourth ward of Port Jervis, which caused basement flooding in several homes. The Department of Public Works reported 3.25 inches of rainfall in an hour. Low pressure and its attending warm front moved through the region, producing torrential rain over a short period of time, which resulted in flash flooding in western Orange County.	Not recorded
10/29/2012	County-wide	Hurricane Sandy produced torrential rains, high winds, and flooding from the Bahamas all the way to northern New England. Orange County reported between 2 and 4 inches (or more) of rain.	$200,000
6/24/2013	Woodbury	Water rescues were performed on Interstate 87 near Mile Marker 49.7 in Highland Mills. The combination of a trough of low pressure stalled over the region and a passing upper-level disturbance triggered a line of severe thunderstorms that passed across Orange and Putnam Counties. This line produced heavy rainfall that caused flash flooding in Orange county.	Not recorded

Date	Affected Areas	Description	Reported Property Damage(2)
7/1/2013	Port Jervis, Deerpark, Tuxedo Park	The intersection of Reservoir Avenue and Orange Street in Port Jervis was closed due to flooding. Route 17 in Tuxedo Park was closed due to flooding. A large, upper-level low encompassing the Mississippi Valley resulted in a moisture feed up the East Coast from the Gulf of Mexico. A stationary boundary just to the west of New York City was the focus for training showers and thunderstorms, which resulted in heavy rain and flash flooding in the Lower Hudson Valley.	Not recorded
8/9/2013	Wawayanda, Newburgh, Goshen, Hamptonburgh, Middletown	Vehicle rescues were performed by local responders after motorists became trapped in flood waters on Dolsontown Road in Middletown. Eight inches of water flowed down Union Avenue in Gardnertown. In New Hampton, I-84 was closed at Dolson Avenue due to flooding. Additionally, a portion of Dolson Avenue was closed due to flooding, including the intersection of Dolsontown Road and Dolson Avenue. Basement flooding was also reported in Middletown. A lake on Carmelite Drive in Middletown overflowed resulting in 6 inches of water flowing across the roadway. Basement flooding was reported on Murray Avenue in Goshen. The southbound lanes of Route 300, Union Avenue, in Newburgh were closed near I-84 due to flooding. A pre-frontal trough triggered scattered heavy showers and thunderstorms with heavy rainfall that resulted in flash flooding in Orange County.	Not recorded
8/21/2014	Port Jervis, Deerpark	Main Street in Port Jervis was flooded and became impassable. The bridge over the Neversink River was closed to traffic due to the flood waters. An upper-level trough pivoting through the Northeast triggered scattered evening showers and thunderstorms, with an isolated severe thunderstorm and flash flooding in Orange County.	Not recorded
7/25/2015	Tuxedo Park	Village Road was closed at Highway 17 in Tuxedo Park due to flash flooding. A slow-moving shortwave trough crossed the region in the afternoon, producing slow-moving showers and thunderstorms that resulted in isolated flash flooding in Orange and Rockland counties.	Not recorded

Date	Affected Areas	Description	Reported Property Damage(2)
6/13/2017	Woodbury	Lent Drive and Schunnemunk Road at Ridge Road were closed due to flooding in Highland Mills. A cold front moved slowly across the area during the afternoon and evening hours, sparking scattered thunderstorms that resulted in isolated flash flooding across Orange County. One spotter in the Highland Mills area reported more than 1 inch of rain in 30 minutes, with more than 2 inches falling in the span of 45 minutes.	Not recorded
6/19/2017	Middletown	The intersection of Wickham Avenue and Wisner Avenue in Middletown was closed due to flooding. A cold front crossing the area during the afternoon and evening produced numerous showers and thunderstorms, some of which resulted in flash flooding across parts of the Lower Hudson Valley and New York City. These storms developed in an environment with precipitable water values of around 2 inches. Rainfall totals ranged from 1–3 inches across the area, with 2.45 inches reported by a trained spotter in Middletown.	Not recorded
8/2/2017	Walden	East Main Street in Walden was closed due to flooding. An approaching upper-level disturbance, combined with increasing instability, resulted in the development of afternoon showers and thunderstorms. With weak steering flow and precipitable water values of 1.5 inches or more, these storms produced isolated flash flooding across parts of New York City and the Lower Hudson Valley.	Not recorded
9/1/2021	Orange County	Heavy rain associated with the remnants of Hurricane Ida impacted Orange County between September 1 and September 2, 2021. Flash flooding occurred, resulting in an estimated $1 million in individual damages and $9 million in public assistance damages.	$10 million
7/9/2023	Highland Mills	A heavy thunderstorm resulted in rainfall of up to 2–3 inches per hour. Parts of the county received 3–5 inches (and in some areas, up to 8 inches) over a period of several hours. One woman was found dead after having been swept away by flood waters.	Not recorded

1 Where specific flood impacts are mentioned by NCDC
2 NCDC indicates these damages occurred wholly in Orange County

Agriculture-related flood disasters are quite common. The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties as well as in counties that are contiguous to a designated county. Table 19 summarizes the USDA disaster designations for flood-related events.

Table 19: USDA Disaster Designations for Orange County, 2007–2024[175]

Incidence Period	Event Type	USDA Declaration Number	Losses/Impacts
April 14–18, 2007	Severe storms and inland and coastal flooding, excessive rain, flash flooding, and flooding	M1692, S2528	Production and physical losses were attributed to excessive rain, flash flooding and flooding.
May 1–3, May 16, May 20, and June 16, 2008	Excessive rain, high winds, flooding, flash flooding, hail, and lightning	S2725, S2724, S2827	The U.S. Department of Agriculture designated 19 counties in New York as primary natural disaster areas because of losses resulting from extreme weather which occurred during the period of May 1–3, 2008, and continuing. Production losses were attributed to multiple extreme weather events from May 1 to June 13, 2008.
May 16, 2009	Excessive rain, flash flooding, hail, high winds	S2929	Production losses were attributed to excessive rain, flooding, flash flooding, hail and high winds.
March 13–15, 2010	Severe storms and flooding	M1899	Production and physical losses were attributed to severe storms and flooding.
April 1–June 15, 2011	Excessive rain, high winds, and hail	S3160	Production and physical losses were attributed to excessive rain, high winds, and hail.
July 10–August 25, 2011	Excessive heat and excessive rain	S3204, S3202	Production and physical losses were attributed to excessive heat and excessive rain, and the combined effects of excessive rain, flooding, flash flooding, hail, high winds, below-normal temperatures, and tornadoes.
August 26–September 5, 2011	Tropical Storm /Hurricane Irene	M4020	Production and physical losses were attributed to the effects of Tropical Storm and Hurricane Irene.

[175] USDA. Disaster Designation Information. 2024. https://www.fsa.usda.gov/resources/disaster-assistance-program/disaster-designation-information.

Incidence Period	Event Type	USDA Declaration Number	Losses/Impacts
July 23, 2018	Excessive rain, moisture, humidity	S4479	Combined effects of excessive rainfall, moisture, and storm-force winds from Hurricane Florence
July 20–September 27, 2018	Hurricanes, typhoons, tropical storms (Hurricane Florence)	S4455	Excessive rainfall, moisture, and storm-force winds from Hurricane Florence
April 1, 2019	Excessive rain, moisture, humidity	S4622	Excessive rain
August 3–4, 2020	Excessive rain, moisture, humidity	S4892	High winds and heavy rain from Hurricane Isaias

Future Potential Impacts

The probability of occurrence of a flood at a given location is expressed in percentages as the odds of a flood of a specific magnitude occurring in any given year. The so-called 100-year flood has a 1% chance of occurring in any given year. The 100-year flood is often also referred to as the “base flood.” Although this probability of occurrence might be interpreted to mean that a 100-year flood would reoccur only once every 100 years, in reality this is not the case. Indeed, a 100-year flood can happen multiple times in a single year, or not at all for more than 100 years. Properties located in FEMA-mapped A- and V-Zones are within the footprint of the 100-year floodplain. FEMA A-Zones represent the 100-year floodplain.

All floodplains are associated with water surface elevations unique to any given location on a map (in other words, 100-year flood levels vary from one community to the next throughout Orange County, and also within individual communities). Figure 60 shows the locations of critical assets within the FEMA 100-year floodplain.[176] Additionally, the symbols in the map’s legend show the consequence levels of each critical assets: Assets with higher consequence levels have larger location markers. The main conclusion that can be drawn from this map is that there are two primary clusters of high-consequence at-risk assets: wastewater treatment plants (WWTPs) along the Hudson River, and multiple high-consequence asset categories in Goshen.

[176] “Orange County Climate Resilience Plan.” March 2023. https://www.orangecountygov.com/DocumentCenter/View/29242/Orange-County-Climate-Resilience-Plan.

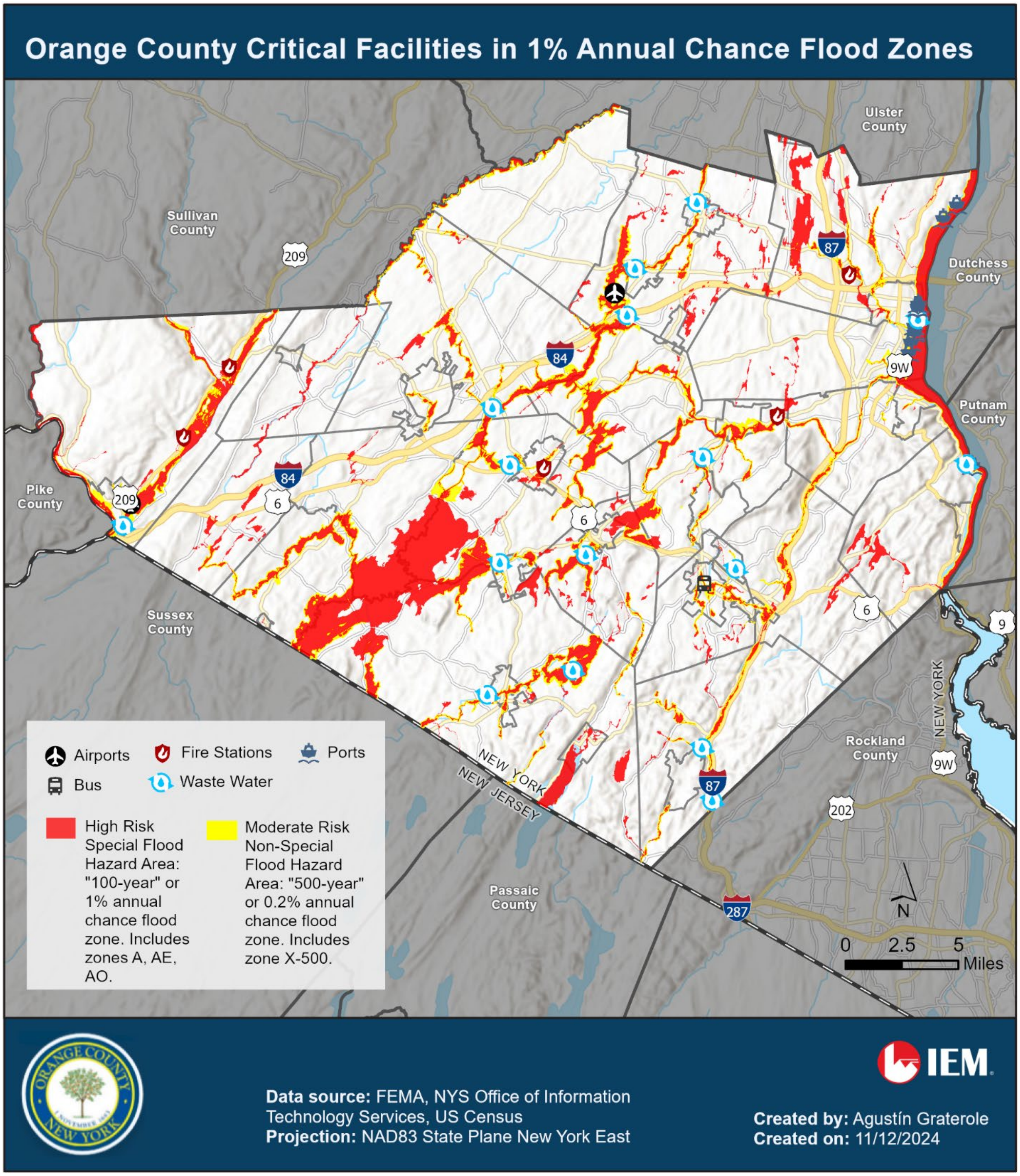


Figure 59: Critical Asset Exposure in the 100-Year Floodplain

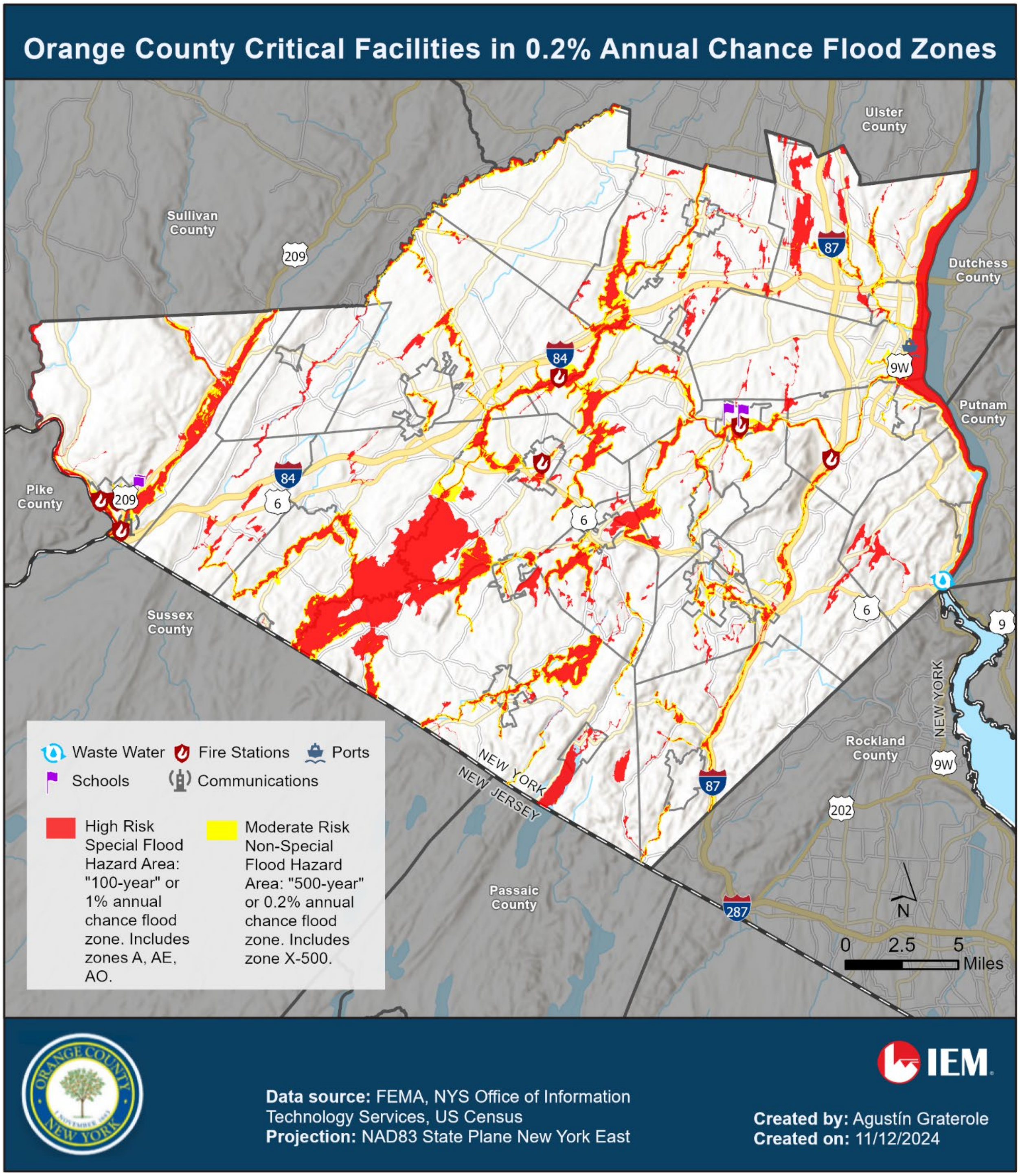


Figure 60: Critical Asset Exposure in the 500-Year Floodplain

Within the 100-year floodplain, flooding can occur both below and above the 100-year flood level. The 100-year flood represents a flood of high magnitude: It is a deep and widespread event. The 500-year flood is of a greater magnitude and would be deeper and more widespread than a 100-year event; however, it is less likely to occur. Smaller floods, such as those with magnitudes of 10 or 50 years, are also possible within the 100-year floodplain. These would not be as deep or as widespread as a 100-year flood; however, they are much more likely to occur.

The term "100-year flood" can often be confusing to someone not intimately familiar with flooding or statistics. FEMA's NFIP Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials (FEMA-480), suggests that another way to look at flood risk is to think of the odds that a 100-year flood will happen sometime during the life of a 30-year mortgage of a home in the floodplain. Figure 61 illustrates these odds over various time periods for different size floods. In any given year, a property in the 100-year floodplain has a 10% chance of being flooded by a 10-year flood, and a 1% chance of being flooded by a 100-year flood. Although it may seem insignificant, over a 30-year period, that same location has a 96% chance of being flooded by a 10-year flood and a 26% chance of being flooded by a 100-year flood.

WHAT ARE THE ODDS OF BEING FLOODED?

The term "100-year flood" has caused much confusion for people not familiar with statistics. Another way to look at flood risk is to think of the odds that a 100-year flood will happen sometime during the life of a 30-year mortgage—a 26% chance for a structure located in the SFHA.

Chance of Flooding over a Period of Years

Time Period	Flood Size 10-year	25-year	50-year	100-year
1 year	10%	4%	2%	1%
10 years	65%	34%	18%	10%
20 years	88%	56%	33%	18%
30 years	96%	71%	45%	26%
50 years	99%	87%	64%	39%

Even these numbers do not convey the true flood risk because they focus on the larger, less frequent, floods. If a house is low enough, it may be subject to the 10- or 25-year flood. During a 30-year mortgage, it may have a 26% chance of being hit by the 100-year flood, but the odds are 96% (nearly guaranteed) that it will be hit by a 10-year flood. Compare those odds to the only 1-2% chance that the house will catch fire during the same 30-year mortgage.

Figure 61: The Odds of Being Flooded

Impact of Climate Change

Climate change is expected to increase the frequency and intensity of flooding in New York State overall and in Orange County specifically. For example, the maximum precipitation experience over coastal flooding may be increased due to rising sea levels. Furthermore, climate change contributes to more intense and extreme storms, including hurricanes and tropical storms, which can impact Orange County and cause flooding that may overwhelm local stormwater systems.

Vulnerability Assessment

EXPOSURE

Floods can strike anywhere it rains. All of Orange County is considered at risk from flooding, including its people, structures, businesses, and other systems and resources. FEMA 1% and 0.2% flood zones identify areas exposed to riverine and coastal flooding. Urban flooding and other localized flooding outside these mapped zones is also possible in low-lying areas, during heavy precipitation events, or when stormwater drains are overwhelmed. The community assets that are exposed to flooding may vary based on multiple factors such as the extent of area flooded as well as the depth and velocity of flood waters.

IMPACT ON COUNTY ASSETS

Flooding can pose a significant threat to health and safety of Orange County residents. Individuals who become caught in flood waters may be injured or killed. Flood-related rescues may be necessary, which are dangerous for first responders as well. Flooding can damage or destroy residential structures, and some displaced residents may require public shelter. Flood waters can become contaminated with chemicals, hazardous materials, and other pollutants that pose a public health risk. Flooding can result in widespread power outages, which increases risk to vulnerable populations who rely on power for health and/or life safety. Utility outages may include water and sewer service disruptions, which also increase health risks. Transportation disruptions may result if roads and transit systems are inundated or washed out by floods, and road closures may delay emergency response and other services. Critical facilities and other public structures may be damaged by flooding, which may delay a variety of services to the community.

Businesses may experience direct losses if structures or goods are damaged by flood waters. Economic recovery may be slow as power, communications, and transportation services are gradually restored. Employees may not be able to return to work immediately; lost wages and reduced productivity can further slow economic recovery. Flooding can also affect agricultural assets and may cause crop and livestock losses, which may have a significant economic impact in Orange County.

Flooding can have negative impacts on natural systems. Flood waters may be contaminated with various pollutants that are harmful to the environment and can harm plants and animals. Flooding can also contribute to stream-bank erosion, channel migration, and water-quality degradation. Erosion or increased soil saturation may contribute to landslides.

The Orange County Climate Resilience Plan identifies potential impacts of flooding across multiple sectors. This plan also includes details on specific facilities with low, moderate, or high consequences from flooding. The flooding impacts identified in the Climate Resilience Plan are as follows:

Transportation

- Flooding disrupts rail service and damages electrical equipment.
- Flooding creates dangerous conditions for pedestrians and bicyclists.

- Flooding damages the structural integrity of bridges.
- Flooding inundates roadways, leading to dangerous driving conditions and loss of public transit, impacting businesses and emergency response.
- The Orange County Airport runway and a small portion of the Warwick Airport runway are in the 100-year floodplain.

Infrastructure

- Flooding increases operational costs and chemical does at wastewater treatment plants.
- Flooding of substations and transformers leads to power loss and hazardous conditions.

Cultural Facilities and Businesses

- Flooding impacts commutes, affecting wages for hourly workers.
- Flooding damages historical and cultural facilities.

Parks and Open Space

- Flooding erodes hiking trails and parks.

Ecology and Habitats

- Flooding strips soils of nutrients for crops and leads to polluted runoff.
- Flooding disrupts habits and reduces species mobility.

Water Systems

- Flooding erodes streambanks and damages infrastructure.
- Flooding degrades water quality through runoff and debris.
- Floodwater overwhelms stormwater infrastructure, resulting in localized flooding.
- Floodwater seeps into water supply pipes, increasing water pressure and ground table, thereby degrading water quality.
- Floodwater saturates septic tanks and underground pipes designed for gravity flow, which may lead to sewage backup.
- Coastal flooding causes erosion and overwhelms stormwater infrastructure.

NATIONAL RISK INDEX

RISK SCORE

The NRI evaluates both the risk to coastal flooding and riverine flooding in Orange County. Overall, the county has a “relatively low” risk index score (66.6) for coastal flooding and a “relatively moderate” risk index score (89.3) when compared to the rest of the United States. Within the county, variances occur between jurisdictions. Census tract 36071011900, near Goshen, has a higher estimated risk with a "relatively high" (93.8) risk index score for riverine flooding.

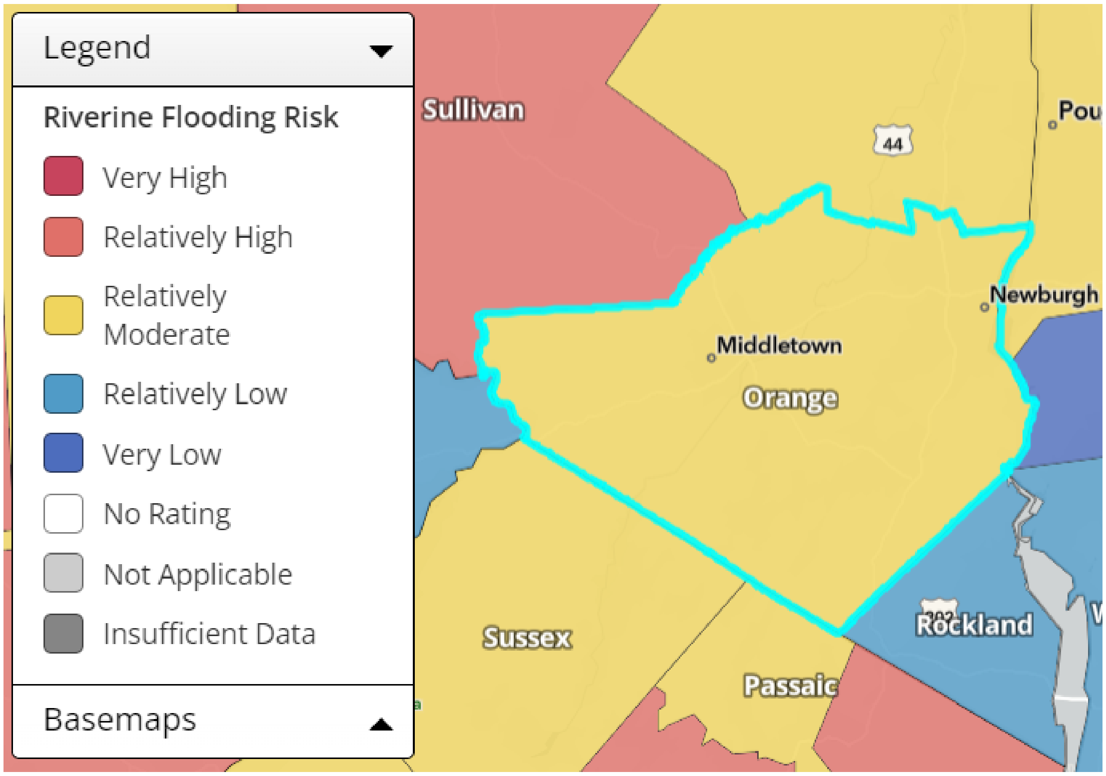


Figure 62: FEMA National Risk Index Orange County Riverine Flooding Score, Map and Legend[177]

[177] FEMA, National Risk Index. Orange County Riverine Flooding Score, Map and Legend. https://hazards.fema.gov/nri/map/.

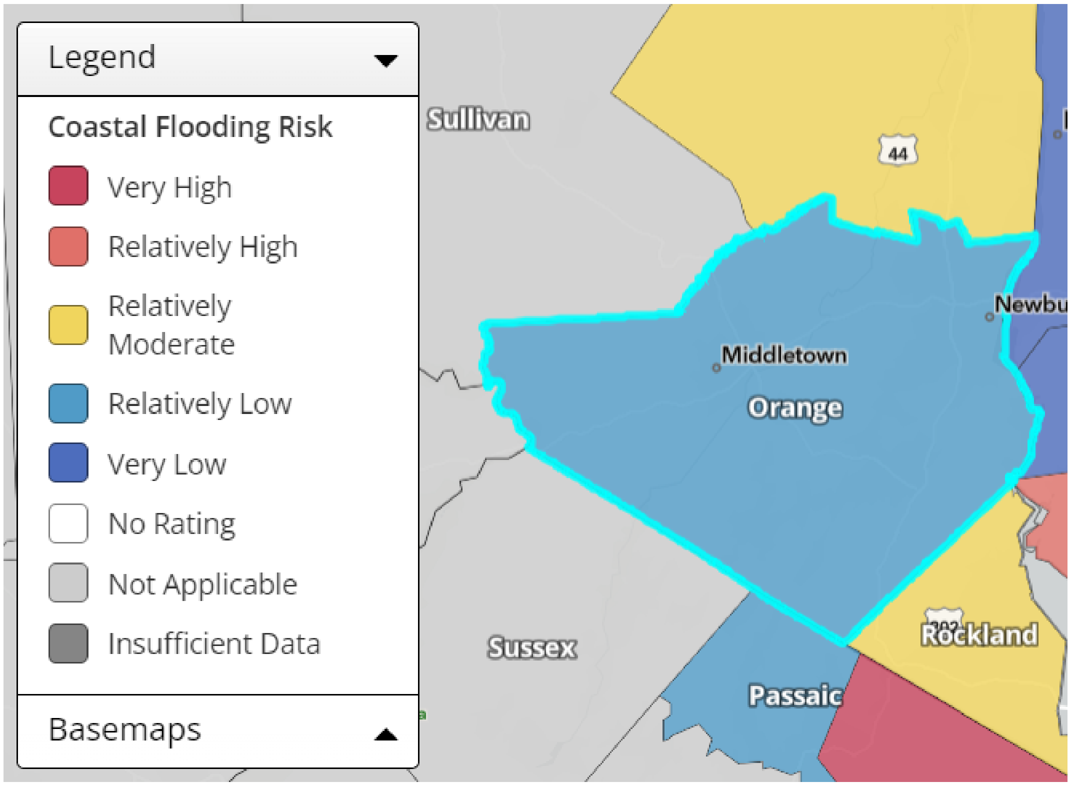


Figure 63: FEMA National Risk Index Orange County Coastal Flooding, Map and Legend[178]

ESTIMATED ANNUAL LOSSES

Flooding can have widespread impacts on a community. Floods can destroy homes, structures, transportation systems, schools, hospitals, and other critical infrastructure. High repair costs can burden homeowners and businesses, making recovery challenging. Daily life can be disrupted due to the damages, including transportation options being disrupted or delayed, especially considering Orange County's unique position between two rivers (the Hudson and the Delaware). Economic impacts can be significant. Businesses may be forced to close either temporarily or permanently. Crop losses can also be expected. People can be injured or killed in a flood. Disease can spread due to contaminated floodwaters. Flood impacts may be felt more severely depending on the warning time, location, and duration. Without sufficient warning time, people are more likely to be caught in a flash flood. The location and duration of a flood can also lead to higher losses. The NRI estimates that the expected annual loss (EAL) for Orange County due to coastal flooding is considered "relatively moderate" with a score of 84.77 when compared to the rest of the U.S., and $460,000 in losses. For riverine flooding, the NRI estimates that the EAL for riverine flooding is "relatively moderate" with a score of 90.1 and an estimated $3.3 million in losses.

VULNERABLE POPULATIONS

Our most vulnerable citizens are often disproportionately impacted by hazards such as flooding. There are many reasons why someone may be more vulnerable to flooding, including social, health, and economic

[178] FEMA, National Risk Index. Orange County Coastal Flooding, Map and Legend. https://hazards.fema.gov/nri/map.

factors. Vulnerable communities, especially those with lower income levels and the unhoused, often lack the resources for effective flood response, recovery, and resilient building. Additionally, people with limited mobility, such as the elderly, persons living with disabilities, the youth, people who speak a first language other than English, and people without access to a reliable form of transportation, face additional challenges in evacuating or seeking help. For example, in Orange County, more than one third of Orange County's population is aged 65 years or older, or younger than 18. Additionally, there are many undocumented individuals who may be unaware of the resources available to them for evacuating or post-flood recovery, or may not feel comfortable accessing them.[179] These populations may be at higher risk from flooding. This risk is further exacerbated by climate change. As climate change increases the frequency and severity of flooding events, it is likely that these vulnerable populations will experience additional impacts from flooding.

The Climate and Economic Justice Screening Tool (CEJST) has been used in FEMA mitigation grant applications to identify socially vulnerable populations and disadvantaged communities by identifying census tracts that are overburdened or underserved according to certain measurements. A small portion of Orange County around Port Jervis meets these criteria in part due to its flood risk. This area has a projected flood risk in the 97th percentile and is in the 73rd percentile for low-income residents. Highlighted areas in Figure 64 identify disadvantaged communities according to the CEJST.

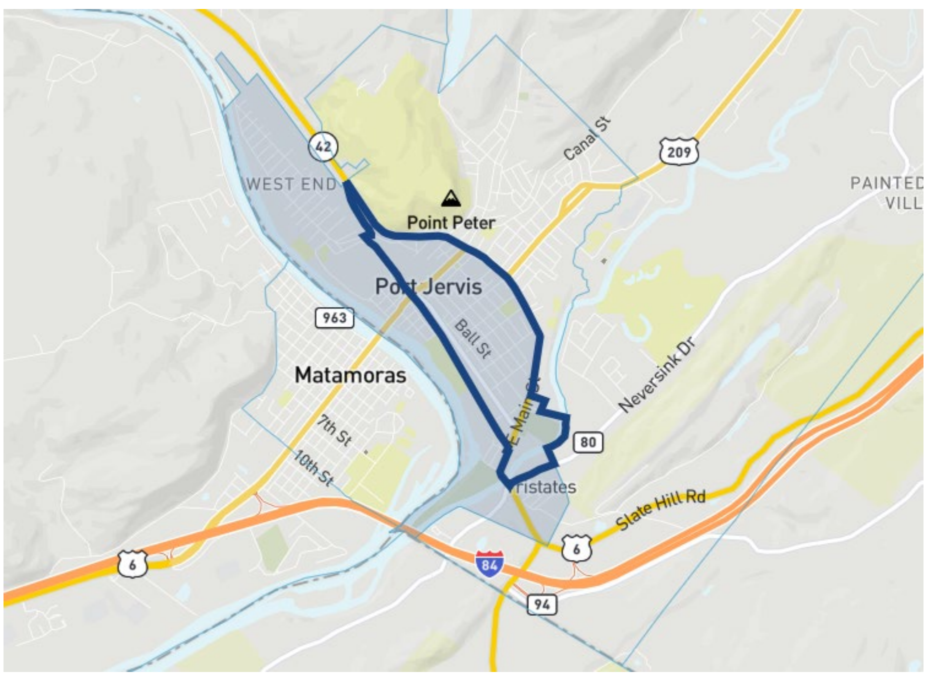


Figure 64: CEJST Projected Flood Risk

DEVELOPMENT TRENDS

Development changes can influence overall vulnerability to flooding. Development can increase flood risk when additional structures and infrastructures are built in high-risk floodplains. Additional impervious

[179] Orange County. "2022 Orange County Emergency Preparedness Assessment (CEPA)." Unavailable online.

surfaces, such as parking lots, can increase rainwater runoff. Changes in development can also impact the natural environment and beneficial functions of the floodplain. Population growth, land use trends, and increased risk due to climate change can all increase vulnerability. At the same time, development can be designed with flooding in mind. Most communities in Orange County participate in the NFIP, which requires minimum standards for development such as the issuance of permits for all development projects in the Special Flood Hazard Area (SFHA). By regulating development in the high-risk floodplain, local communities can help reduce the risk of flooding.

COMMUNITY LIFELINES

All community lifelines (see Figure 65) can be impacted by flooding. In particular, floods can result in the disruption, damage, or destruction of infrastructure and systems as well as endanger staff and daily operations. In particular, floods can disrupt transportation, making response and recovery difficult due to damaged roads, bridges, railways, and more. Another concern involves hazardous materials, such as chemicals and sewage, which can be spread by floodwaters and may cause environmental damage as well as human health harms.

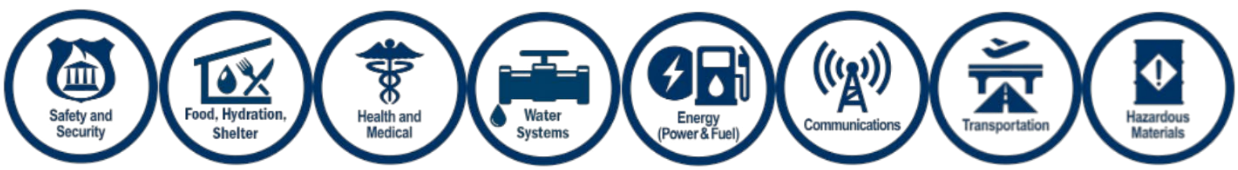


Figure 65: Community Lifelines

Hurricanes and Tropical Storms

Hazard Description

A hurricane is a severe tropical cyclone characterized by winds that reach a constant speed of 74 mph or more. The winds revolve in a large spiral around a relatively calm center called the "eye," typically spanning 20 to 30 miles in diameter, while the entire hurricane can extend outward by up to 400 miles.

In the Northern Hemisphere, hurricanes circulate counterclockwise around the eye. Although hurricanes are usually short-lived, they are extremely powerful and can cause significant damage due to intense storm surges and high winds. When wind speeds range between 39 and 73 mph, these systems are classified as "tropical storms." In the Atlantic Basin, hurricanes and tropical storms are most likely to occur from June 1 to November 30, with the highest frequency of events typically occurring between mid-August and late October.

Location and Extent

Most hurricanes that reach the New York State area are likely to become downgraded to tropical storms, especially when moving inland. Given its geographic position within the state, Orange County is more likely than most counties to experience the impacts of tropical systems, with the southeastern areas of the county at greater risk because of their immediate proximity to the Atlantic coast. The following towns are not directly on the coast, but their proximity to major rivers and low-lying areas makes them vulnerable to the effects of hurricanes and storm surges:

- **Newburgh:** Located along the Hudson River and relatively close to coastal areas
- **Middletown:** Situated inland but still susceptible to heavy rainfall and flooding
- **Port Jervis:** Near the Delaware River and vulnerable to storm-related impacts
- **Walden:** Close to various waterways and may experience flooding during severe weather

Due to the size of hurricane and tropical storm systems, areas within Orange County can still be affected even when the eye makes landfall outside of Orange County. The hazards associated with hurricane and tropical storm events have distinct hazard area locations.

The extent of a hurricane is measured using several key metrics that help assess its intensity and potential impact. Maximum sustained wind speeds over precisely one minute are recorded to determine the hurricane's strength, and are crucial for categorizing the storm on the Saffir–Simpson scale. Also essential is wind field size, indicating the radius of solid winds affecting the area, which can vary significantly. Additionally, central pressure is measured, with lower values typically signifying a stronger hurricane. Rainfall totals are also considered because hurricanes can produce heavy rains that lead to flooding far from their center. Storm surge—the rise in seawater caused by the hurricane's winds—is a critical factor in coastal flooding risks and is measured in feet.

The Saffir–Simpson Scale is a five-category wind speed/storm surge classification scale used to classify Atlantic hurricane intensities. The scale estimates the potential property damage and flooding that can be expected. The Saffir–Simpson values range from Category 1 to Category 5, as shown in Figure 1. Wind speed is the determining factor in the scale because storm surge values are highly dependent on the slope of the continental shelf in the landfall region.

Tropical storms with wind speeds between 39 and 73 mph are not included in the scale. Their typical effects include breakage of twigs and tree branches, toppling of shallow-rooted trees, and some damage to signboards and windows.

Table 20: NOAA Saffir–Simpson Hurricane Wind Scale[180]

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74–95 mph 64–82 kt 119–153 km/h	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to their roofs, shingles, vinyl siding, and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles will likely result in power outages that could last several days.
2	96–110 mph 83–95 kt 154–177 km/h	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected, with outages that could last several days to weeks.
3	111–129 mph 96–112 kt 178–208 km/h	**Devastating damage will occur:** Well-built framed homes may incur major damage or have roof decking and gable ends removed. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	130–156 mph 113–136 kt 209–251 km/h	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage by losing most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles will be downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	157 mph or higher 137 kt or higher 252 km/h or higher	**Catastrophic damage will occur:** Many framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

180 National Hurricane Center and Central Pacific Hurricane Center. "Saffir–Simpson Hurricane Wind Scale." https://www.nhc.noaa.gov/aboutsshws.php.

The magnitude or severity of hurricane and tropical storm events will increase under the following conditions:

- As the storm category increases
- As the diameter of the storm system increases
- As the system's forward speed decreases
- As rainfall amounts increase
- As the number of people, structures, and infrastructure in the affected areas increases
- As the temperature of the ocean increases

To clarify, for communities located within mapped areas of erosion, surge, or wave action, the severity of these issues tends to increase alongside the level of erosion, surge, and/or wave action. Although the New York State Hazard Mitigation Plan (SHMP) discusses waves in the context of flood hazards, it is important to note that damaging waves are considered a coastal phenomenon. Because Orange County is situated more than 30 miles from the nearest coastline that could be affected by wave action, these waves are not considered a hazard for this county-level plan.

Previous Historical Occurrence

Table 21: Hurricane, Tropical Storm Events, 1950–2024

Affected Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Orange County	9/06/2008	Tropical Storm	0	0	$4,000	$0
Orange County	8/04/2020	Tropical Storm	0	0	$0	$0

The following events are specific to Orange County. Details and descriptions are available for the following elected events that have occurred since the publication of the 2018 Orange County plan:

- **September 1, 2021:** Hurricane Ida struck New York City, and three (3) inches of rain fell within one hour. The event ultimately led to 16 deaths city-wide, drawing criticism of city officials' inadequate preparation. Aggressive flooding safeguard tactics, such as travel bans and basement apartment evacuations, had not been implemented. However, state transportation officials were dispatched to clear debris from culverts and other drainage systems.[181]
- **August 22, 2021:** Hurricane Henri hit New York early on a Sunday morning. Downpours caused major flooding in the city. Streets turned into rivers and water entered the subway stations, causing them to

[181] 2023 New York State Hazard Mitigation Plan (SHMP). Hurricane Historic Occurrences. https://mitigateny.org/hazards_of_concern/hurricane/hurricane_hazard_history.

suspend trains. Nearly four inches of rain fell on Central Park over Saturday night. Hurricane Henri struck Long Island, NY; New Haven, CT; Rhode Island; and along the Massachusetts border.[182]

- **August 4, 2020[183]:** Category 1 Hurricane Isaias, with maximum sustained winds of 85 mph, landed near Ocean Isle Beach, NC, at 11:10 pm on August 3rd. The hurricane's strength was downgraded to that of a tropical storm as its forward speed increased to nearly 30 mph early in the morning of August 4th. At 3 p.m. on August 4, 2020, the center of Isaias passed about 65 miles west of New York City; tropical-storm-force winds extended well east of the center of circulation. The highest sustained wind speeds ranged from 35 to 55 mph, with 60 to 80 mph gusts across Long Island, New York City, as well as portions of the Lower Hudson Valley, resulting in widespread wind damage and power outages. During low tide, storm surge as high as 3 to 5 feet washed over Lower New York Harbor and the southern shore of western Long Island. This only resulted in localized minor coastal flood benchmarks being reached in these spots. More significant impacts struck along the ocean beachfront, where surf reached heights of 8 to 12 feet, causing significant beach erosion and flooding. One death and one injury were attributed to Hurricane Isaias.

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182 Ibid.

183 NOAA, National Centers for Environmental Information. "Storm Events Database." https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=923900.

The map in Figure 66 shows the magnitude and pathway of previous tropical storms and hurricanes that have occurred near Orange County.

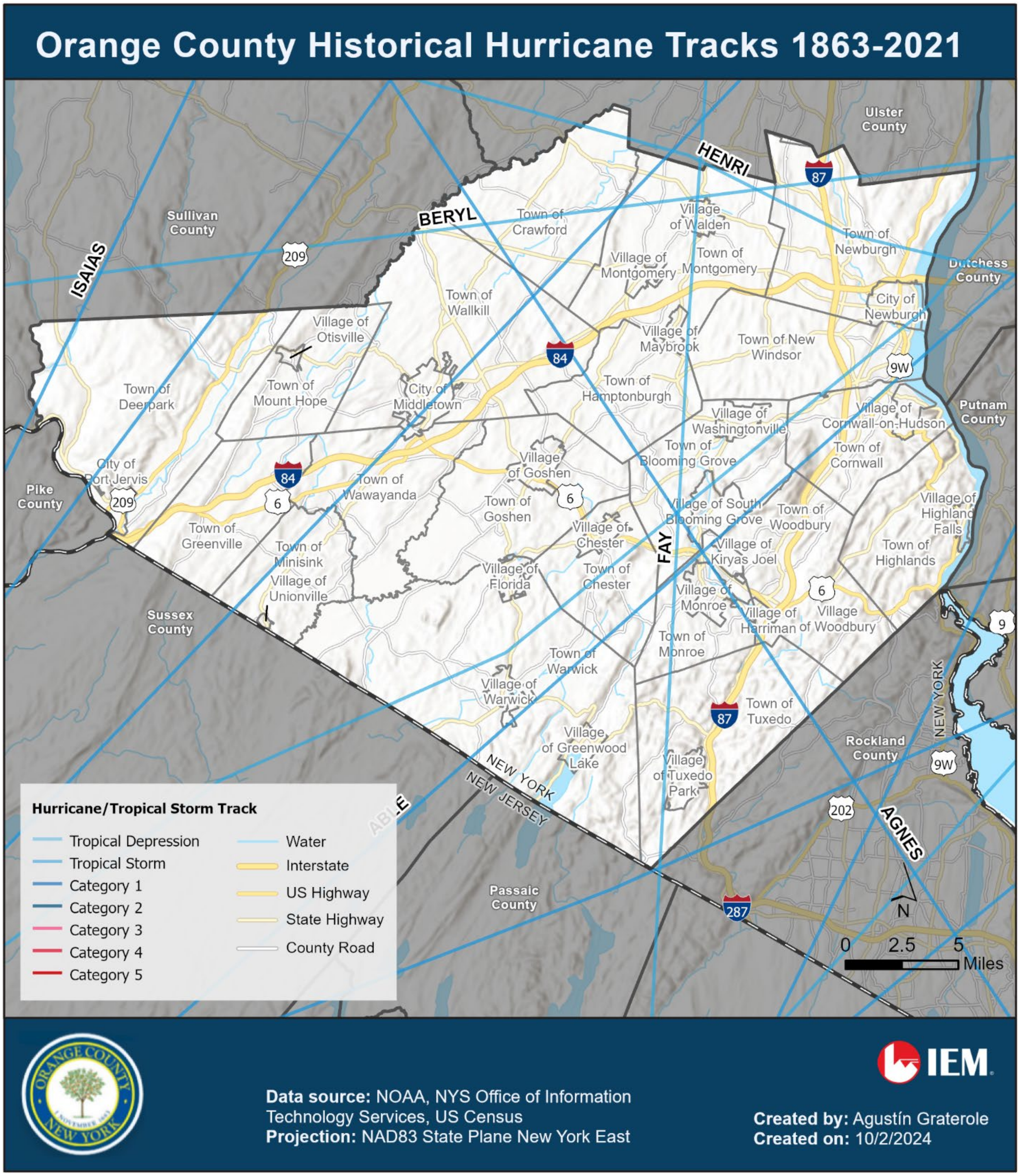

Figure 66: Historical Hurricane Tracks near Orange County

Future Potential Events

The probability of future events is derived from the likelihood categories of the 2022 County Emergency Preparedness Assessment (CEPA). The likelihood of a hurricane/tropical storm occurring in 2022 is "medium," indicating that this event is expected to affect the county within the next 20 years.

Impact of Climate Change

Climate change will make hurricanes intensify more rapidly, cause heavier rainfall, and result in more severe storm surges. Hurricane intensity decay is also anticipated to continue slowing. Although models suggest that hurricane frequency will decrease, the proportion of Category 4 and 5 hurricanes is projected to increase. However, the certainty of this finding is mixed to low. Some studies have suggested that, as the world warms, tropical storms in the Atlantic will tend to form nearer to the coast than before. As a result, more will make landfall, particularly along the East Coast. A more granular study reported similar findings, and also asserted that tropical cyclones may travel closer to Boston and Norfolk than to New York City. However, there is not yet a scientific consensus on this finding, and most papers on the potential climate-induced geographic shifts in tropical cyclones include significant caveats and low-confidence findings.

Hurricane intensity typically lessens, or "decays," as a hurricane moves inland. This is because hurricanes gain intensity from ocean moisture. However, studies have shown that the rate of decay in hurricane intensity has lessened proportionally with increased sea surface temperatures. This means that, compared to past storms, hurricanes are now preserving more of their destructive power as they move further inland. Hurricanes also now move more slowly, causing more rainfall, wind damage, and other impacts as they linger overhead. Finally, data gathered since 1979 indicates that, on average, hurricane season in the North Atlantic is starting earlier every year.[184]

Vulnerability Assessment

EXPOSURE

To understand its vulnerability to natural hazards, a community must identify the assets that are exposed or vulnerable in the hazard area. Orange County is approximately 60 miles north of New York City and is characterized by a diverse topography, including rivers, lakes, and elevated regions. The region's humid continental climate makes it susceptible to heavy rainfall, particularly during hurricane season (June to November). Increased instances of climate change leading to severe weather patterns heighten risks.

The county has experienced significant storm events, including Hurricane Irene (2011) and Superstorm Sandy (2012), which caused extensive flooding and infrastructure strain. Storm surge is rare in Orange County, compared to the coastal areas of New York, yet heavy rains can result in localized flooding and rising river levels.

[184] "New York State Hazard Mitigation Plan." 2023. https://mitigateny.org/.

IMPACT ON COUNTY ASSETS

INFRASTRUCTURE IMPACTS

- **Transportation:** During severe weather events, major roads, bridges, and public transit may be obstructed or damaged, leading to community isolation and delayed emergency response.
- **Utilities:** Electricity, water, and gas services may be disrupted, impacting residential and commercial facilities. Critical facilities such as hospitals may also face operational challenges.
- **Public Buildings:** Local government buildings, schools, and emergency services infrastructure need evaluation for their resilience to storm conditions.

Hurricanes and tropical storms can have devastating primary and secondary impacts on Orange County's infrastructure. The initial impact typically includes severe wind damage and flooding that can damage or destroying roads, bridges, and public transportation systems. This immediate result is disruption to emergency services and reduced access to essential resources. Secondary impacts may arise, such as prolonged power outages, which can compromise communication systems and create challenges for water and sewage treatment facilities. Disruption of services that depend on these systems can have a negative impact on public health and safety and endanger the lives of those who depend on medical devices. Moreover, widespread property damage can result in heightened demand for repairs, straining local contractors and resources. The cumulative effect threatens public safety and poses significant economic challenges as the community works to recover and rebuild.

PEOPLE, COMMUNITY AND PUBLIC HEALTH EFFECTS

- Vulnerable populations, including the elderly, people with disabilities, and low-income families, face heightened risks from evacuation challenges and limited access to resources.
- Mental health concerns stemming from displacement and damage to homes can adversely affect community well-being.

Hurricanes and tropical storms can have significant primary and secondary impacts on individuals as well as the broader community of Orange County. The immediate threats involve strong winds and heavy rainfall that can cause widespread damage to homes, infrastructure, and power lines, disrupting essential services. The flooding accompanying these storms can endanger lives and displace families, particularly those in low-lying areas. In the aftermath, secondary impacts may emerge, such as economic strain due to property damage and loss of business income, leading to increased unemployment rates and hindering local recovery efforts. Additionally, mental health challenges may arise as residents cope with the emotional toll of disaster recovery, affecting community cohesion and resilience over time. Overall, the repercussions extend beyond mere physical damage, impacting the social and economic fabric of Orange County.

ENVIRONMENTAL CONSIDERATIONS

- Flooding can contaminate water supplies and ecosystems, affecting aquatic habitats and local wildlife.
- Increased stormwater runoff from heavy rainfall can degrade water quality in local rivers and lakes.

Hurricanes and tropical storms can significantly impact the natural environment of Orange County. Because these storms bring heavy rainfall and high winds, the risk of flooding increases, leading to soil erosion and the degradation of local habitats. The surge of water can overwhelm streams and rivers, resulting in sedimentation that harms aquatic ecosystems and disrupts the balance of local flora and fauna. Additionally, strong winds can uproot trees and damage forests, affecting wildlife populations and reducing biodiversity. The aftermath of these storms often leads to increased pollution because stormwater runoff can carry contaminants into waterways, further endangering the health of the region's natural resources and ecosystems. Overall, the effects of hurricanes and tropical storms threaten the ecological balance vital for Orange County's environment.

AGRICULTURE

Hurricanes and tropical storms pose significant threats to agriculture in Orange County, entailing both primary and secondary impacts. The primary effects include severe flooding, wind damage to crops, and soil erosion, which can devastate fields and reduce harvest yields. For instance, heavy rains can lead to saturated soils in which crops struggle to thrive, while strong winds can uproot plants or damage structures such as greenhouses and barns. Secondary impacts include disruptions to supply chains, increased pest infestations, and long-term soil degradation. Additionally, the economic strain from crop loss can affect local farmers' livelihoods, leading to decreased investments in farming practices and a potential shift in land use, as some may be driven to abandon agriculture altogether in favor of more resilient industries. The cumulative effects of these storms underscore the need for enhanced preparedness and adaptive strategies within the region's agricultural sector.

CRITICAL AREAS OF CONCERN

LOW-LYING AREAS

- Regions adjacent to rivers, such as the Wallkill River and the Hudson River, are particularly vulnerable to flooding.

URBAN AREAS

- Mid-sized cities, such as Newburgh and Middletown, require infrastructure risk assessments due to their density and economic importance.

RURAL COMMUNITIES

- Smaller communities with limited resources may lack adequate emergency response capabilities and infrastructure resilience.

NATIONAL RISK INDEX

RISK SCORE

In Orange County, high-category hurricanes are not particularly common and, although their potential consequences are high, historically they have not caused significant damages. The National Risk Index (NRI) includes data on the expected annual losses to individual natural hazards, historical loss, and overall risk at a county and Census tract level. Based on the NRI, Orange County has a "relatively moderate" risk index rating and a score of **86.9** for hurricanes.

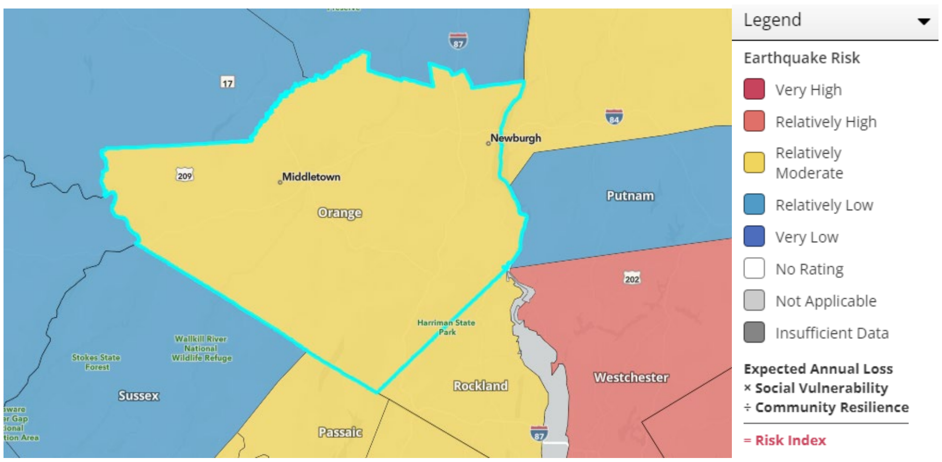

Figure 67: FEMA National Risk Index Orange County Hurricane Score, Map and Legend[8]

ESTIMATED ANNUAL LOSSES

According to the FEMA NRI, the estimated annual losses (EAL) from a hurricane in Orange County, NY, is $8,800,000. Orange County has a "relatively low" risk index for hurricanes. The frequency for Orange County is 0.1 events per year. Historically losses have not been recorded for Orange County.[185] According to the NYS Hazard Mitigation Plan (2023) Hazus-MH software estimates that among the 62 counties in New York, Orange County ranks 11th in terms of exposure to hurricane hazard events. Figure 37 illustrates the NRI rating the EAL for Orange County from a hurricane, with a rating of relatively moderate EAL.

[185] FEMA, National Risk Index. Earthquake. https://hazards.fema.gov/nri/map.

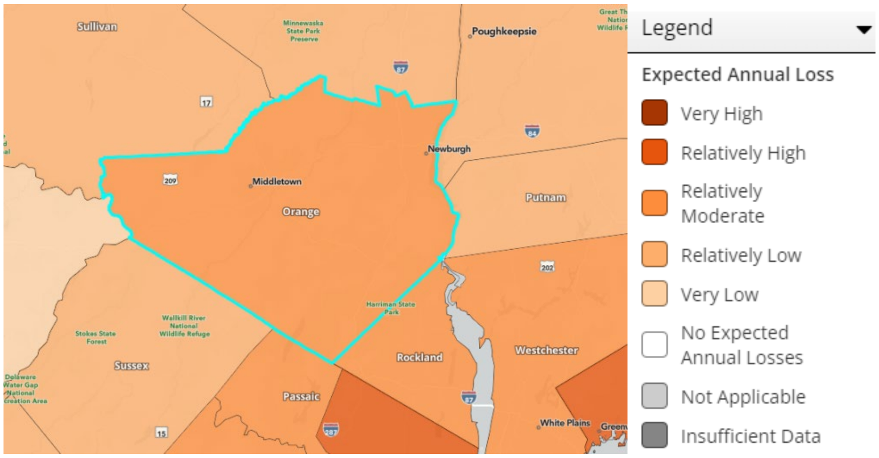

Figure 68: Hurricane National Risk Index - Expected Annual Loss

VULNERABLE POPULATIONS

For more information on vulnerable populations, please refer to County Profile.

In Orange County, specific populations are particularly vulnerable to the impacts of hurricanes, tropical storms, and storm surges. Low-income communities often lack the financial resources for effective storm preparedness and recovery, leaving them especially susceptible to severe weather effects. In addition, elderly residents and individuals with disabilities face unique challenges, as mobility issues and the need for specialized assistance can hinder evacuation efforts. Families with young children are another vulnerable population; they may struggle to find safe evacuation routes and resources, complicating their response to emergencies. Additionally, residents in rural areas often find themselves isolated, with limited access to emergency services, making it difficult to evacuate or seek shelter. Aging infrastructure in some parts of the county can exacerbate flooding, posing additional risks to these vulnerable populations. Addressing these challenges is vital for enhancing community resilience and ensuring the safety of all residents during severe weather events.

DEVELOPMENT TRENDS

Orange County is poised for significant development in the coming years, which will bring changes to housing, commerce, and community needs. As the population grows, there will be an increased demand for diverse residential options, including affordable housing and mixed-use developments that blend living and working spaces. The commercial sector is also expected to expand, with more retail and office spaces emerging to cater to a burgeoning local economy. Sustainability will be crucial in shaping future projects, emphasizing green building practices and energy-efficient technologies. Additionally, improvements in transportation infrastructure will enhance connectivity, making the county more accessible. Recreational areas and open spaces will remain a priority, fostering a balanced environment that promotes community well-being amidst urbanization. Overall, the trend will focus on integrating smart technologies, encouraging economic diversification, and ensuring community engagement in planning processes.

Some specific development projects include:

- **The Village of Goshen:** Ongoing plans are to redevelop the downtown area to enhance retail opportunities and improve public spaces.[186]
- **Hangar Development at Stewart International Airport:** This project aims to expand the airport's facilities, which could stimulate local economic growth and increase transportation options.[187]
- **The Hudson Valley Greenway:** Projects related to this initiative focus on improving green spaces and walking paths throughout the county as well as enhancing recreational opportunities.[188]
- **The Orange County Government Center Renovation:** This project aims to revitalize existing government buildings for better service delivery and community use.[189]
- **Affordable Housing Developments:** Various developers are proposing new multi-family housing projects in locations like Middletown and Newburgh to address the need for affordable living options.[190]
- **Gateway at Hudson Valley:** This mixed-use development project in New Windsor includes residential units and commercial and retail spaces, aiming to create a vibrant community hub.
- **UVAC Expansion:** The United Valley Action Coalition has proposed expansion projects to improve community services and resources.

COMMUNITY LIFELINES

Hurricanes and tropical storms can profoundly disrupt several FEMA community lifelines (see Figure 22). The Safety and Security lifeline may be compromised as emergency services struggle to respond to incidents due to hazardous conditions, such as those occasioned by hurricanes or tropical storms. The Food, Hydration, and Sheltering lifeline is often affected when supply chains are interrupted, leading to food shortages and inadequate access to clean water and safe shelters. Services under the Health and Medical lifeline can become strained, with hospitals being overwhelmed and challenged to reach those in urgent need of care. Hazardous Materials management is another critical concern because hurricanes or tropical storms can lead to spills that pose public health and safety risks. Finally, infrastructure systems face severe impacts, as flooding can wash out roads and bridges, hinder transportation, and limit access to essential services, while communications outages can further complicate emergency responses.

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186 The Chronicle. "Goshen Seeks Public Input on Village Revitalization." October 8, 2024. https://www.chroniclenewspaper.com/news/local-news/goshen-seeks-public-input-on-village-revitalization-FA3727250.

187 Katz, Peter. "$119M in New Hangar Projects Coming to Stewart Airport." Westfair Business Journal. May 23, 2024. https://westfaironline.com/aviation/119m-in-new-hangar-projects-coming-to-stewart-airport/.

188 New York State, Hudson River Valley Greenway. "Community Planning." https://hudsongreenway.ny.gov/community-planning.

189 Kahn, Kathy. "A New Government Center for Orange County?" Westfair Business Journal. September 2, 2010. https://westfaironline.com/construction/a-new-government-center-for-orange-county/.

190 Orange County, New York. "Home Investment Partnership Program (HOME)." https://www.orangecountygov.com/223/Home-Investment-Partnership-Program-HOME.

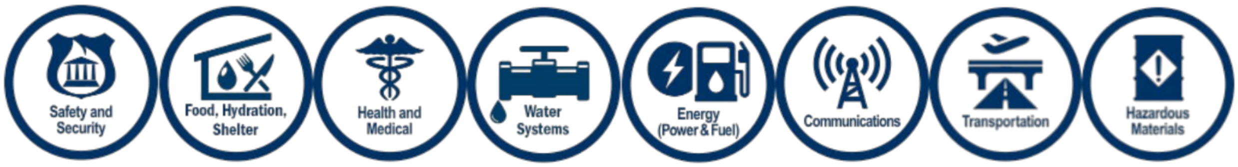

Figure 69: Community Lifelines

Ice Jams

Hazard Description

An ice jam is a large accumulation of ice in rivers or streams that interrupts normal water flow and often produces flooding conditions and/or nearby structural damage. Ice jam events are often short-lived and only affect localized reaches or areas of bodies of water[191]. There are two main types of ice jams: freeze-up and breakup. The former occurs during the early winter months and are often made of white, fine-grained frazil ice, while the latter occurs during the late winter months as spring emerges.[192]

Ice jams form when ice floating downstream in a river stalls and builds into a jam, forming a dam. The "reservoir" behind the dam quickly fills with water until out-of-bank flooding occurs. The observed effect can be very similar to flash flooding, and sudden flooding downstream may be caused by the ice jam abruptly failing or releasing. Typically, ice jams form at locations where an obstruction or a significant hydrologic change reduces the ice transport downstream. Natural obstructions in the river can include bends, intact sheet ice cover, or a decrease in channel slope; man-made obstructions can include bridges, existing dams, waterline crossings, and other channel constructions.[193]

Ice jams and the resulting floods can occur during fall freeze-up from the formation of frazil ice (a collection of loose, randomly oriented, needle-shaped ice crystals) during midwinter periods when stream channels freeze solid to form anchor ice. During spring break-up, ice jams may occur when rising water levels from snowmelt or rainfall break existing ice cover into large floating masses that lodge against bridges or other constructions. Damage caused by ice jam flooding may exceed that from open water flooding—flood elevations are typically higher than predicted for free-flow conditions, and water levels can change rapidly. During cold weather, there is a reduction in evapotranspiration, infiltration due to frozen ground, and surface storage as ground depressions are filled with snow and ice, increasing the amount of water being delivered to the channel.

Therefore, during colder seasons, the amount of excess water available for runoff will be greater than equal amounts of total available water during cold and warm seasons. Additional damage may arise from the force of floating ice colliding with buildings, other structures, and automobiles.[194]

The key parameters contributing to ice congestion and jams are[195]:

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[191] New York State Department of Environmental Conservation. Ice Jam Flooding, "Resources for Local Officials and Emergency Managers." https://dec.ny.gov/environmental-protection/water/water-quantity/dam-safety-coastal-flood-protection/flood-preparation/ice-jam-flooding.
[192] Womack, Claire, et al. "River Ice Jams in Iowa – Historical Evaluation, Impacts, and Predictability." National Weather Service. https://www.weather.gov/media/mbrfc/ice_jam/womack_et_al_2020.pdf.
[193] 2018 Orange County Multi-jurisdictional Hazard Mitigation Plan.
[194] 2018 Orange County Multi-jurisdictional Hazard Mitigation Plan. https://www.orangecountygov.com/DocumentCenter/View/21882/OCHMP---Cover-TOC-Section-1-0.
[195] Natural Hazards and Earth System Sciences. "River predisposition to ice jams: a simplified geospatial model." July 6, 2017. https://nhess.copernicus.org/articles/17/1033/2017/nhess-17-1033-2017.pdf.

- Reduced channel slope or slope break
- Reduced channel top width (naturally or due to border ice)
- Constricted channel from bends, meandering, islands, and bridges
- Presence of shallow reaches and bottom bars
- Presence of an intact ice cover

Location and Extent

Ice jam was not a profiled hazard for the 2018 Orange County Multi-Jurisdiction Hazard Mitigation Plan project. However, after numerous municipalities within the county raised issues regarding ice jams, ice jams were chosen for further analysis in the county plan, just as in the 2011 Orange County HMP.

The exact location of ice jams can often be challenging to specify. Ice jams are common in New York State, which the U.S. Army Corps of Engineers Cold Region Research and Engineering Laboratory (USACE CRREL) notes has experienced more ice jam events than any other state except Montana. Figure 70 depicts the locations of ice jams across the state from 1875 to 2024. The figure identifies Wallkill River as one of the top four most ice-jam-prone waterways in New York State, with 54 ice jam incidents over the period along its Ulster County and Orange County segments.[196]

[196] CRREL, Ice Jam Database. https://icejam.sec.usace.army.mil/ords/f?p=1001:2::::IR_STATE:NY.

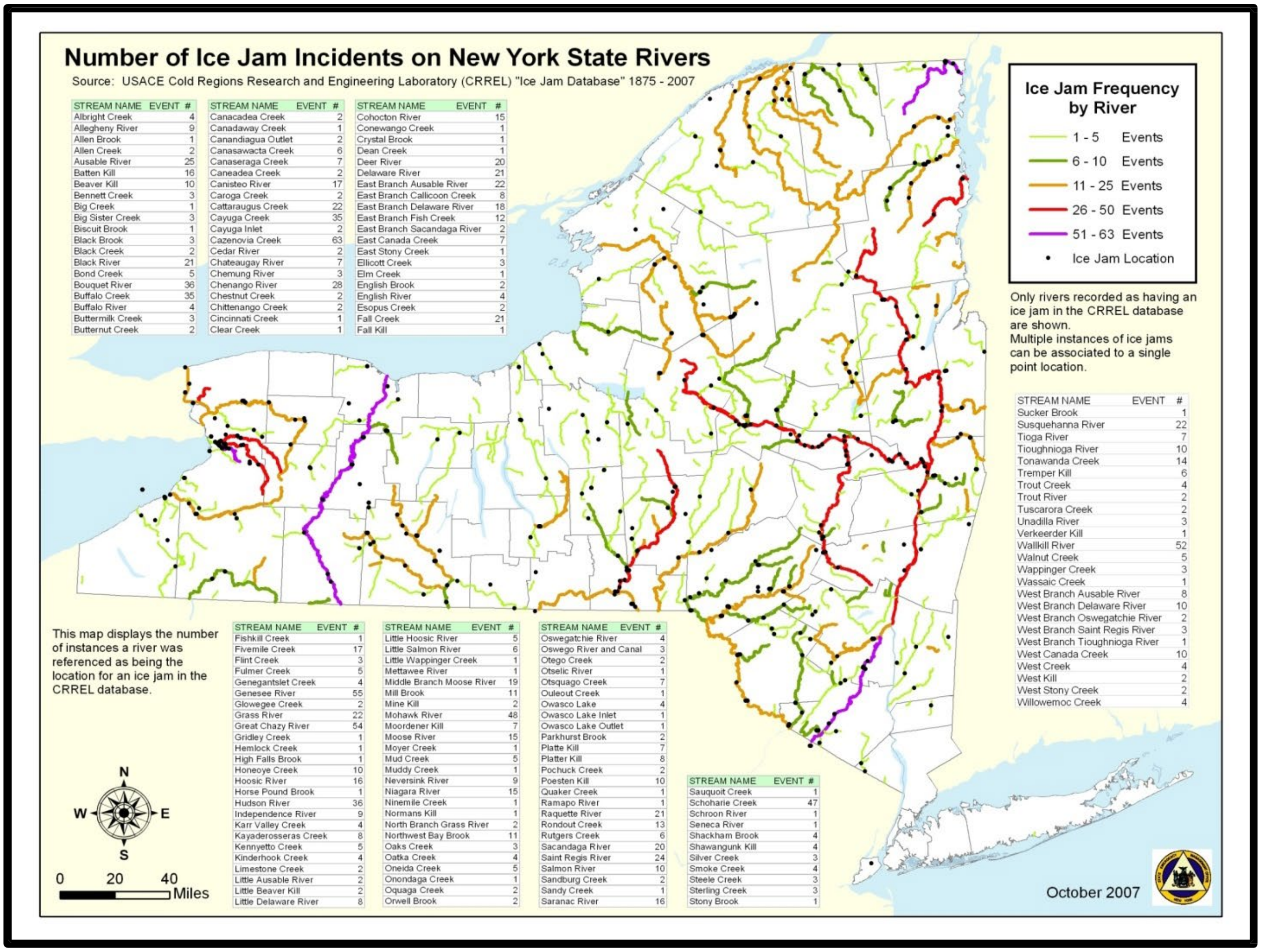

Figure 70: New York State Ice Jam Incidents, 1857–2024

Figure 71 shows the locations commonly susceptible to ice jams particular to Orange County. The map in the figure highlights ice jams in the Wallkill River, Delaware River, Neversink River, and Shawangunk Kill watersheds. The area around the City of Port Jervis is especially prone to ice jams.

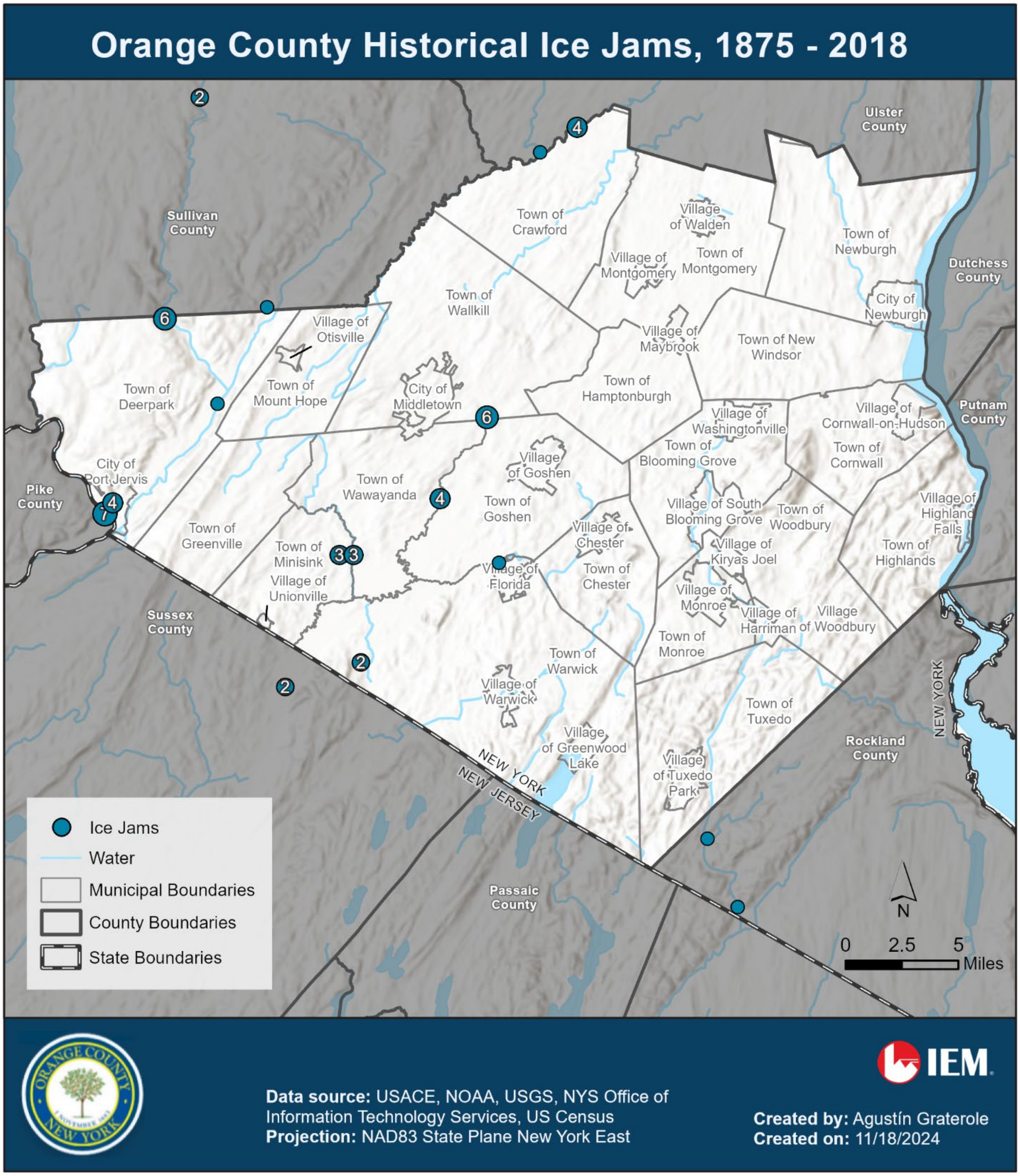

Figure 71: Orange County Ice Jam Incidents Recorded by U.S. Army Corps of Engineers Cold Region Research and Engineering Laboratory

Previous Historical Occurrence

USACE CRREL has recorded 34 ice jam events in Orange County since 1875. Of these, 12 occurred in the City of Port Jervis on the Delaware River, which the *New York Times* dubbed an "ice gorge" in the late 1800s (see Table 22). Phillipsburg, in the Town of Wallkill, and Pellets Island Mountain, in the Town of Wawayanda along the Wallkill River, are the next most ice-jam-prone locations in Orange County, with six and four occurrences, respectively. The hamlet of Pine Bush in the Town of Crawford has experienced four ice jams along its banks on the Shawangunk Kill, while the Town of Warwick's Pine Island has had two incidents on the Pochuck Creek. Ice jam events have been more prevalent in the county over the last 15 years.

Table 22: Ice Jam Occurrences Events, 1875–2024[197]

Date	Watercourse	Location	Municipality
2/27/1875	Delaware River	Port Jervis	Port Jervis, City of
2/11/1881	Delaware River	Port Jervis	Port Jervis, City of
1/1/1904	Delaware River	Port Jervis	Port Jervis, City of
3/8/1904	Delaware River	Port Jervis	Port Jervis, City of
3/19/1923	Wallkill River	Pellets Island Mountain	Wawayanda, Town of
1/26/1937	Wallkill River	Pellets Island Mountain	Wawayanda, Town of
2/8/1941	Wallkill River	Phillipsburg	Wallkill, Town of
2/8/1941	Wallkill River	Pellets Island Mountain	Wawayanda, Town of
2/22/1943	Wallkill River	Phillipsburg	Wallkill, Town of
2/28/1945	Pochuck Creek	Pine Island	Warwick, Town of
12/27/1945	Wallkill River	Phillipsburg	Wallkill, Town of
2/21/1948	Pochuck Creek	Pine Island	Warwick, Town of
2/21/1948	Wallkill River	Pellets Island Mountain	Wawayanda, Town of
2/11/1951	Wallkill River	Phillipsburg	Wallkill, Town of
2/28/1958	Wallkill River	Phillipsburg	Wallkill, Town of
1/22/1959	Wallkill River	Phillipsburg	Wallkill, Town of
1/22/1959	Shawangunk Kill	Pine Bush	Crawford, Town of
1/23/1959	Wallkill River	Unionville	Village of Unionville
2/25/1961	Shawangunk Kill	Pine Bush	Crawford, Town of
1/7/1962	Neversink River	Godeffroy	Deerpark, Town of
3/18/1963	Shawangunk Kill	Pine Bush	Crawford, Town of

[197] CRREL, Ice Jam Database. https://icejam.sec.usace.army.mil/ords/f?p=1001:2.

Date	Watercourse	Location	Municipality
03/19/1963	Wallkill River	Unionville	Village of Unionville
1/25/1964	Shawangunk Kill	Pine Bush	Crawford, Town of
2/16/1971	Delaware River	Port Jervis	Port Jervis, City of
1/24/1979	Quaker Creek	Florida	Florida, Village of
2/12/1981	Delaware River	Port Jervis	Port Jervis, City of
3/18/198	Delaware River	Port Jervis	Port Jervis, City of
2/5/1982	Delaware River	Port Jervis	Port Jervis, City of
1/30/1994	Delaware River	Port Jervis	Port Jervis, City of
2/1/1994	Delaware River	Port Jervis	Port Jervis, City of
1/19/1996	Delaware River	Port Jervis	Port Jervis, City of
1/24/1999	Verkeerder Kill	Crawford	Crawford, Town of
12/18/2000	Delaware River	Port Jervis	Port Jervis, City of
2/25/2011	Wallkill River	Walden	Walden, Village of

Descriptions of the impacts and damages resulting from these events have not always been recorded with these entries on the CRREL ice jam database. Some descriptions have been taken from other sources, as noted. Summaries of ice jam events with recorded descriptions follow:

- **February 27, 1875:** The *New York Times* described the City of Port Jervis as "panic-stricken" due to the severe ice jam on the Delaware River. Numerous streets, including Pike Street and King Street, and houses were flooded, and families had to be rescued by boat as the water level rose at a rate of one foot every minute. The Port Jervis gas works were inundated, and the *Times* later reported that the event caused $300,000 in property damage in the city.
- **February 11, 1881:** The *New York Times* reported that an ice jam on the Delaware River had flooded between 30 and 40 houses and caused an estimated $5,000 in damage.
- **March 3, 1981:** An ice jam on the Delaware River caused $14.5 million in damages in the towns of Port Jervis and Matamoras. The river first jammed at Thirsty Deer, followed by the Interstate 84 bridge, and then Port Jervis. King Street and Brain Street were then inundated. There were 40 miles of unbroken ice. On March 18, the Erie Railroad Delaware Bridge crossing the river to Lackawaxen was ripped from its pier and sent downstream, wiping out two other bridges. The ice jam caused flooding of agricultural and urban areas, damaging embankment, pavement, buildings, power, water, sewer, and telephone utilities. The death of a Matamoras resident was attributed to the ice jam. The jam was thought to be caused by an extremely cold winter followed by thaw and rains, coupled with the very sharp bend in the river at this location. Sandbagging and mechanical ice removal were employed to prevent further damage.

- **January 30, 1996:** Two flood events took place on January 19-20 and 27 in Port Jervis. The event on January 19–20 resulted in a massive ice run. Access roads to the island were blocked by high water. New tree scars showed very high water levels at between 5 and 10 feet, and that the ice passing through the diversion channel was around 3 feet thick. In several areas, the ice had come to rest within the treed areas, resulting in jams quickly building up in thickness and grounding (5–15 feet thick) in some locations. On January 31, evidence of a massive ice run all along the river was observed, particularly at the entrance to the diversion channel. Based on post-event photos, it appears that a short-lived jam occurred in the vicinity of Thirsty Deer Island. Prior to the ice and water reaching the downstream end of the diversion channel, the Thirsty Deer Island jam broke, reducing the water levels upstream and decreasing the amount of water entering the diversion channel. With less water to carry the ice through the diversion channel, it became jammed in place. The main channel then carried the bulk of the discharge, since it was open, and the diversion channel became jammed. This event was a good test of the diversion channel, which operated as intended.
- **January 24, 1999:** Officials reported an ice jam on the Verkeerder Kill along the Ulster and Orange County Border, in the vicinity of the confluence of the Verkeerder Kill and Shawangunk Kill rivers in Crawford. Ulsterville Road was closed from the intersection of Pirog Road South into the Town of Crawford in Orange County due to a bridge near the intersections of Ulsterville Road, Pirog Road, and Gillespie Street being flooded with four to five feet of water. Additional incidents were reported by Orange County staff at Horan Bridge over Indigot Creek in 1996 and several times at Denton Bridge since. Although no damages were recorded, some farmland was inundated at the latter, and one home was threatened at the former. Orange County staff also reported that a large ice jam had caused significant flooding in the City of Port Jervis in February 1857.
- **February 25, 2011:** On this date, the National Weather Service (NWS) issued a Flood Advisory in New York, NY, at 11:00 p.m. for urban and small streams due to ice jam flooding in Orange County. The observed river stage on the Wallkill River at Gardiner downstream in Ulster County had reached 9.98 ft and was rapidly rising due to an apparent breakup ice jam following warm temperatures in the region. The USGS station’s hydrograph located at Gardiner indicated that an initial peak of approximately 12.7 ft occurred in the early morning hours of Saturday, February 26, but rain was forecast for Sunday. The flood stage was 13.0 ft. At 11:00 a.m. on Tuesday, March 1, the NWS reported the stage to be 15.1 ft., with minor flooding occurring and forecast to continue over several days along the banks of the Wallkill River from the Village of Walden to the Town of Gardiner.

Future Potential Events

The probability of future events for Orange County is taken from the 2022 County Emergency Preparedness Assessment’s (CEPA) likelihood categories. Ice jams are ranked “medium,” meaning that the event could happen within the next 20 years. Going forward, it is likely that ice jams will continue to affect the riverfront area of Orange County, particularly in the City of Port Jervis, Town of Wallkill, Town of Wawayanda, Town of Crawford, and Town of Warwick. In recent years, there has been a drop-off in the frequency of ice jam events, which could lead to a decrease in the number of future events if this short-term trend prevails in the long term.

Impact of Climate Change

Ice jams are impacted by several climatic factors that are likely to shift under a future warming climate. Due to the complexity of river ice phenology, it can be challenging to project future ice jams. However, it is essential to be able to project future ice jam behavior. Additionally, research on ice jams is restricted by a lack of long-term monitoring data.[198]

Vulnerability Assessment

EXPOSURE

Ice jams that cause flooding can occur with little warning and pose significant threats to lives and properties. A coordinated multi-agency, multi-jurisdictional response may be necessary to effectively respond to an ice jam event. The NWS is instrumental in providing Orange County and municipalities with warnings in regard to potential ice jam events. The most vulnerable assets are critical infrastructure located near rivers and waterways. Ice jams are often unpredictable due to changing weather conditions, and areas affected can vary from year to year.

IMPACT ON COUNTY ASSETS

Water levels can rise rapidly behind jams which can form temporary backwater lakes and localized flooding upstream. Residences, businesses, and critical facilities near the ice jam can be damaged by this flooding. The sudden release of a jam can lead to flash flooding downstream. Large sheets of ice can be pushed up onto riverbanks and cause damage to structures on shorelines. When the ice jam breaks, these sheets of ice and other debris carried downstream and can cause further damage. MitigateNY reports that homes have been pushed off their foundations by these sheets of ice.

Impacts of ice jams are similar to other types of flooding. Structures can be damaged by flood waters that saturate flooring, frames and foundations and lead to deterioration and mold growth. Floodwaters can damage electrical and HVAC systems and other building components. Road closures due to flooding or blockage by ice and debris may limit transportation routes. Evacuations caused by flooding near ice jams may temporarily displace residents or close businesses. Flash flooding following an ice jam break can injure or drown people downstream. Building repairs, contents losses, and business interruptions all contribute to economic losses in the community. Flooding can also affect utility systems may lead to power outages or other service interruptions. Impacts on natural systems may include erosion of banks, damage to vegetation and wildlife habitat, and water can become contaminated by pollutants or waste runoff.

[198] Zhang, F., Elshamy, M. & Lindenschmidt, K.E. "Climate change impacts on ice jam behavior in an inland delta: a new ice jam projection framework." *Climatic Change* 171, 13 (2022). https://link.springer.com/article/10.1007/s10584-022-03312-3.

Assets near the Delaware, Wallkill, Neversink, and Shawangunk Kill rivers and Quaker Creek and Pochuck Creek, as well as other rivers and tributaries are at risk to potential impacts from ice jams.

NATIONAL RISK INDEX

RISK SCORE

Although the National Risk Index (NRI) does not specifically rank the risk of ice jams, the 2022 CEPA states that the consequence of ice jams is medium. This means that the event would have a noticeable impact on the people, responders, property, and economy of the county; mutual aid would likely be required from other counties and/or the state.

ESTIMATED ANNUAL LOSSES

Estimating annual losses from ice jams in Orange County is challenging due to the unique nature of the hazard, which combines elements of riverine flooding and winter weather events. While FEMA's NRI offers insights into flooding and severe winter storms, it does not specifically account for the complexities of ice jams, which can cause significant, sudden flooding during freeze-thaw cycles. Ice jams form when river ice accumulates and obstructs water flow, causing a rapid rise in water levels and potentially leading to localized flooding. Given the rarity and variability of these events, it can be difficult to predict annual losses, as damage can range from minimal to severe, depending on ice formation, river conditions, and temperature fluctuations. This variability illustrates the necessity of more refined modeling to better understand how Orange County is impacted by ice jams.

VULNERABLE POPULATIONS

For more information on vulnerable populations, please refer to the Orange County Profile section of this plan.

In Orange County, certain populations are more vulnerable to the impacts of ice jams, which can cause rapid, unpredictable flooding in areas near rivers and streams during freeze-thaw cycles. Vulnerable populations, including older residents, individuals with mobility challenges, low-income households, and people without access to reliable transportation, may have a restricted ability to evacuate quickly in an ice jam-induced flood or lack the resources to recover from property damage. Additionally, residents of mobile homes or older, flood-prone housing are at increased risk of harm and property loss.

DEVELOPMENT TRENDS

Development trends in Orange County can significantly influence ice jam frequency and severity. Increased construction near rivers and waterways, particularly in floodplains, can alter natural water flow and create conditions conducive to ice formation and accumulation. Urbanization often leads to more impervious surfaces, such as roads and buildings, which reduce natural water absorption of water and increase runoff into rivers during freeze-thaw cycles. This added runoff can raise water levels, making rivers more susceptible to ice jams.

COMMUNITY LIFELINES

Ice jams can disrupt critical community lifelines (see Figure 22), particularly during freeze-thaw cycles. Rivers and streams becoming blocked with ice can lead to the occurrence of rapid flooding, disrupting transportation by making roads impassable and isolating communities. Energy infrastructure, including power lines and heating resources, may also be at risk, especially if flooding causes outages during cold weather, leaving residents without heat. Water services, such as drinking water and wastewater management, may be compromised if facilities are flooded or access is restricted. Additionally, blocked roads or hazardous conditions can limit emergency services and healthcare access, potentially delaying response times.

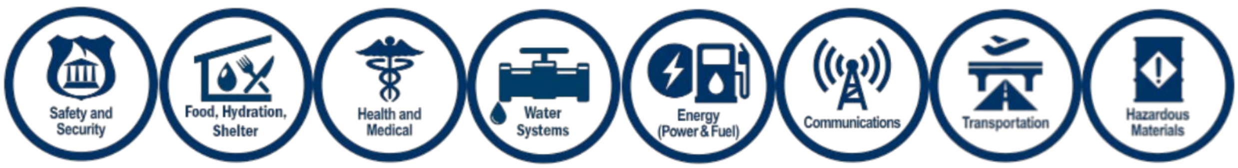

Figure 72: Community Lifelines

Infrastructure Failure

Hazard Description

Infrastructure failure encompasses the breakdown of essential systems that support community functionality, safety, and quality of life. An infrastructure failure can be either natural or human-caused due to physical or cyber-attacks, flooding, tornadoes, or other severe weather events. Infrastructure failures, especially those impacting critical systems, can disrupt transportation, jeopardize public safety, and strain economic resources. Critical infrastructure, as defined by the USA Patriot Act of 2001 (42 U.S.C 5195c(e)), is systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.[199] Infrastructure includes but is not limited to roadways, bridges, hospitals, utilities, airports, and community support facilities (e.g., fire, law enforcement, search/rescue).

Failures can result from various causes, including aging infrastructure, extreme weather events, cyberattacks, or natural hazards like earthquakes or floods. When these systems fail, communities may face widespread power outages, limited access to clean water, communication barriers, and transportation disruptions, which can delay emergency response and impact public health and safety. While specific vulnerabilities vary by infrastructure type, the interdependence of these systems means that a failure in one area can have cascading effects, making it crucial to assess, maintain, and reinforce infrastructure to minimize the risk and impact of utility failures.

Location and Extent

The location and extent of infrastructure failure are difficult to predict. Although some of the infrastructure can be predicted due to age. It can be difficult to know the overall impacts it can have on Orange County and the municipalities. Infrastructure failure disasters are complex scenarios. They can be challenging to respond to, prepare for, and mitigate, as the infrastructure is often a mechanism for responding to, preparing for, and mitigating hazards. Further, infrastructure is usually owned by various public and private interests, making delegating responsibilities difficult.

Previous Historical Occurrence

There have been multiple infrastructure incidents since 2019, especially after the flooding in August of 2023. Table 23 depicts a few events that have happened since 2019.

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[199] 42 U.S. Code § 5195c - Critical infrastructures protection. https://www.law.cornell.edu/uscode/text/42/5195c.

Table 23: Infrastructure Failure Events, 2019–2024

Affected Location	Date	Impact
Highlands	August 2023	Popolopen Bridge damaged after flooding event and had major impacts on traffic and economic activity

Future Potential Events

The probability of future events is pulled from the likelihood categories of the 2022 County Emergency Preparedness Assessment (CEPA). Infrastructure failure is ranked medium, meaning this event is likely to occur within the next 20 years in the county.

Impact of Climate Change

While a direct correlation between infrastructure failure and climate change is still under study, an increasing number of extreme heat events is already placing additional strain on the electric grid. As temperatures rise, energy demand spikes, especially from cooling systems, which can overwhelm grid capacity and heighten the risk of failures.

Vulnerability Assessment

EXPOSURE

Infrastructure failure can be challenging to predict as they can occur for many reasons, with or without notice. Severe weather events can cause damage or destruction to infrastructure, resulting in complete loss of capabilities, as can any form of cyber or physical attack. All assets are at risk; however, an infrastructure incident is more likely to occur in urban, densely populated areas, as that is where most infrastructure is located.

IMPACT ON COUNTY ASSETS

The entirety of Orange County is at risk for an infrastructure failure, specifically road-based and utility-based events. However, more highly populated areas are at a higher risk for building-based infrastructure incidents. Critical infrastructure failure may affect the entire county but would more than likely take a more significant toll on vulnerable populations within the area.

VULNERABLE POPULATIONS

For more information on vulnerable populations, please reference County Profile.

In the event of an infrastructure failure, vulnerable populations, particularly individuals with medical dependencies and mobility challenges, face heightened risks. Those on dialysis, oxygen, or other life-sustaining medical treatments require consistent access to power and healthcare facilities; any disruption can threaten their health and well-being. For example, during a power outage, dialysis patients may face delays in receiving treatment, and individuals dependent on powered medical devices could experience life-threatening interruptions. Additionally, individuals with mobility issues, including the elderly or disabled, may have difficulty evacuating or accessing essential resources when transportation systems or elevators fail.

DEVELOPMENT TRENDS

Orange County and its municipalities are constantly trying to include ways to regulate safety and are consistent with state and federal regulations to ensure that infrastructure has the best chance of withstanding destructive events.

COMMUNITY LIFELINES

During an infrastructure failure emergency, several critical community lifelines (see Figure 22) are likely to be significantly impacted. Power outages can disrupt energy supplies, affecting residential and commercial operations and jeopardizing public safety services, including emergency response systems. Water and wastewater services may be compromised, leading to limited access to clean drinking water and potential public health risks from untreated sewage. Transportation networks can become incapacitated, hindering mobility and access to essential services, such as healthcare facilities and grocery stores. Additionally, telecommunications failures can sever communication lines, preventing coordination among emergency responders and limiting residents' access to vital information. The interconnectedness of these lifelines means that a failure in one area can create a cascading effect, emphasizing the importance of robust infrastructure resilience and emergency preparedness to maintain community stability during such events.

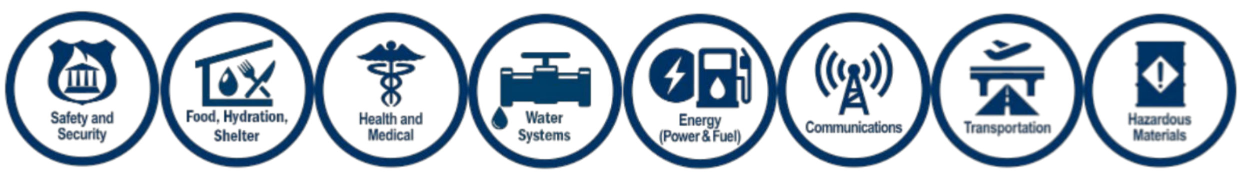


Figure 73: Community Lifelines

Landslide

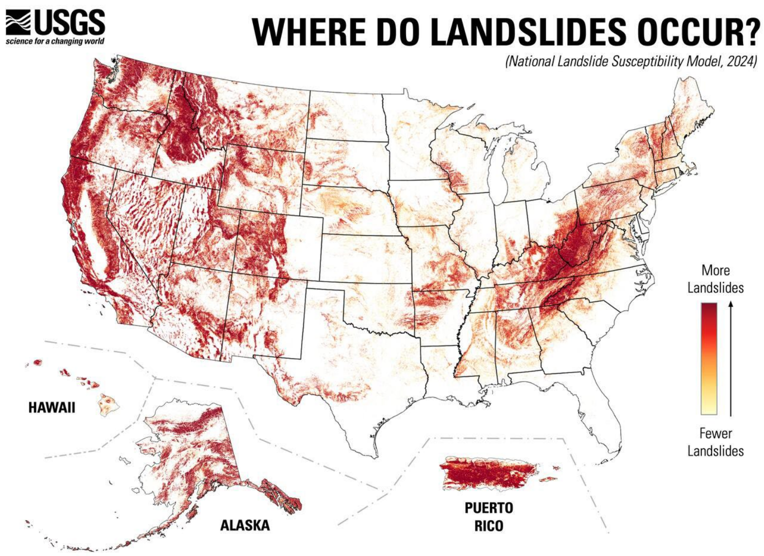
Hazard Description

Landslides are defined as the downward and outward movement of slope-forming materials reacting to the force of gravity. Landslides can move slowly or rapidly. A rapid-moving landslide can travel several miles and impact trees, cars, and infrastructure, affecting large areas. Water, rainfall, or irrigation can create landslides by oversaturating the land and creating an unstable environment. Landslides occur in every state of the United States, with areas that are composed of weak or fractured materials resting on a steep incline the most susceptible.[200] Storms, earthquakes, fires, alternate freezing or thawing, and the steepening of slopes by erosion or human modification can activate landslides. Landslide problems can also be caused by land mismanagement, especially in mountainous and coastal regions. Land-use zoning, professional inspections, and proper design can minimize many landslide, mudflow, and debris flow problems in areas with high landslide potential. A mudflow is a rapidly moving mass of water and sediment down a slope. A debris flow is similar to a mudflow but contains larger materials such as boulders and trees. Debris flows can move quicker than a normal landslide, with speeds up to 35 mph.

Location and Extent

New York's rock type, topography, structural integrity, and climate make it susceptible to landslides. All areas of New York have had landslides occur, including Orange County and the planning area. Landslides that are the most common in New York State result from New York's physiography and glacial history. The National Landslide Susceptibility Model (Figure 74) is based on an analysis of terrain features and past landslide locations to model where landslides are more or less likely to occur. Figure 75 shows the latest inventory of landslides in New York.

[200] USGS. "Landslide Basics." July 1, 2024. https://www.usgs.gov/programs/landslide-hazards/science/landslide-basics.



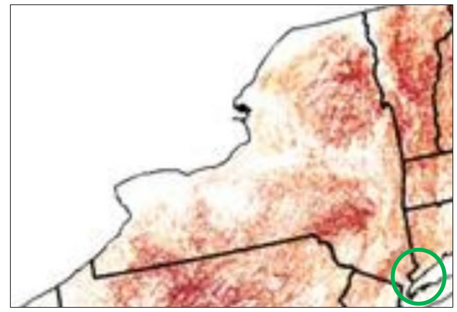


Figure 74: National Landslide Susceptibility Model

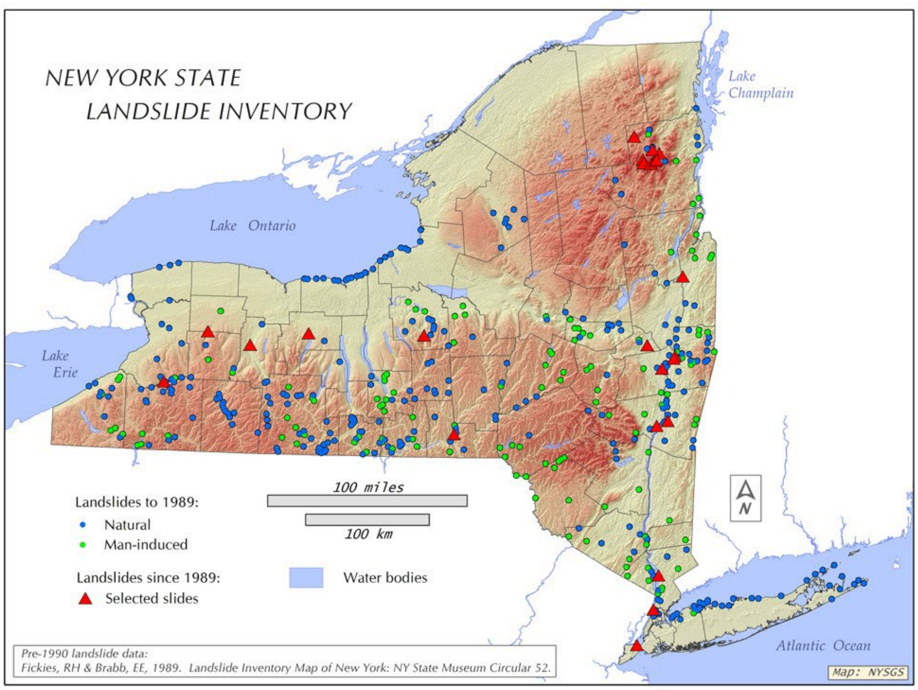


Figure 75: New York State Landslide Inventory

Large lakes are a basin for the types of sediments (clay and silts) that result in slope failures in the state.[201] Figure 76 shows the glacial landscape evolution that contributes to present-day landslide risk in New York.[202]

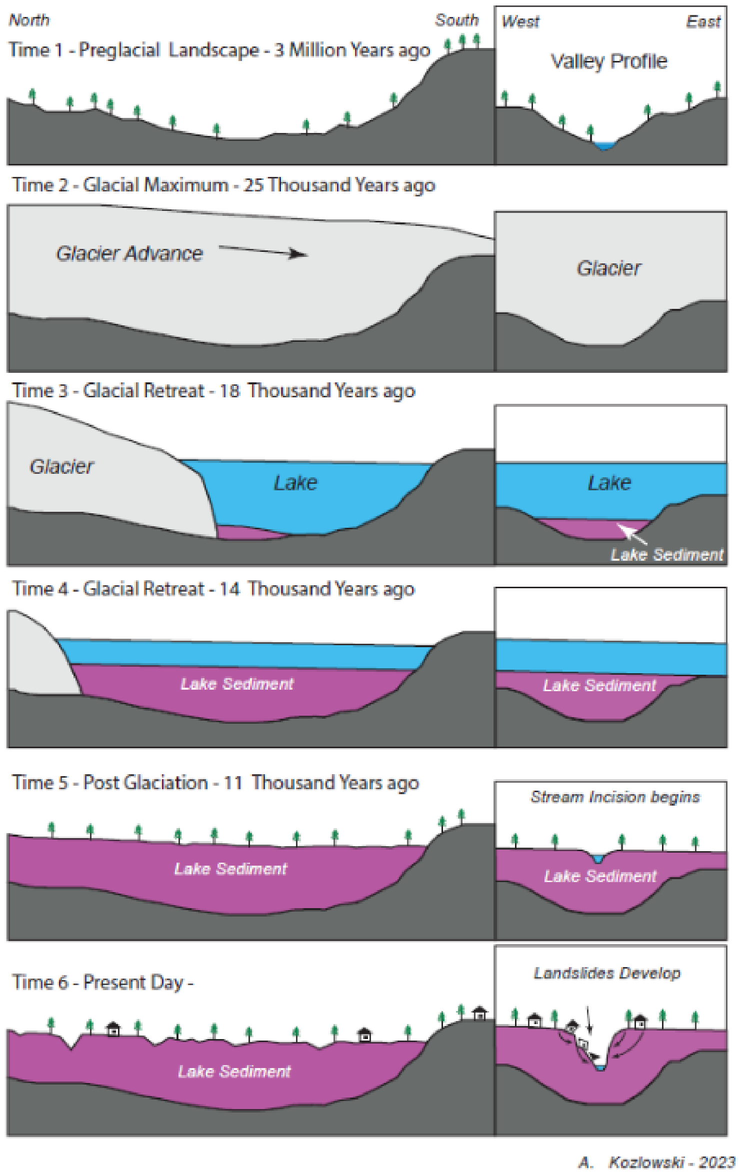


Figure 76: Glacial Landscape Evolution, New York

The U.S. Geological Survey (USGS) landslide susceptibility mapping uses three basic classifications to communicate the risk, in conjunction with three further classifications to communicate the combinations of susceptibility and incidence:

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201 New York State Museum. "Landslides in New York State." https://nysm.nysed.gov/research-collections/geology/research/landslides-new-york-state.
202 MitigateNY. Glacial History. https://mitigateny.org/hazards_of_concern/landslide/landslide_resources.

- High incidence (greater than 15% of the area involved)
- Moderate incidence (1.5%–15% of the area involved)
- Low incidence (less than 1.5% of the area involved)
- High susceptibility/moderate incidence
- High susceptibility/low incidence
- Moderate susceptibility/low incidence

Figure 77 shows the susceptibility to landslides in the Orange County planning area. As noted by the colors, there is a low to high chance, depending on the location.

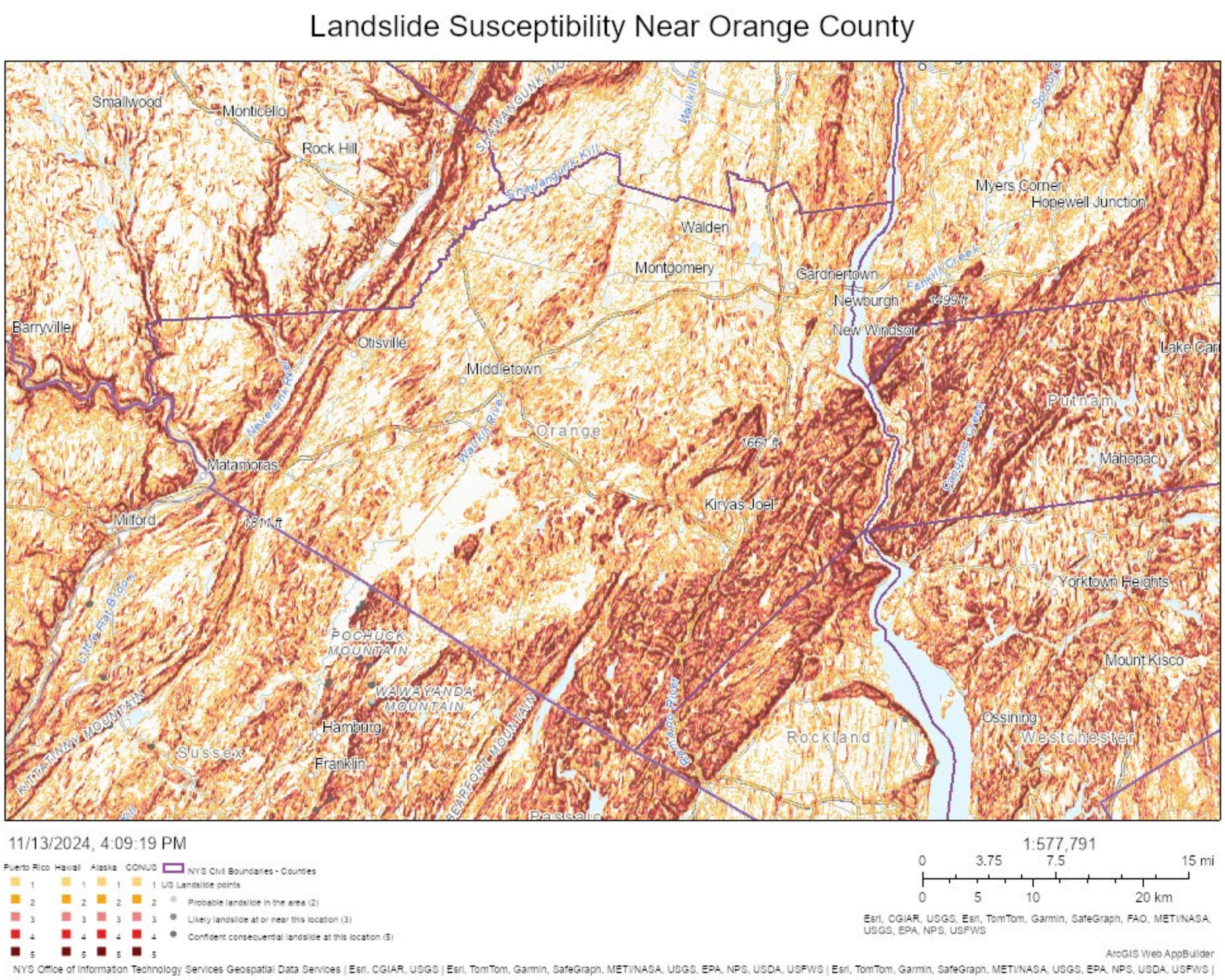

Figure 77: Landslide Susceptibility of Orange County[203]

[203] USGS. U.S. Landslide Inventory and Susceptibility. 2024. https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=ae120962f459434b8c904b456c82669d.

Previous Historical Occurrence

There is no history of presidential disaster declarations in New York State due to landslides. The National Centers for Environmental Information (NCEI) recorded six non-declared events statewide from January 1, 1996, to May 31, 2024. Landslides have not impacted Orange County. According to the NCEI, there have been no recorded landslides since 2019.[204] Although there were no recorded events with NCEI, the severity of a landslide depends in large part on the degree of development in the area in which it occurs and the geographic area of the slide itself. Generally speaking, landslides often result in devastating consequences, but only in very localized areas. A landslide occurring in an undeveloped area would be less severe because lives and property would not be affected; the only impacts would be to land, vegetation, and possibly some wildlife. On the contrary, a landslide occurring in a developed area can have devastating effects, ranging from structure and infrastructure damage to injury and/or loss of life. Structures or infrastructure built on susceptible land would likely collapse as their footings slide downhill, while those below the land failure would likely be crushed. Landslides in the area of roadways can have the potential to damage or destroy vehicles and force other drivers to have accidents.

Future Potential Events

The probability of future events is pulled from the likelihood categories of the 2022 County Emergency Preparedness Assessment (CEPA). Landslide was ranked low, meaning this event could occur once within the next 50 years. While New York State has a history of landslides, Orange County has not reported any. However, flooding, a factor known to trigger landslides, has occurred in the county, and its hilly terrain further increases the likelihood. These conditions suggest that Orange County may experience reportable landslides in the future. Landslides are very difficult to predict and can occur with no warning. They also have impact risks to the natural environment, human safety, property, infrastructure, utilities, and transportation, with impacts causing injuries or fatalities.[205] Some landslides show clues that they are in danger of happening, such as new cracks in the ground, structural separation from the surrounding soil, or trees that are tilting.[206]

Impact of Climate Change

As of spring 2023, there has not been any research showing a direct link between climate change and current or historic landslide events in New York State. Landslides may be impacted by climate change in the future, however. The underlying conditions and causes of landslides, such as bedrock stability and heavy rain events, are influenced by climate-related trends like temperature increases, sea level rise, and extreme precipitation events. Unseasonably warm days leading to rapid snowmelt, or extreme precipitation events, can make the ground overly saturated. This in turn creates an unstable environment on steep slopes, which can cause landslides. Warming trends and increasingly frequent and intense

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[204] NOAA, National Centers for Environmental Information. Storm Events Database, Orange County, NY. https://tinyurl.com/yc4pe836.
[205] 2023 New York State Hazard Mitigation Plan. Hazards of Concern, Landslide. https://hazardmitigation.ny.gov/hazards_of_concern/landslide.
[206] USGS. Landslide Basics. July 1, 2024. https://www.usgs.gov/programs/landslide-hazards/science/landslide-basics.

extreme precipitation events will only continue to become more common due to climate change. As climate change continues, the existing equilibrium between landscape development and climate that New York has experienced since the end of the last Ice Age will change. Increased precipitation amounts and more frequent extreme precipitation events will lead to the development of a new equilibrium. This adjustment in equilibrium will likely increase incidence of landslide events.[207]

Vulnerability Assessment

EXPOSURE

To understand its vulnerability to natural hazards, a community must determine the assets that are exposed or vulnerable in the hazard area. Landslides cause extensive damage to the built environment. The shifting ground can cause damage to plumbing lines and road surfaces and may result in accumulation of debris in stormwater drainage paths, ultimately leading to flooding. Manufactured homes are highly susceptible to damage from landslides due to their lightweight construction. Embankment erosion may lead to road subsidence and failure. Any buildings located on slopes or hillsides are also at risk to landslides during times of heavy rainfall because fully saturated soil may become destabilized.[208]

IMPACT ON COUNTY ASSETS

Landslide impacts are often localized and occur irregularly, and triggering mechanisms vary widely. Landslides have not been a frequent occurrence in Orange County; however, the current Landslide Susceptibility Model indicates that the area is susceptible to landslides. The resolution of this model is not sufficient to identify specific facilities at risk to landslide, but general impacts can be described. All populations, buildings, facilities, and infrastructure are considered exposed to this hazard and could be affected. Figure 77 indicates susceptibility to landslides is higher in the southeast area of the county, including the towns of Tuxedo, Woodbury, Highlands, Cornwall, and parts of Warwick and Monroe. A corridor roughly following the Neversink River in the northwest area of the county also has higher landslide susceptibility.

PEOPLE

Rapidly moving landslides can present a significant risk to human life. Those who live, work, or travel in areas prone to landslides are more at risk to injury or loss of life. Residents can also be affected indirectly if landslides disrupt transportation, utility, and other community lifelines, as well as the negative economic effects of damage to these systems or businesses.

INFRASTRUCTURE

Water, wastewater, communications, power, and other utility services are critical community needs. These systems can be damaged by landslides, resulting in loss of service to the community. Loss of these

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[207] MitigateNY. Hazards of Concern, Landslide – Risk Profile. https://mitigateny.org/hazards_of_concern/landslide/landslide_risk_profile.
[208] Ibid.

services can have extensive impacts on residents and businesses. Transportation systems such as roads or railways can also be damaged, and road closures may isolate some individuals and possibly impede emergency response. I-87, US 6, US 209, NY 32, NY 293, and NY 17 are among the transportation routes in higher susceptibility areas.

ECONOMY

Residents are dependent on roads and bridges to travel to work. Landslide damage to transportation networks may cause delays and detours that affect employees and businesses. Interruptions to utility services from landslide damage may also disrupt business and result in economic losses.

NATURAL SYSTEMS

Landslides along streams and lakes may affect water quality and also affect aquatic and other wildlife. Localized damage to vegetation and other natural systems in susceptible areas is also possible.

AGRICULTURE

Landslides may have a localized impact on agricultural areas. Agriculture-related businesses may also experience disruptions from utility and road damage.

NATIONAL RISK INDEX

RISK SCORE

In Orange County, Landslides are not particularly common. The FEMA National Risk Index (NRI) includes data on the expected annual losses due to individual natural hazards, historical loss, and overall risk at a county and Census tract level. Based on the NRI, Orange County has a relatively moderate rating for the risk index and a score of **85.21** for landslides.

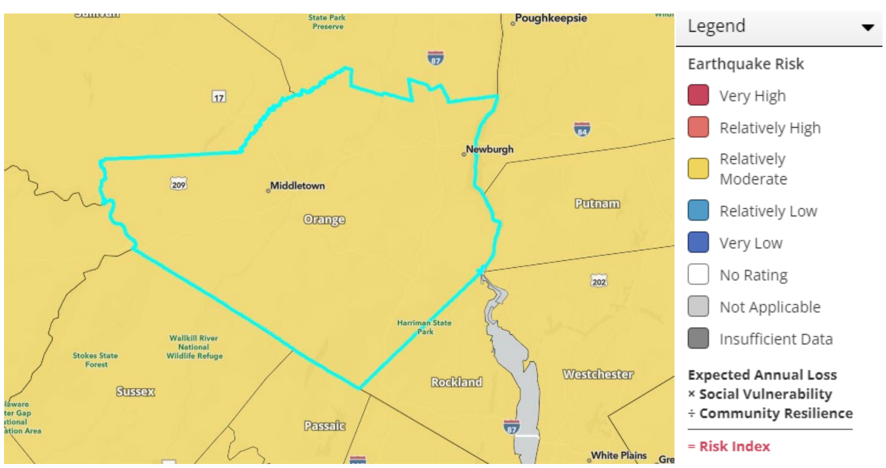

Figure 78: FEMA National Risk Index Orange County Landslide Score, Map and Legend

ESTIMATED ANNUAL LOSSES

According to the NRI, the expected annual losses from a landslide in Orange County, NY, is $152,000. The county has a relatively moderate risk compared to the rest of the United States. The frequency for Orange County is 0 events per year.[209] According to the NYS Hazard Mitigation Plan (2023), Hazus-MH software estimates that out of the 62 counties in the state, Orange County ranks 20th in terms of exposure to landslide hazard events. Figure 37 illustrates the National Risk Index rating for the Expected Annual Loss for Orange County from landslides.

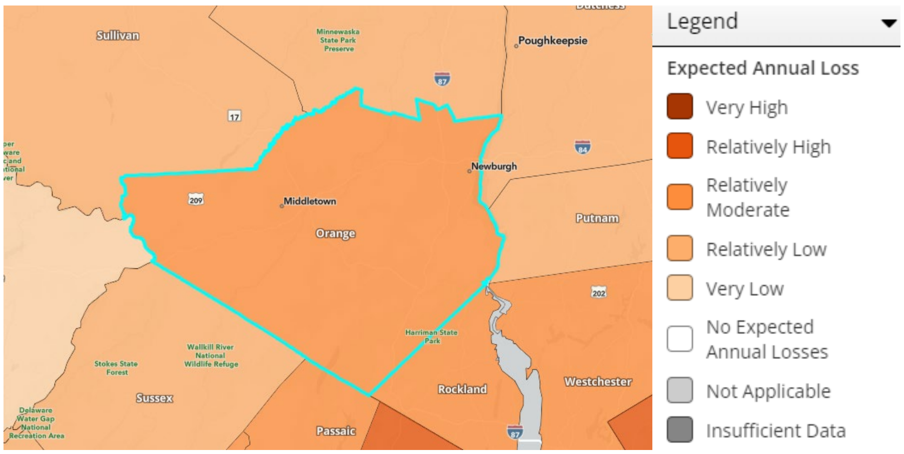

Figure 79: Landslide National Risk Index – Expected Annual Loss

VULNERABLE POPULATIONS

For more information on vulnerable populations, please reference the Orange County Profile section of this plan.

Certain populations are particularly vulnerable to landslides due to their proximity to steep slopes or unstable soil areas. These vulnerable groups include low-income households, elderly residents, people with disabilities, and those living in older or inadequately constructed homes, especially near hillsides or in rural areas. Limited financial resources may prevent some residents from implementing protective measures, like slope stabilization or property relocation, to mitigate landslide risk. Additionally, people with limited mobility or access to transportation may face challenges evacuating quickly in a landslide event.

DEVELOPMENT TRENDS

Development trends in Orange County can play a significant role in increasing the risk and frequency of landslides. Construction on or near slopes, especially without proper erosion control measures, can destabilize the soil, making it more susceptible to landslides. The removal of vegetation to make way for new developments also reduces slope stability, as trees and plants help anchor the soil and absorb excess water. Additionally, an increase in impervious surfaces, like roads and buildings, leads to greater water

[209] FEMA, NRI. Landslide. https://hazards.fema.gov/nri/map.

runoff, which can erode slopes and add pressure to unstable terrain. These development practices, if not managed carefully, may heighten landslide risks for nearby communities.

COMMUNITY LIFELINES

Landslides can disrupt community lifelines (see Figure 22), particularly critical infrastructure in areas with steep terrain or near or around hillsides. Transportation routes, such as roads and railways, are highly vulnerable, as landslides can block or damage them, isolating communities and delaying emergency response efforts. Energy infrastructure, including power lines and pipelines, may be compromised if they are in the path of a landslide, leading to potential power outages and hazards from ruptured lines. Water systems can also be affected if landslides cause sediment to enter reservoirs or damage water mains, impacting both drinking water and wastewater services. Emergency services and healthcare access may face delays if roads are obstructed, limiting timely medical assistance for those in need.

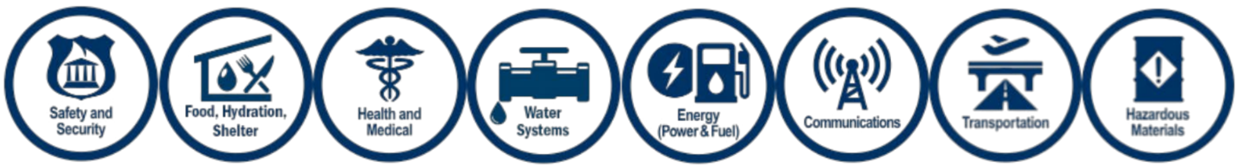

Figure 80: Community Lifelines

Severe Thunderstorms

Hazard Description

Severe thunderstorms, which include hailstorms, windstorms, and thunderstorms, can cause damage from wind, hail, heavy rainfall, and/or lightning strikes. Moreover, severe thunderstorms can result in flooding, power outages, sanitation threats, and debris.

HAILSTORMS

Often associated with severe thunderstorms, hailstorms are characterized by balls or irregularly shaped lumps of ice greater than 0.75 in (1.91 cm) in diameter, which fall with rain. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to warm air rapidly rising into the upper atmosphere and the subsequent cooling of the air mass. Gradually, frozen droplets accumulate on the ice crystals until they reach a certain weight, at which point they fall as precipitation. The size of hailstones is a direct function of the storm's severity and size. High-velocity updraft winds are required to keep hail in suspension in thunderclouds. Peak periods for hailstorms are late spring and early summer, when the jet stream migrates northward across the United States.

WINDSTORMS

Wind is defined as the motion of air relative to the earth's surface. The most significant aspects of the hazard are the horizontal component of the three-dimensional flow and the near-surface wind phenomenon. Extreme windstorm events are associated with tropical cyclones, winter cyclones, and severe thunderstorms. Winds vary from zero at ground level to 200 mph (89 m/s) in the upper atmospheric jet stream at 6 to 8 mi (10 to 13 km) above the earth's surface.

- **Derecho** is a widespread, long-lived windstorm associated with a band of rapidly moving showers or thunderstorms.[210] A typical derecho comprises numerous microbursts, downbursts, and downburst clusters.
- **Straight-line winds** describe any thunderstorm wind not associated with the rotation that usually indicates a tornado. The National Weather Service (NWS) classifies straight-line winds as severe when they meet or exceed 58 miles per hour. Straight-line wind intensity can be as powerful as a tornado.[211]

THUNDERSTORMS

The NWS estimates that over 100,000 thunderstorms occur on the U.S. mainland each year, of which approximately 10% are classified as "severe." Thunderstorms can produce deadly and damaging tornadoes, hailstorms, intense downburst and microburst winds, lightning, and flash floods. To determine the duration of a thunder event, the time between the first and last peals of thunder is measured. The last

[210] Corfidi, Stephen F., et al. "About Derechos." NOAA, Storm Prediction Center. February 12, 2024. https://tinyurl.com/e88nnk3m.
[211] New York State Hazard Mitigation Plan. "Wind." https://mitigateny.org/hazards_of_concern/wind.

peal of thunder is defined as that which is followed by a period of at least 15 minutes without a further peal.

LIGHTNING

Lightning, a feature of all thunderstorms, can strike anywhere. Generated by the buildup of charged ions within a thundercloud, the discharge of a lightning bolt interacts with an optimal conducting object or surface on the ground. The air within the channel of a lightning strike can reach temperatures exceeding 50,000ºF. On average, lightning strikes are fatal to approximately 10% of people who are struck.[212]

Location and Extent

Severe thunderstorm risk categories are used to assess and communicate the potential impact and intensity of severe weather events. The Storm Prediction Center (SPC) classifies these risks based on a scale from “marginal” to “high”, indicating the likelihood of damaging winds, large hail, and tornadoes. In Orange County, these risk categories are crucial for informing local preparedness and response efforts, given that the region’s infrastructure and population are vulnerable to the impacts of severe weather. A “marginal” or “slight” risk may prompt a limited response, while an “enhanced” or “moderate” risk marks an increased chance of widespread damage, including power outages, property damage, and transportation network disruptions. Although rare, a “high” risk signals an exceptional threat, requiring immediate action to safeguard life and property. Figure 81 highlights the SPC’s categories of thunderstorm risk.

[212] Centers for Disease Control and Prevention. “Frequently Asked Questions About Lightning.” April 15, 2024. https://www.cdc.gov/lightning/faq/index.html#:~:text=About%2010%25%20of%20people%20struck%20by%20lightning%20die.,die%2C%20most%20commonly%20because%20of%20a%20heart%20attack.

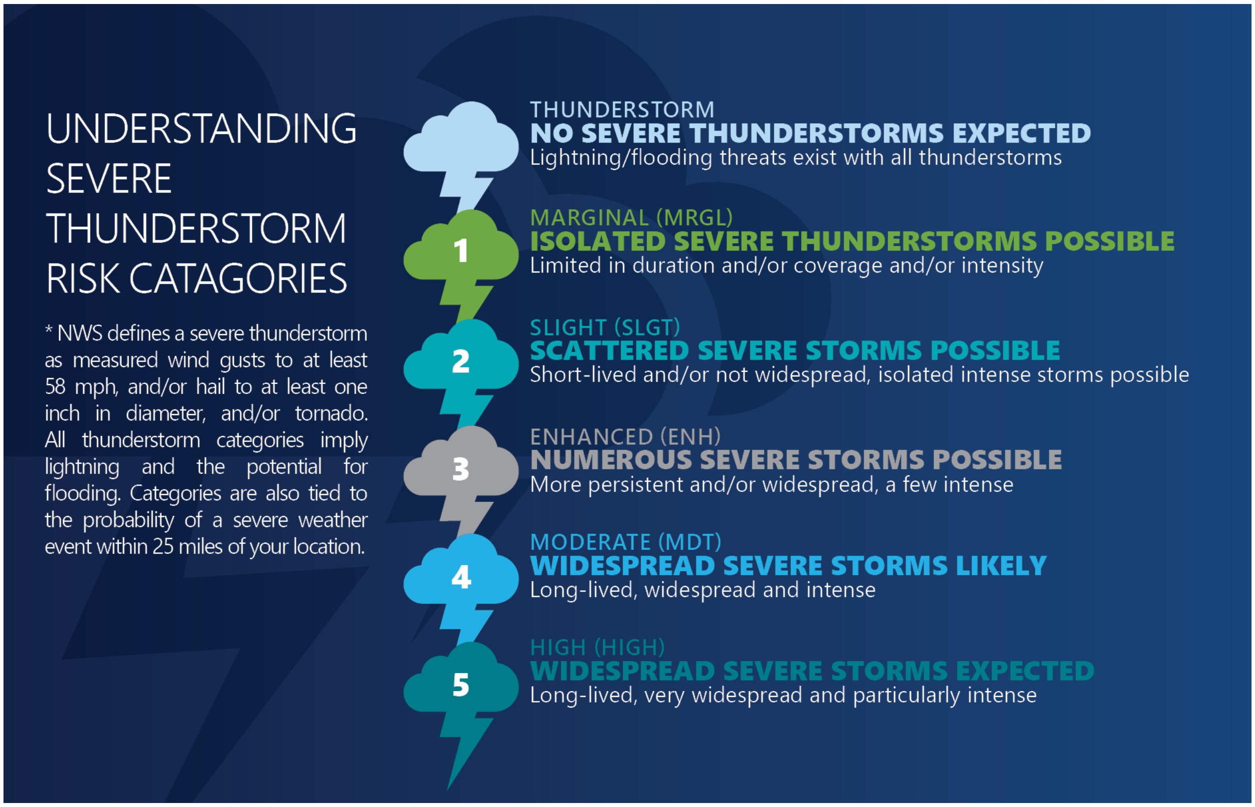

Figure 81: Storm Prediction Center Severe Thunderstorm Risk Categories[213]

All regions of the U.S. experience extreme wind events, the severity of which depends upon the maximum sustained winds experienced in a given area. Extreme winds pose a significant threat to life, property, and infrastructure due to both direct wind forces and wild flying debris, such as rocks, lumber, fuel drums, sheet metal, and any type of loose gear that the wind can pick up and hurl with great force. Extreme winds also down trees and power lines, often resulting result in power outages across an affected area. Table 24 illustrates the severity and typical effects of various wind speeds obtained via the National Oceanic and Atmospheric Administration National Climatic Data Center (NOAA NCDC) website.

Table 24: Severity and Typical Effects of Various Wind Speeds

Maximum Wind Speeds	Equivalent Saffir-Simpson Scale* (Hurricanes)	Equivalent Fujita Scale (Tornadoes)	Severity	Typical Effects
40–72 mph *(35–62 kt)*	Tropical Storm = 39–73 mph	F0	Minimal	Some damage to chimneys; twigs and branches broken off trees; shallow-rooted trees pushed over; signboards damaged; some windows broken; hurricane wind speed begins at 73 mph.

[213] NOAA, Storm Prediction Center. "SPC Products." https://www.spc.noaa.gov/misc/about.html.

Maximum Wind Speeds	Equivalent Saffir-Simpson Scale* (Hurricanes)	Equivalent Fujita Scale (Tornadoes)	Severity	Typical Effects
73–112 mph *(63–97 kt)*	Cat 1 = 74–95 mph Cat 2 = 96–110 mph Cat 3 = 111–130 mph	F1	Moderate	Surfaces peeled off roofs; mobile homes pushed off foundations or overturned; outbuildings demolished; moving vehicles pushed off the roads; trees snapped or broken.
113–157 mph *(98–136 kt)*	Cat 3 = 111–129 mph Cat 4 = 130-156 mph Cat 5 > 155 mph	F2	Considerable	Roofs torn off frame houses; mobile homes demolished; frame houses with weak foundations lifted and moved; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
158–206 mph *(137–179 kt)*	Cat 5 > 157 mph or higher	F3	Severe	Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forests uprooted; heavy cars lifted off the ground and thrown; weak pavement blown off roads.
207–260 mph *(180–226 kt)*	Cat 5 > 157 mph or higher	F4	Devastating	Well-constructed homes leveled; structures with weak foundations blown some distance; cars thrown and disintegrated; large missiles generated; trees in forest uprooted and carried some distance. Maximum hurricane wind speeds are not likely to reach this level.
261–318 mph *(227–276 kt)*	N/A	F5	Incredible	Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 300 ft (100 m); trees debarked; incredible phenomena will occur. Maximum hurricane wind speeds are not expected to reach this level.
Greater than 319 mph *(277 kt)*	N/A	F6	N/A	Maximum tornado and hurricane wind speeds are not expected to reach this level.

Note: The Saffir-Simpson Scale is a wind speed/storm surge classification scale used to classify Atlantic hurricane intensities, with values ranging from Category 1 to Category 5. The strongest SUSTAINED hurricane wind speeds correspond to either a strong F3 (Severe Tornado) or a weak F4 (Devastating Tornado) value. While the highest wind gusts in Category 5 hurricanes correspond to moderate F4 tornado values, F5 tornado wind speeds are not reached in hurricanes.

Previous Historical Occurrence

The National Centers for Environmental Information (NCEI) reports that thunderstorms in Orange County have caused over $646,000 in property damage since 2010.[214] Although no agricultural losses have been recorded, this figure likely underestimates the true impact, as the NCEI's reporting methods often fail to fully capture crop damage.[215]

Table 25: Thunderstorm Events, 2019-2024

Affected Location	Date	Event Type	Reported Deaths	Reported Injuries	Reported Property Damage	Reported Crop Damage
Orange County	1/30/2019	Strong Wind	0	0	$10,000	$0
Orange County	2/25/2019	High Wind	0	0	$50,000	$0
Salisbury Mills	4/15/2019	Thunderstorm Wind	0	0	$3,000	$0
Warwick	5/19/2019	Thunderstorm Wind	0	0	$3,000	$0
Florida	5/19/2019	Thunderstorm Wind	0	0	$3,000	$0
Maybrook	5/26/2019	Thunderstorm Wind	0	0	$10,000	$0
Cornwall	5/26/2019	Thunderstorm Wind	0	0	$3,000	$0
Goshen	7/22/2019	Thunderstorm Wind	0	0	$1,000	$0
Craigsville	7/22/2019	Lightning	0	0	$6,000	$0
Monroe	7/22/2019	Thunderstorm Wind	0	0	$3,000	$0
Monroe	7/22/2019	Thunderstorm Wind	0	0	$1,000	$0
Tristates	7/30/2019	Thunderstorm Wind	0	0	$1,000	$0
East Coldenham	8/8/2019	Thunderstorm Wind	0	0	$1,000	$0
Orange County	1/16/2020	Strong Wind	0	0	$10,000	$0
Orange County	4/13/2020	High Wind	0	0	$100,000	$0
Warwick	6/3/2020	Thunderstorm Wind	0	0	$2,000	$0

[214] NOAA, National Centers for Environmental Information. Storm Events Database. https://www.ncdc.noaa.gov/stormevents/.
[215] NOAA, National Centers for Environmental Information. Storm Data FAQ Page. https://www.ncdc.noaa.gov/stormevents/faq.jsp.

Affected Location	Date	Event Type	Reported Deaths	Reported Injuries	Reported Property Damage	Reported Crop Damage
Port Jervis	6/28/2020	Hail	0	0	$0	$0
Tristates	6/28/2020	Hail	0	0	$0	$0
Tristates	6/28/2020	Thunderstorm Wind	0	0	$1,000	$0
Searsville	6/28/2020	Thunderstorm Wind	0	0	$1,000	$0
Campbell Hall	6/28/2020	Thunderstorm Wind	0	0	$1,000	$0
Rock Tavern	6/28/2020	Thunderstorm Wind	0	0	$1,000	$0
Vails Gate Jct	6/28/2020	Lightning	0	0	$10,000	$0
Westtown	7/1/2020	Lightning	0	0	$10,000	$0
Lake	7/1/2020	Lightning	0	0	$10,000	$0
Gardnertown	7/8/2020	Lightning	0	0	$6,000	$0
Newburgh	7/8/2020	Thunderstorm Wind	0	0	$2,000	$0
Tristates	7/22/2020	Thunderstorm Wind	0	0	$10,000	$0
Walden	8/27/2020	Thunderstorm Wind	0	0	$7,000	$0
Thompson Ridge	8/27/2020	Thunderstorm Wind	0	0	$5,000	$0
Montgomery	8/27/2020	Hail	0	0	$0	$0
Montgomery	8/27/2020	Thunderstorm Wind	0	0	$0	$0
Huguenot	11/15/2020	Thunderstorm Wind	0	0	$2,000	$0
Allard Corners	11/15/2020	Thunderstorm Wind	0	0	$3,000	$0
Orange County	12/25/2020	High Wind	0	0	$0	$0
Orange County	3/14/2021	High Wind	0	0	$0	$0
Orange County	3/26/2021	High Wind	0	0	$0	$0
Slate Hill	6/7/2021	Lightning	0	0	$6,000	$0
Port Jervis	6/8/2021	Thunderstorm Wind	0	0	$4,000	$0
Tristates	6/8/2021	Thunderstorm Wind	0	0	$25,000	$0
Goshen	6/8/2021	Thunderstorm Wind	0	0	$1,000	$0
Chester	6/8/2021	Thunderstorm Wind	0	0	$12,000	$0
Tristates	6/21/2021	Thunderstorm Wind	0	0	$3,000	$0
Oxford	6/21/2021	Thunderstorm Wind	0	0	$3,000	$0
Scotchtown	6/30/2021	Thunderstorm Wind	0	0	$15,000	$0
Chester	7/2/2021	Thunderstorm Wind	0	0	$10,000	$0

Affected Location	Date	Event Type	Reported Deaths	Reported Injuries	Reported Property Damage	Reported Crop Damage
Monroe	7/2/2021	Thunderstorm Wind	0	0	$15,000	$0
Monroe	7/2/2021	Hail	0	0	$0	$0
Orange Lake	7/6/2021	Thunderstorm Wind	0	0	$1,000	$0
Balmville	8/11/2021	Thunderstorm Wind	0	0	$2,000	$0
Oxford	3/7/2022	Thunderstorm Wind	0	0	$0	$0
Oxford	4/14/2022	Thunderstorm Wind	0	0	$1,000	$0
Oxford	4/14/2022	Thunderstorm Wind	0	0	$1,000	$0
Waterloo Mills	5/16/2022	Thunderstorm Wind	0	0	$5,000	$0
Goshen	5/16/2022	Thunderstorm Wind	0	0	$2,000	$0
Middletown	5/16/2022	Thunderstorm Wind	0	0	$2,000	$0
Orange County	2/3/2023	High Wind	0	0	$0	$0
Goshen	7/3/2023	Thunderstorm Wind	0	0	$3,000	$0
Goshen	7/3/2023	Thunderstorm Wind	0	0	$3,000	$0
Goshen	7/3/2023	Thunderstorm Wind	0	0	$3,000	$0
Florida Colemans Arp	7/3/2023	Thunderstorm Wind	0	0	$10,000	$0
Chester	7/3/2023	Thunderstorm Wind	0	0	$5,000	$0
Monroe	7/3/2023	Thunderstorm Wind	0	0	$5,000	$0
Middletown	7/9/2023	Thunderstorm Wind	0	0	$10,000	$0
Gardnertown	7/9/2023	Lightning	0	0	$10,000	$0
Westtown	7/13/2023	Thunderstorm Wind	0	0	$3,000	$0
Unionville	7/13/2023	Thunderstorm Wind	0	0	$3,000	$0
Burnside	7/27/2023	Thunderstorm Wind	0	0	$3,000	$0
Woodbury	7/27/2023	Thunderstorm Wind	0	0	$3,000	$0
Chester	7/29/2023	Thunderstorm Wind	0	0	$10,000	$0
Circleville	8/4/2023	Hail	0	0	$0	$0
Circleville	8/4/2023	Hail	0	0	$0	$0
Bullville	8/4/2023	Thunderstorm Wind	0	0	$3,000	$0
Maybrook	8/4/2023	Thunderstorm Wind	0	0	$3,000	$0
Savilton	8/12/2023	Thunderstorm Wind	0	0	$1,000	$0

Affected Location	Date	Event Type	Reported Deaths	Reported Injuries	Reported Property Damage	Reported Crop Damage
Leptondale	8/12/2023	Thunderstorm Wind	0	0	$3,000	$0
St Andrew	8/12/2023	Thunderstorm Wind	0	0	$3,000	$0
Gardnertown	8/12/2023	Thunderstorm Wind	0	0	$10,000	$0
Michigan Corners	9/7/2023	Thunderstorm Wind	0	0	$3,000	$0
Thompson Ridge	9/7/2023	Thunderstorm Wind	0	0	$3,000	$0
Salisbury Mills	9/7/2023	Thunderstorm Wind	0	0	$3,000	$0
Montgomery	9/7/2023	Thunderstorm Wind	0	0	$3,000	$0
Savilton	9/7/2023	Thunderstorm Wind	0	0	$5,000	$0
Vails Gate	9/7/2023	Thunderstorm Wind	0	0	$3,000	$0
Chester	9/8/2023	Lightning	0	0	$15,000	$0
Port Jervis	9/8/2023	Thunderstorm Wind	0	0	$5,000	$0
Washingtonville	9/8/2023	Hail	0	0	$0	$0
Dutch Hollow	9/8/2023	Thunderstorm Wind	0	0	$1,000	$0
Fair Oaks	9/8/2023	Thunderstorm Wind	0	0	$5,000	$0
Highland Mills	9/8/2023	Thunderstorm Wind	0	0	$3,000	$0
Pine Bush	9/8/2023	Thunderstorm Wind	0	0	$3,000	$0
Cornwall	9/8/2023	Thunderstorm Wind	0	0	$3,000	$0
Orange County	12/18/2023	High Wind	0	0	$0	$0
Greenwood Lake	5/23/2024	Thunderstorm Wind	0	0	$4,000	$0
Greenwood Lake	5/23/2024	Thunderstorm Wind	0	0	$3,000	$0
Greenwood Lake	5/23/2024	Thunderstorm Wind	0	0	$1,000	$0
Tuxedo Park	5/23/2024	Thunderstorm Wind	0	0	$0	$0
Greenwood Lake	5/23/2024	Thunderstorm Wind	0	0	$10,000	$0
Florida	6/23/2024	Thunderstorm Wind	0	0	$10,000	$0
Big Is	6/23/2024	Thunderstorm Wind	0	0	$3,000	$0
Florida Colemans Arp	6/23/2024	Thunderstorm Wind	0	0	$2,000	$0
Chester	6/23/2024	Thunderstorm Wind	0	0	$1,000	$0
Chester	6/23/2024	Thunderstorm Wind	0	0	$6,000	$0
Chester	6/23/2024	Thunderstorm Wind	0	0	$15,000	$0

Affected Location	Date	Event Type	Reported Deaths	Reported Injuries	Reported Property Damage	Reported Crop Damage
Oxford	6/23/2024	Thunderstorm Wind	0	0	$3,000	$0
Salisbury Mills	6/23/2024	Thunderstorm Wind	0	0	$10,000	$0
Highland Mills	6/23/2024	Thunderstorm Wind	0	0	$3,000	$0
Highland Falls	6/23/2024	Thunderstorm Wind	0	0	$2,000	$0
Unionville	6/26/2024	Thunderstorm Wind	0	0	$4,000	$0
Finchville	6/26/2024	Thunderstorm Wind	0	0	$2,000	$0
Edenville	6/26/2024	Thunderstorm Wind	0	0	$13,000	$0
Dutch Hollow	6/26/2024	Thunderstorm Wind	0	0	$3,000	$0
Goshen	6/26/2024	Thunderstorm Wind	0	0	$2,000	$0
Goshen	6/26/2024	Thunderstorm Wind	0	0	$5,000	$0
Monroe	6/26/2024	Thunderstorm Wind	0	0	$3,000	$0
Chester	6/26/2024	Thunderstorm Wind	0	0	$4,000	$0
Montgomery Co. Airport	6/26/2024	Thunderstorm Wind	0	0	$0	$0
Newburgh	6/26/2024	Thunderstorm Wind	0	0	$1,000	$0
Amity	7/16/2024	Thunderstorm Wind	0	0	$2,000	$0
Warwick	7/16/2024	Thunderstorm Wind	0	0	$0	$0
Southfields	7/16/2024	Thunderstorm Wind	0	1	$1,000	$0

- **January 16, 2020:** Strong winds occurred county-wide; a spotter measured a 53 mph wind gust at 2:50 pm.
- **July 14, 2024:** A well-defined shortwave trough and strong heating allowed the area to destabilize, with Mixed Layer Convective Available Potential Energy (MLCAPE) values around 1000-2000 J/kg. Combined with 30 kt of effective bulk shear, this allowed for thunderstorms to become severe and produce damaging wind gusts across southeast NY. There was one recorded injury where the subject was trapped in a tent due to a fallen tree, sustaining minor injuries.

NOAA's SPC provides location information on past severe hail and wind events, as shown in Figure 82 and Figure 83.

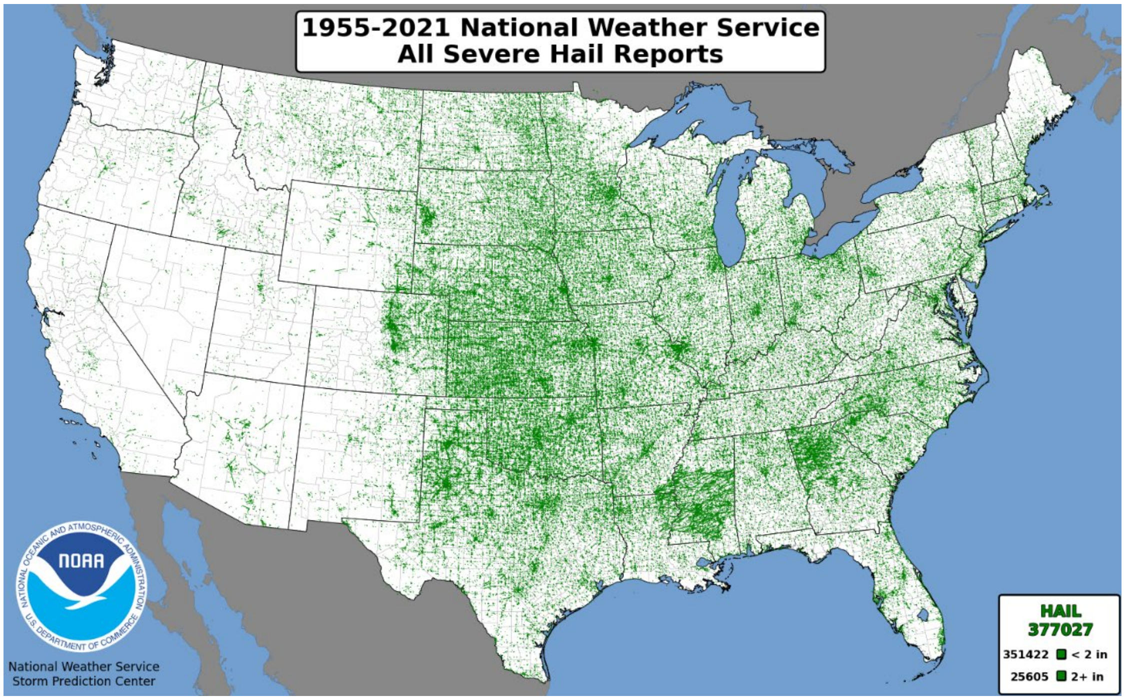

Figure 82: Severe Hail Events, 1955–2021[216]

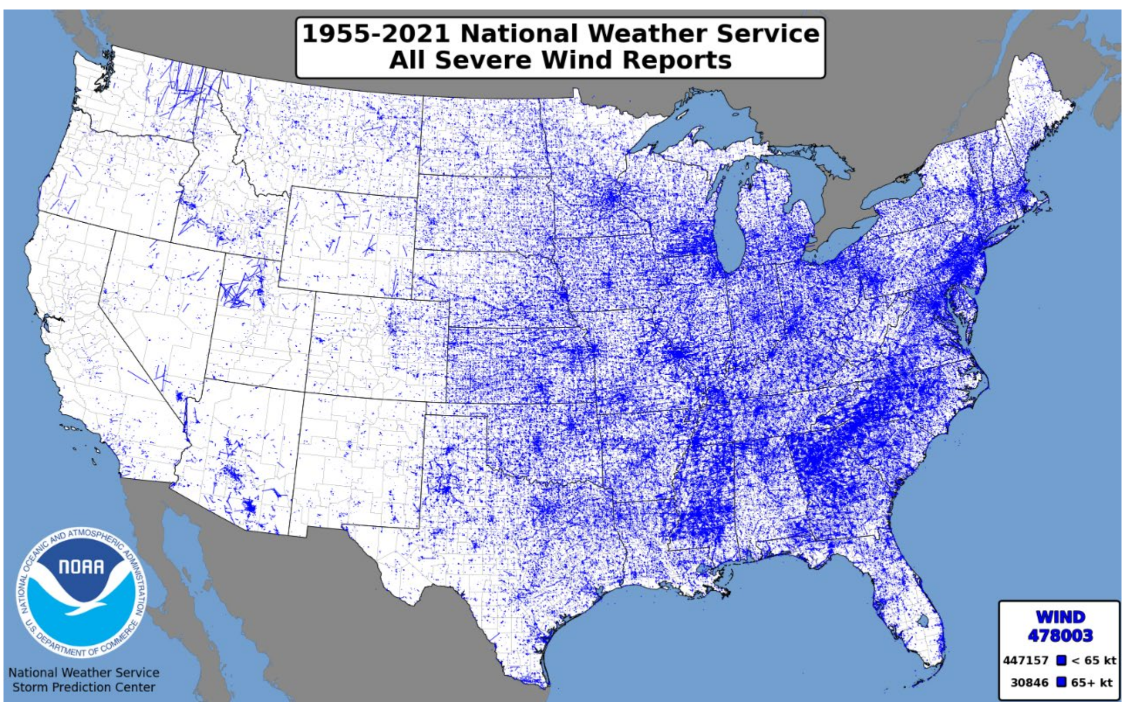

Figure 83: Severe Wind Events, 1955–2021[217]

[216] NOAA, Storm Prediction Center. Severe Report Database. "1955–2021 National Weather Service All Severe Hail Reports" (map). https://www.spc.noaa.gov/gis/svrgis/images/hail.png.
[217] NOAA, Storm Prediction Center. Severe Report Database. "1955–2021 National Weather Service All Severe Wind Reports" (map). https://www.spc.noaa.gov/gis/svrgis/images/wind.png.

Future Potential Events

The probability of future events is based on the likelihood categories of the 2022 County Emergency Preparedness Assessment (CEPA). Thunderstorms, ranked as Severe Wind/Tornadoes, were categorized as a medium, indicating that this event could occur once within the next 20 years. As the county continues to develop, there is an increased likelihood of exposure to thunderstorm-related hazards—such as hail, high winds, and lightning—for both community assets and residents.

Impact of Climate Change

CLIMATE CHANGE AND LIGHTNING

There Is limited research on how climate change may affect lightning. One model projected a 12% increase in the number of lightning strikes in the U.S. for every one-degree increase in global average air temperatures. Meanwhile, a study in Europe projected that the impacts of climate change on lightning would be location-specific, with some areas experiencing more lightning strikes than others, primarily based on latitude. While projections of changes in intensity and duration remain limited, one study suggested that long-continuing-current lightning flashes—intense lightning flashes that are longer in duration and more likely to spark fires than other lightning types—may become more common, though not significantly so in the Northeast. Ultimately, while the specific impacts to lightning remain uncertain, lightning occurs more frequently in warmer temperatures, so it may be reasonable to see increased lightning occurrence with projected climate change. As of early 2023, there was no clear change in lightning frequency or intensity in the U.S. While the number of lightning-caused fires in the West has increased, this is largely due to dry conditions rather than a shift in lightning frequency or intensity.

CLIMATE CHANGE AND HAIL

Climate change will potentially cause hailstones to grow and hailstorms to become more intense yet less frequent in North America. This holds true in the Northeast, which is projected to see a decrease in the overall number of hail days, along with small- and medium-sized hail events. Nonetheless, models show that very large hailstones will become more common in the Northeast. Ultimately, while hail is projected to decrease in frequency yet increase in severity, these models remain uncertain; the effects of climate change on hail event duration, if any, are uncertain at this time.

Vulnerability Assessment

EXPOSURE

Thunderstorms pose a significant vulnerability to Orange County, exposing both community assets and residents to a variety of hazards. The impacts of weather events on community assets are difficult to predict due to the high variability in storm severity. They can occur anywhere in the county, potentially impacting small areas or the entire county. The powerful winds, large hail, and frequent lightning associated with these storms threaten critical infrastructure, such as power lines, transportation routes, and communication networks, which could disrupt daily life and emergency response capabilities. Certain structures, including older buildings and those with minimal storm protection, are particularly at risk of damage from hail and high winds. Agricultural areas may face crop losses due to the impact of hail, while parks, outdoor recreational areas, and public spaces are vulnerable to lightning, which may heighten safety risks. Residents of the area are also directly exposed, particularly those with limited access to shelter during severe weather events, increasing the likelihood of injuries or fatalities.

IMPACT ON COUNTY ASSETS

Thunderstorms pose significant risks to Orange County's assets, affecting both critical equipment and structures essential for county operations. Hailstorms, for example, can damage the county's fleet of vehicles, emergency response equipment, and outdoor machinery, which may require costly repairs and temporary service disruptions. County-owned facilities, such as government buildings, fire stations, and maintenance facilities, are vulnerable to damage from hail, high winds, and lightning strikes. Substantial damage to roofs, windows, and HVAC systems on these structures may compromise building functionality and the safety of personnel inside.

Wind can cause significant damage to light construction buildings, including manufactured homes. Orange County's 48 mobile home and RV parks may be susceptible to more severe damage. Residents of these structures may struggle to find more secure shelter in time, increasing their risk of being injured or killed. Severe damage to homes may cause residents to be displaced, and some of these individuals may require public shelter.

Additionally, outdoor infrastructure, such as traffic lights, street signs, and communication towers, may be affected, impacting transportation and emergency response services. High winds can produce debris that impedes travel on roadways and other transit systems, which requires expensive removal efforts. Strong winds can cause power outages, potentially disrupting the operations of utility systems, emergency response, public services, and businesses.

Hail, high wind, and lightning are dangerous to individuals who lack access to appropriate shelter. Outdoor workers, people in outdoor recreation areas, participants in outdoor sporting events, or those without permanent housing are particularly vulnerable to injuries. Exposure to storms can cause harm to individuals through being hit by blowing debris or falling tree limbs, injured by large hail, or struck by lightning.

Hail and strong winds can damage or destroy crops, and reduced yields can cause severe monetary losses for farmers. Soil erosion from heavy rainfall may also impact future productivity. These losses, combined with other business disruptions in the area, may result in significant economic losses. The financial burden will depend on the scale of the event, the extent of the damage, and the speed with which normal activities can be restored.

NATIONAL RISK INDEX

Given the complexities associated with severe thunderstorms, the National Risk Index (NRI) categorizes the risks of tornadoes, hail, and lightning individually to better inform preparedness and mitigation efforts. The following information focuses on the NRI's findings for hail and lightning hazards, with the tornado risk addressed in a separate profile.

HAIL RISK SCORE

The NRI includes data on the expected annual losses to individual natural hazards, historical loss, and overall risk at the county and census tract levels. According to the NRI, Orange County has a relatively low rating in the risk index and a **71.8** score for hail.

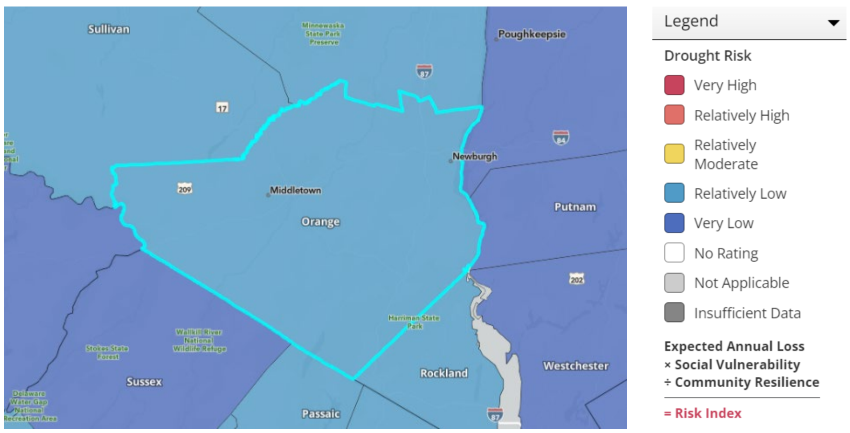

Figure 84: FEMA National Risk Index Orange County Hail Score, Map and Legend[8]

HAIL ESTIMATED ANNUAL LOSSES

According to the FEMA NRI, the expected annual loss from drought in Orange County amounts to $277,000. The county has a relatively low risk index in regard to drought; the frequency for Orange County is 2.6 events per year. The NYS Hazard Mitigation Plan (2023) ranks Orange County second out of the state's 62 counties in terms of exposure to drought hazard events. Figure 37 illustrates the NRI rating for the expected annual loss for Orange County from hail.

Figure 85: Hail National Risk Index – Expected Annual Loss

LIGHTNING RISK SCORE

The NRI includes data on the expected annual losses to individual natural hazards, historical loss, and overall risk at the county and census tract levels. Based on the NRI, Orange County has a relatively high rating for the risk index and a **95.1** score for lightning.

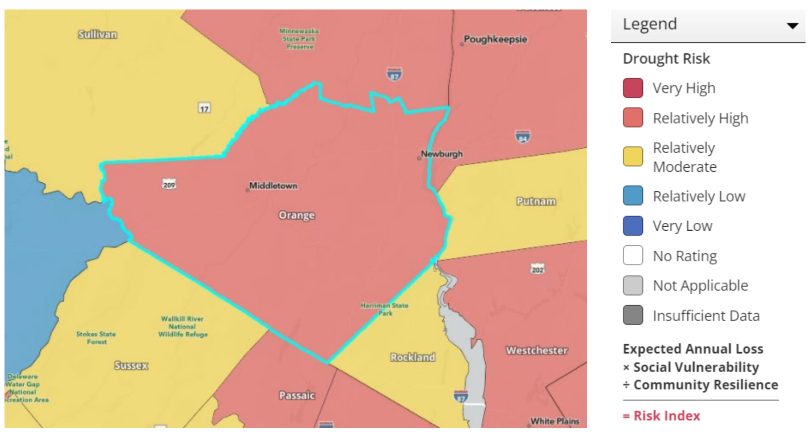

Figure 86: FEMA National Risk Index Orange County Lightning Score, Map and Legend[8]

LIGHTNING ESTIMATED ANNUAL LOSSES

According to the FEMA NRI, the expected annual losses from lightning in Orange County is $984,000. The county has a relatively high risk index for lightning and a frequency of 33 events per year. The NYS Hazard Mitigation Plan (2023) ranks Orange County 4th out of the state's 62 counties in terms of exposure to lightning hazard events. Figure 37 illustrates the NRI rating for the expected annual loss for Orange County from lightning.

Figure 87: Lightning National Risk Index – Expected Annual Loss

VULNERABLE POPULATIONS

During thunderstorms, certain populations in Orange County are particularly vulnerable due to their exposure and dependence on electricity. Individuals who spend extended periods outdoors—such as construction workers, farmers, and those engaging in recreational activities—are at greater risk of injury from lightning strikes, hail, and sudden high winds. Lacking access to safe shelter, they are directly exposed to hazardous conditions. Additionally, residents who rely on consistent electricity—such as those using medical devices, elderly individuals requiring climate-controlled environments, and families with young children—are highly vulnerable during power outages. Extended loss of electricity could disrupt critical medical equipment, compromise temperature-sensitive health needs, and restrict access to essential services.

DEVELOPMENT TRENDS

Development trends in Orange County can both heighten and mitigate vulnerabilities to thunderstorms, hail, and lightning. Rapid growth, particularly in residential and commercial areas, can increase the concentration of structures and people in storm-prone regions, elevating overall exposure. For instance, new housing developments or business districts may lack resilient infrastructure designed to withstand severe storm impacts, causing susceptibility to wind and hail damage. Additionally, expanding suburban or rural areas also contributes to the growth of impervious surfaces, intensifying flood risks during intense rainfall. However, development that incorporates modern building codes, storm-resistant materials, and adequate drainage systems can help reduce vulnerabilities. Investment in public infrastructure, such as underground utilities and lightning protection for public buildings, further mitigates the risks of power outages and structural damage.

COMMUNITY LIFELINES

Thunderstorms with hail and lightning put several critical community lifelines (see Figure 22) in Orange County at risk, particularly the safety and security lifeline. Hazardous conditions from thunderstorms, such as downed power lines, fallen trees, and damaged roadways, can impede emergency response efforts and restrict the safe movement of residents throughout the area. Lightning strikes may cause fires in buildings or wooded areas, placing strain on firefighting resources and increasing the risk of injury or property loss. Additionally, strong winds and hail may damage essential public safety facilities, such as fire stations and police departments, potentially disrupting their operations. Power outages from storm-damaged infrastructure can also impact other lifelines that are essential for coordinating emergency services and keeping the public informed, including energy, transportation, and communication networks.

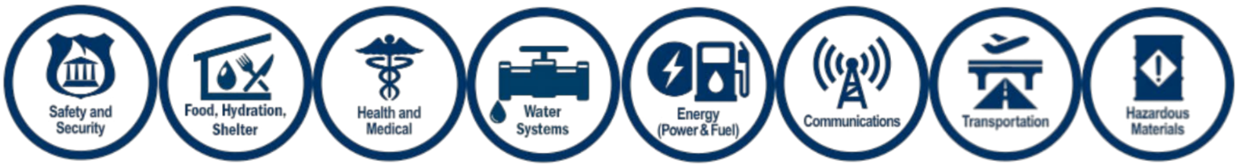

Figure 88: Community Lifelines

Severe Winter Storms

Hazard Description

A severe winter storm is defined as a storm system that develops in late fall to early spring and deposits wintry precipitation, such as snow, sleet, or freezing rain, with a significant impact on transportation systems and public safety. The severity of a winter storm depends on temperature, wind speed, type of precipitation, accumulation rate, and length of the storm (which can range from a few hours to several days). Winter storms, including blizzards and nor'easters, can bring extreme cold, freezing rain, snow, ice, and high winds.[218]

Ice storms are characterized by freezing rain, which accumulates in a substantial glaze layer of ice, resulting in serious disruptions of normal transportation and possible downed power lines. The NWS uses the term "ice storm" to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines, leading to breakdowns in power and communications. Such accumulations of ice pose a risk to walking and driving. Such events can lead to structural damage, utility failures, and tree damage as a result of excessive weight.

Location and Extent

According to Climate Data, "The climate in Orange County, New York, is characterized as humid continental, which means it experiences four distinct seasons with wide temperature variances throughout the year. Summers are generally warm and humid, while winters are cold and snowy."[219]

The entire county is susceptible to damaging winter storms. The Northeast Snowfall Impact Scale (NESIS) classifies the extent of a severe winter storm by meteorological measurements and evaluating its societal impacts. These storms have large areas of 10-inch (or greater) snowfall accumulations. NESIS has five ranking categories: notable (1), significant (2), major (3), crippling (4), and extreme (5). Figure 89 identifies and describes each ranking. The index differs from other meteorological indices in that it uses population information and meteorological measurements. Thus, NESIS indicates a storm's societal impacts. This scale was developed because of the impact northeast snowstorms can have on the rest of the country in terms of transportation and economic impacts.

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[218] 2023 New York State Hazard Mitigation Plan. "Snowstorm." https://mitigateny.org/hazards_of_concern/snowstorm.
[219] Climate Data. Climate: Orange County (New York). https://en.climate-data.org/north-america/united-states-of-america/orange-county-new-york-10163/.

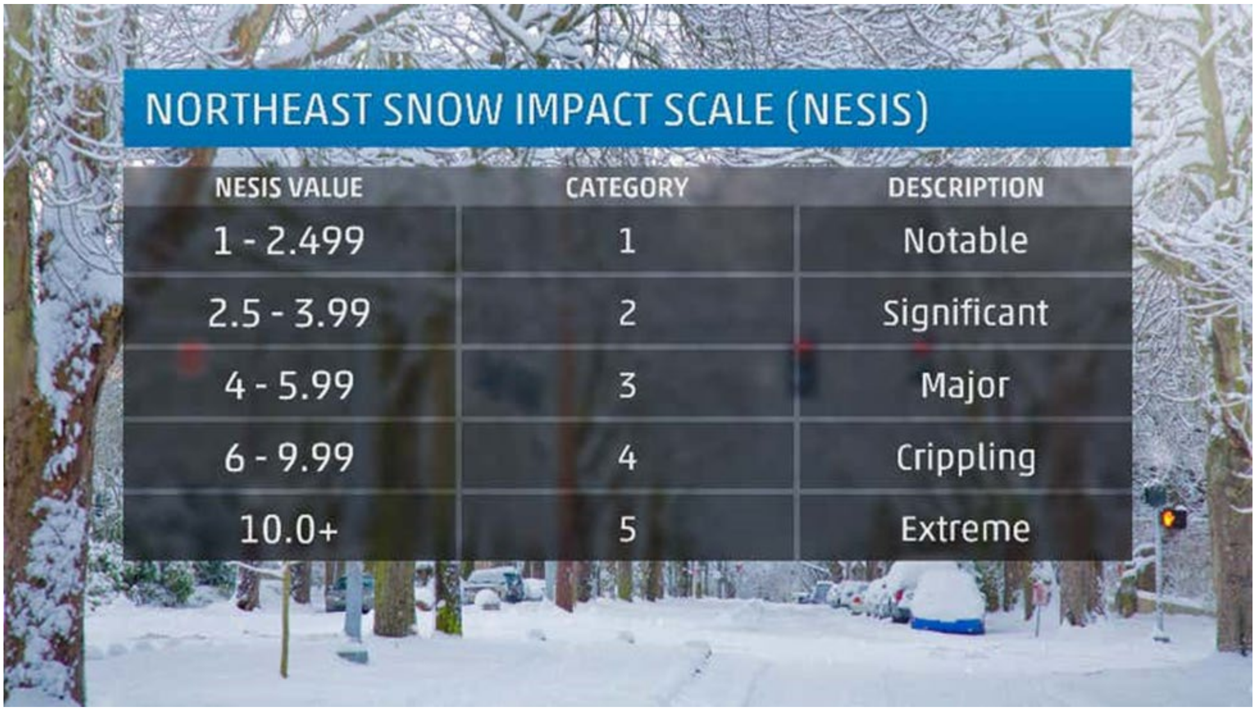

Figure 89: Northeast Snow Impact Scale (NESIS)

- **Category 1 Notable:** These storms are notable for their large areas of 4-inch accumulations and small areas of 10-inch snowfall.
- **Category 2 Significant:** Includes storms that produce significant areas with more than 10 inches of snow, while some include small areas of 20-inch snowfalls. A few cases may even include relatively small areas of extreme snowfall accumulations (greater than 30 inches).
- **Category 3 Major:** This category encompasses the typical major Northeast snowstorm, with large areas of 10-inch snow (generally between 50 and 150 x 103 mi2—roughly one to three times the size of New York State) and significant areas of 20-inch accumulations.
- **Category 4 Crippling:** These storms consist of some of the most widespread, heavy snows of the sample, and can be best described as crippling to the northeastern United States, with transportation and economic impacts felt throughout the country. These storms encompass huge areas of 10-inch snowfalls, and each case is marked by large areas of 20-inch and greater snowfall accumulations.
- **Category 5 Extreme:** The storms represent the most extreme snowfall distributions, blanketing large areas and populations with snowfalls greater than 10, 20, and 30 inches. These are the only storms in which the 10-inch accumulations exceed 200 x 103 mi2 and affect more than 60 million people.

According to data from the National Oceanic Atmospheric Administration (NOAA), average annual snowfall ranges from a low of approximately 10–20 inches in the New York City/Long Island area, to over 175 inches in the Adirondack Mountains in the north of the state. For Orange County, the average annual snowfall ranges from 30 to 50 inches per year, with an average of 40. This can vary significantly by year, particularly if several major extended-period storms impact the area (during which snowfall totals can approach or exceed annual averages), considering Orange County's vulnerability to nor'easters along the Atlantic coast.

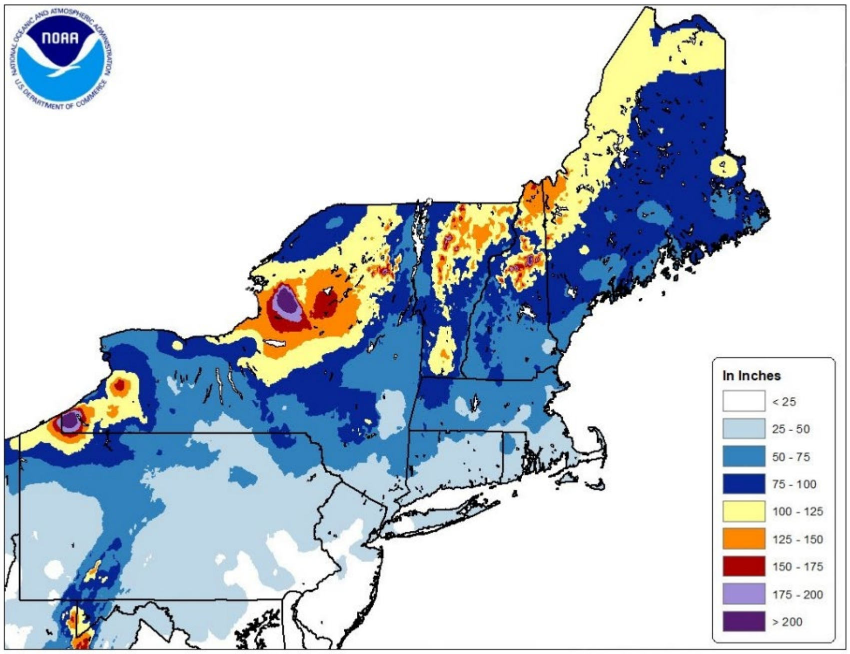

Figure 90: Northeast U.S. Snowfall Map, 2021

Sleet is defined as pellets of ice composed of frozen (or mostly frozen) raindrops or refrozen (or partially melted) snowflakes. These pellets usually bounce after hitting the ground or other hard surfaces. Freezing rain is rain that falls as a liquid but freezes into glaze upon contact with the ground and other structures since temperatures are 32 degrees or below at the surface.[220] Both types of precipitation, even in small accumulations, can cause significant hazards to a community. Orange County lies within an area of the country that experiences averages of 8–12 hours of freezing rain per year, while much of New York State further north experiences even greater amounts.

Previous Historical Occurrence

NOAA's National Centers for Environmental Information (NCEI) Storm Events Database has recorded 29 winter storm events in Orange County between 2019 and 2024, causing $0 in property damage. Table 26 details the damages, injuries, and fatalities given for these events. Notable occurrence details are also provided in this section. All winter events are county-wide impacts, meaning that there will be no multi-jurisdictional differences in occurrences.

[220] Dolce, Chris. "Sleet and Freezing Rain: What's the Difference." The Weather Channel. March 23, 2016. https://weather.com/storms/winter/news/sleet-freezing-rain-difference-20121123.

Table 26: Winter Storm Events, 2019–2024

Affected Location	Date	Event Type	Reported Deaths	Reported Injuries	Reported Property Damage	Reported Crop Damage
Orange County	1/19/2019	Winter Storm	0	0	$0	$0
Orange County	1/29/2019	Winter Weather	0	0	$0	$0
Orange County	3/2/2019	Winter Weather	0	0	$0	$0
Orange County	3/3/2019	Heavy Snow	0	0	$0	$0
Orange County	12/1/2019	Heavy Snow	0	0	$0	$0
Orange County	12/16/2020	Winter Storm	0	0	$0	$0
Orange County	1/3/2021	Winter Weather	0	0	$0	$0
Orange County	2/1/2021	Winter Storm	0	0	$0	$0
Orange County	2/15/2021	Winter Weather	0	0	$0	$0
Orange County	2/18/2021	Winter Weather	0	0	$0	$0
Orange County	2/22/2021	Winter Weather	0	0	$0	$0
Orange County	1/7/2022	Winter Weather	0	0	$0	$0
Orange County	1/16/2022	Winter Weather	0	0	$0	$0
Orange County	1/28/2022	Winter Weather	0	0	$0	$0
Orange County	2/4/2022	Winter Weather	0	0	$0	$0
Orange County	2/4/2022	Winter Weather	0	0	$0	$0
Orange County	2/4/2022	Winter Weather	0	0	$0	$0

Affected Location	Date	Event Type	Reported Deaths	Reported Injuries	Reported Property Damage	Reported Crop Damage
Orange County	2/13/2022	Winter Weather	0	0	$0	$0
Orange County	2/25/2022	Winter Weather	0	0	$0	$0
Orange County	3/9/2022	Winter Weather	0	0	$0	$0
Orange County	3/12/2022	Winter Weather	0	0	$0	$0
Orange County	12/15/2022	Winter Weather	0	0	$0	$0
Orange County	12/15/2022	Winter Weather	0	0	$0	$0
Orange County	12/15/2022	Winter Weather	0	0	$0	$0
Orange County	12/15/2022	Winter Weather	0	0	$0	$0
Orange County	2/27/2023	Heavy Snow	0	0	$0	$0
Orange County	3/13/2023	Heavy Snow	0	0	$0	$0
Orange County	1/6/2024	Heavy Snow	0	0	$0	$0
Orange County	2/13/2024	Heavy Snow	0	0	$0	$0

- **January 19, 2019:** Trained spotters and the general public reported 4–6 inches of snow. A trained spotter also reported 0.4 inches of ice accretion in Newburgh, and the Montgomery Airport ASOS reported 0.27 inches. The combination of snow and ice created hazardous travel conditions along with downed tree limbs and power lines.
- **January 16, 2022:** Snow accumulated and then changed to freezing rain, with the latter lasting for several hours across far western portions of Orange County. Port Jervis Cocorahs reported 8.4 inches of snow, with Middletown Fire Department reporting 6.2 inches, a trained spotter in Monroe reporting 5.8 inches, and a public report from Gardnertown reporting 4.2 inches. Montgomery ASOS reported 0.14 inches of ice from freezing rain. The vast majority of Orange County fell below warning criteria, with only far western portions reporting warning criteria of snow or snow/ice.

- **January 28, 2022:** Most snowfall totals ranged from 3 to 6 inches across Orange County, with a handful of higher, more local amounts. A larger majority of the county did not reach warning criteria, with a couple of smaller pockets reaching over 6 inches. A trained spotter in Highland Mills reported 8.4 inches and 5.8 inches in Warwick, and there was a public report of 6.9 inches in Greenwood Lake. These higher totals were reported in the southwest part of the county. The remainder of the county had reports of under 6 inches, with most being closer to 3 and 4 inches. A trained spotter reported 5.0 inches in Blooming Grove. Trained spotters also reported the following: 4.0 in Gardnertown, 3.5 in Middletown, 3.5 in Otisville, and 2.5 in Pine Bush.
- **January 6, 2024:** Snowfall totals varied across Orange County from west to east. Cocorahs observers reported 13.1 inches in Port Jervis and 10.3 inches in Warwick. A trained spotter reported 11.7 inches in Walden. The public reported 10.2 inches in Newburgh, 10.2 inches in Pine Bush, and 9.5 inches in Florida. A trained spotter reported 9.2 inches in Salisbury Mills. Snowfall totals averaged over 6.0 inches across the county, although amounts varied greatly, with some western locations generally receiving less due to their being on the outer edge of the precipitation shield when colder air arrived. Trained spotters reported 15.5 inches at 1 WNW Monroe and 6.1 inches at Salisbury Mills. Public reports included 9.4 inches in Chester and 6.5 inches at 2 SW Greenwood Lake. Cocorahs reports included 8.5 inches in Port Jervis, but only 2.2 inches in Walden.

Future Potential Events

The probability of future events is sourced from the likelihood categories of the 2022 County Emergency Preparedness Assessment (CEPA). Winter Storms are ranked high, meaning there is a potential this event could happen once every 5 years.

Impact of Climate Change

In the Northeast, while snow events may become less common and the snow season shorter due to higher average temperatures, extreme snowstorms (including lake-effect snowstorms) may increase in frequency relative to historical levels. However, this trend may not hold toward the end of the century as warming continues to increase. One study suggested that, while snowstorms will likely become less common due to atmospheric warming, when temperatures are cold enough, they will produce more snow than has historically been the case. [221] Climate-linked changes to snowstorm duration are unclear at this time.

Many areas in the Northeast have seen record snowstorm events in recent years. The relative increase in extreme snowstorm events over the past decades has been linked to climate change.[222]

[221] 2023 New York State Hazard Mitigation Plan. https://mitigateny.org/hazards_of_concern/snowstorm/snowstorm_risk_profile.
[222] Ibid.

Vulnerability Assessment

EXPOSURE

To assess its vulnerability to natural hazards, a community must identify which of its assets are exposed or at risk within the hazard-prone areas. Winter weather events often affect large geographic areas, so a storm event may affect both an entire county and its neighbors. Snow accumulation and other impacts may differ over the region depending on local variations in topography or other conditions. Due to the widespread nature of the hazard, all populations, critical facilities, infrastructure, utilities, and other structures may be affected.

IMPACT ON COUNTY ASSETS

During winter weather events, several key assets are particularly susceptible to damage or failure. Roofs may collapse under heavy snow or ice accumulation. Heavy snow and ice can accumulate on tree limbs, causing them to collapse and, in turn, damaging power lines or other property. Road infrastructure may become impassable during storms due to snow accumulation or ice. This can delay emergency response for storm related or other types of emergency calls. Road closures or other transportation disruptions may affect individuals commuting to and from work, and individuals may become stranded in hazardous conditions. Ice accumulation on roadways can lead to loss of vehicle control, thereby heightening the risk of injury due to collisions. Road surfaces can also deteriorate due to freezing and thawing cycles and may require repairs.

Individuals without adequate housing, sufficient heating, insulated clothing, or dry living conditions are at risk of cold-related illnesses, such as hypothermia or frostbite. Power outages during winter storm events increase the likelihood of these negative health effects. Overexertion from shoveling snow, pushing a vehicle, or even walking in heavy snow can cause exhaustion or heart attacks, particularly for older individuals or those with underlying health problems. Icy sidewalks and other surfaces can lead to injuries from falls. Isolated populations may experience limited access to essential resources.

Utility powerlines are vulnerable to ice build-up, which can cause widespread outages. Critical infrastructure, such as hospitals, emergency services, and communication networks, may also be disrupted, thus impacting response and recovery efforts. Additionally, water supply systems may freeze, and ruptured pipes can cause damage to structures and roads. Residential and commercial heating systems could also become overburdened.

Business may experience direct losses if buildings and equipment are damaged by winter storms. They may also be hit with indirect losses due to road closures, power outages, and lost productive work time. Agricultural losses are also possible because livestock can be negatively impacted by extreme cold, snow, and ice.

NATIONAL RISK INDEX

RISK SCORE

In Orange County, the National Risk Index (NRI) includes data on the expected annual losses to individual natural hazards, historical loss, and overall risk at a county and Census tract level. Orange County has a relatively moderate (compared to the national percentile) NRI rating and a score of **70.7** for winter weather (Figure 91).

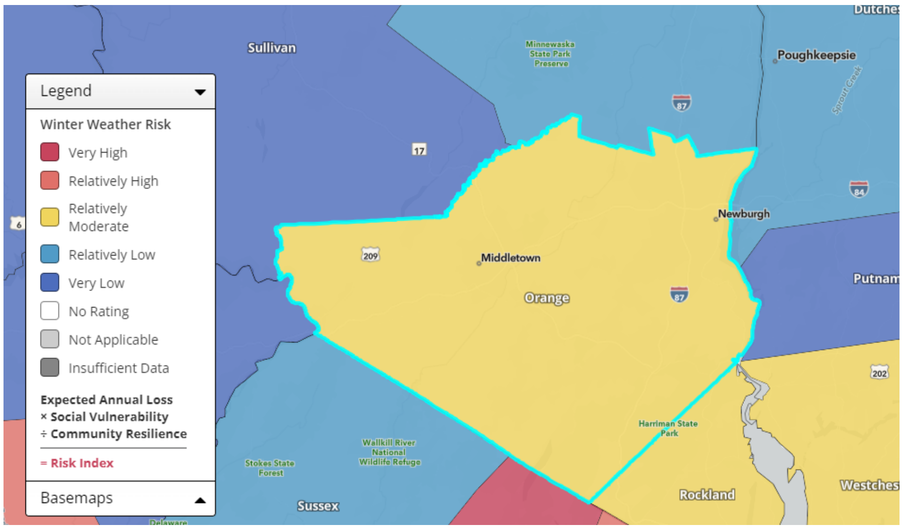

Figure 91: FEMA National Risk Index Orange County Winter Weather Score, Map, and Legend[8]

ESTIMATED ANNUAL LOSSES

Figure 92 illustrates the (relatively moderate) NRI rating for the composite expected annual loss for Orange County at $121,000 from winter weather, and a risk score of 72.7.

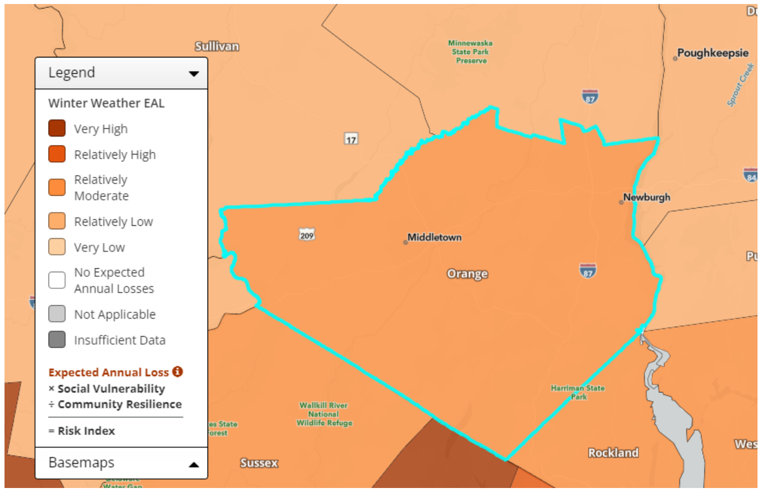

Figure 92: FEMA National Risk Index Orange County Expected Annual Loss, Score, Map, and Legend[223]

VULNERABLE POPULATIONS

For more information on vulnerable populations, please see the Orange County Profile section of this plan.

One of the primary concerns with winter weather is the ability to knock out heat, power, and communications services to residents' homes or offices, sometimes for days at a time. Heavy snowfall and extreme cold can immobilize entire regions.[224] Severe weather poses major challenges to the continuity of public health operations across health departments of various sizes. This serves to exacerbate the problems encountered by local health departments when attempting to continue critical services and respond to the community's storm-related needs.[225] During a winter weather event, several populations are particularly vulnerable due to various risk factors. Elderly individuals face increased risks from limited mobility, underlying health conditions, and greater susceptibility to such cold-related illnesses as hypothermia, especially if they rely on electrically powered medical devices that may fail during power outages.

Infants and young children are also at risk, as they have limited ability to regulate body temperature, making them more prone to hypothermia. Individuals with disabilities, particularly those with mobility or sensory impairments, may struggle to navigate icy conditions or access necessary resources, and may experience disruptions to essential medical equipment during outages. People with chronic illnesses, such as cardiovascular or respiratory conditions, may find their symptoms worsened by the cold and could face challenges in reaching medical care if roads are impassable. Low-income households often face limited

[223] FEMA, National Risk Index. Orange County Tornado Expected Annual Loss Score, Map, and Legend. https://hazards.fema.gov/nri/map.
[224] Weather Underground. "Winter Weather Preparedness." https://www.wunderground.com/prepare/winter-weather.
[225] Bernard D, Konate S, and Savoia E. "Snow Storms and Vulnerable Populations: Local Public Health Activities in Response to the 2014–2015 Severe Winter Weather." *Disaster Medicine and Public Health Preparedness*. 2019;13(3):647-649. https://www.cambridge.org/core/journals/disaster-medicine-and-public-health-preparedness/article/abs/snow-storms-and-vulnerable-populations-local-public-health-activities-in-response-to-the-20142015-severe-winter-weather/4B48C45E8607183843CB60E1B8049BB5.

access to heating, winter clothing, and emergency supplies, further hindering recovery following property damage.

Homeless populations are highly vulnerable to exposure due to their lack of adequate shelter from the cold, which increases the risk of hypothermia and frostbite. Isolated individuals, especially those in rural or remote areas, may encounter delays in emergency response and limited access to resources due to road closures or power outages. Additionally, non-English-speaking populations may face challenges in understanding emergency alerts and instructions, thus impacting their ability to respond effectively to winter weather hazards.

DEVELOPMENT TRENDS

In Orange County, New York, development trends can increase vulnerability to winter weather events by impacting infrastructure, land use, and emergency response. As residential and commercial developments expand, the increase in impervious surfaces, such as roads, sidewalks, and parking lots, can lead to faster accumulations of ice, thereby making roads and walkways hazardous and complicating snow and ice removal efforts. Higher-density developments can strain aging power infrastructure, increasing the risk of widespread outages when heavy snow or ice accumulates on power lines and transformers. Additionally, as new housing extends into less developed areas, residents may find themselves farther from critical services or on roads that tend to be cleared more slowly, thus limiting access to emergency support during severe winter storms. Without resilient planning and infrastructure improvements, these development trends can amplify the impact of winter weather events, resulting in greater risks to public safety, longer recovery times, and higher costs for both the community and emergency services.

COMMUNITY LIFELINES

During an extreme winter weather event, essential community lifelines are likely to be significantly impacted. These include safety and security, food, water, shelter, health and medical services, energy, water systems, communications, transportation, and hazardous materials management (see Figure 22) Transportation systems in particular may be severely compromised due to snow-covered roads and hazardous driving conditions, which can lead to increased accidents and even large-scale car pile-ups. Additionally, power outages caused by severe weather conditions can have cascading impacts on other lifelines, particularly communications, as well as health and medical services. Without reliable power, critical infrastructure supporting these services may be disrupted, thereby further compounding the challenges faced by the community during such events.

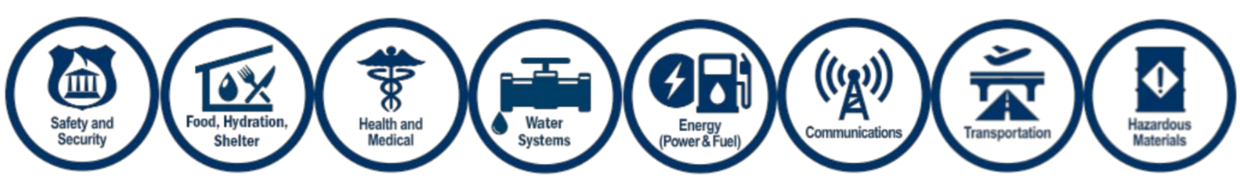

Figure 93: Community Lifelines

Tornadoes

Hazard Description

The 2023 New York State Hazard Mitigation Plan defines tornadoes as violently rotating columns of air extending from the base of a thunderstorm cloud to the ground and often (but not always) visible as a funnel cloud. Tornado wind speeds can range from as low as 40 miles per hour (mph) to as high as 318 mph. Tornadoes often accompany thunderstorms and hurricanes. While they can occur at any time of the year, they are more prevalent during the spring and summer months.

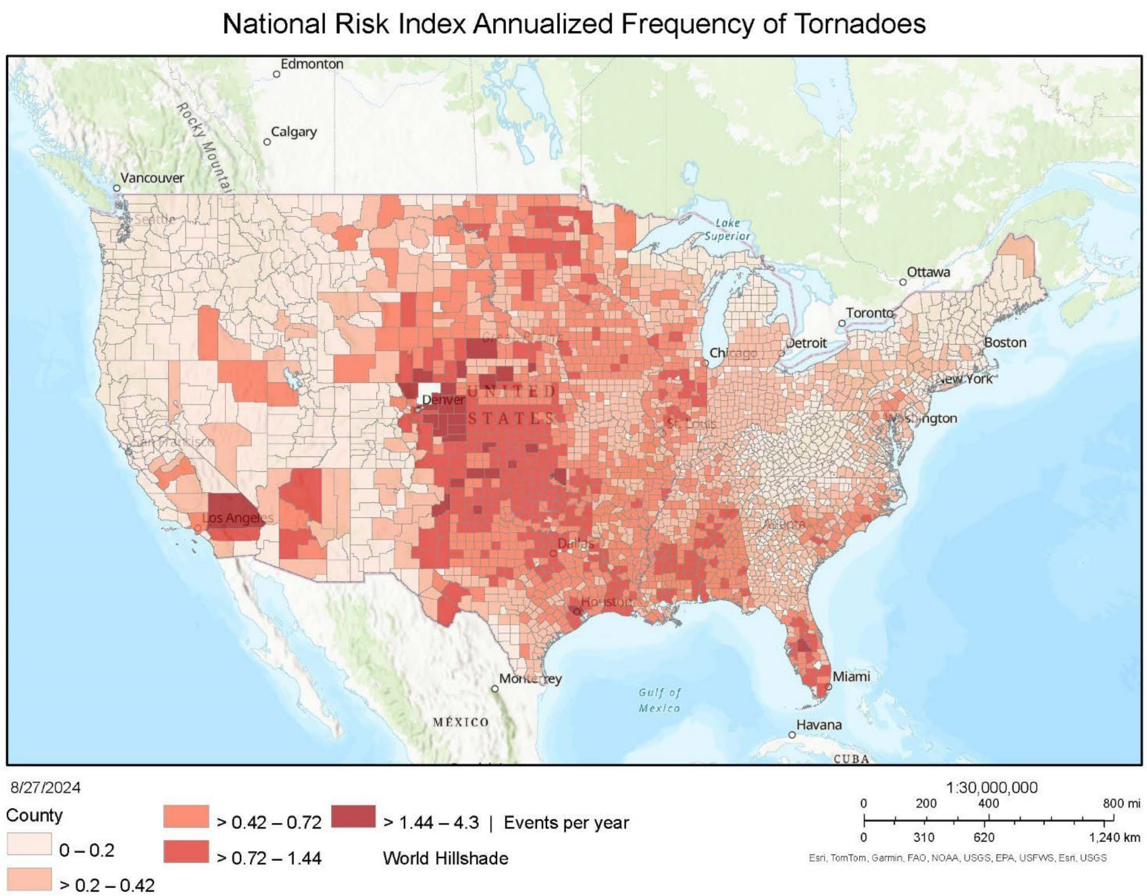

Figure 94: National Risk Index Annualized Frequency of Tornadoes[226]

Location and Extent

Orange County is located in an area susceptible to tornadoes, although their occurrence is not nearly as frequent or intense as in other regions of the country. Of the roughly four tornadoes that touch down in

[226] FEMA, National Risk Index. Tornado. https://hazards.fema.gov/nri/tornado.

New York State each year, approximately 80% tend to be of low magnitude—with an Enhanced Fujita (EF) scale of between 0 and 2—and typically impact only relatively small areas. Figure 94 shows tornado activity in the United States based on the number of recorded tornadoes per 1,000 square miles. All of Orange County is uniformly exposed.

A tornado's magnitude or severity is dependent upon wind speed and categorized by the EF scale, presented in Figure 95. Tornadoes are typically considered to be "significant" at EF2 or EF3, and "violent" at EF4 and EF5. Figure 95 details the EF scale, which was developed to measure tornado strength and associated damages. The tornadoes associated with tropical cyclones are most frequent in September and October, when the incidence of tropical storm systems is the greatest. These types of tornadoes typically occur around the perimeter of the storm, and most often to the right and ahead of the storm path or the storm center as it comes ashore. These tornadoes commonly appear as part of large outbreaks and generally move in an easterly direction.

FUJITA SCALE | ENHANCED FUJITA SCALE FOR TORNADOES

F-Scale	Fasted Quarter Mile Wind Speed	Typical Impacts	Enhanced Sclae: 3 Sec Wind Gust Speed	Enhanced F-Scale
F0	40-72 mph	Some damage to chimney; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.	65-85 mph	EF0
F1	73-112 mph	Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads; attached garages may be destoryed.	86-110 mph	EF1
F2	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.	111-135 mph	EF2
F3	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted.	136-165 mph	EF3
F4	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated	166-200 mph	EF4
F5	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances; automobile-sized missles fly through the air in excesss of 100 meters; trees debarked; steel reinforced concrete structures damaged.	Over 201 mph	EF5

Figure 95: Enhanced Fujita Scale for Tornadoes[227]

Previous Historical Occurrence

The National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI) Storm Events Database has recorded one tornado in Orange County between 2019 and 2024, causing $25,000 in property damages (for details, see Table 26). This section also lists notable occurrence details.

[227] National Oceanic and Atmospheric Administration; Federal Emergency Management Agency.

Table 27: Tornado Events, 2019–2024

Affected Location	Date	Event Type	Reported Deaths	Reported Injuries	Reported Property Damage	Reported Crop Damage
Kaisertown	8/27/2020	Tornado-EF1	0	0	$25,000	$0

- On August 27, 2020, structural damage was noted on two buildings at the airport. A temporary meteorological station installed at the airport measured sustained winds of 69 mph. Significant damage involved the downing of a tree (see Figure 96). For more information, reference the StoryMap developed by the NWS.[228]

Figure 96: Damage in Montgomery on August 27, 2020

[228] "August 27, 2020 EF-1 Tornadoes and Severe Weather: Summary of the Severe Weather Event of August 27, 2020." August 9, 2023. https://storymaps.arcgis.com/stories/3ce02a19d2644d8fbc71363964d04852.

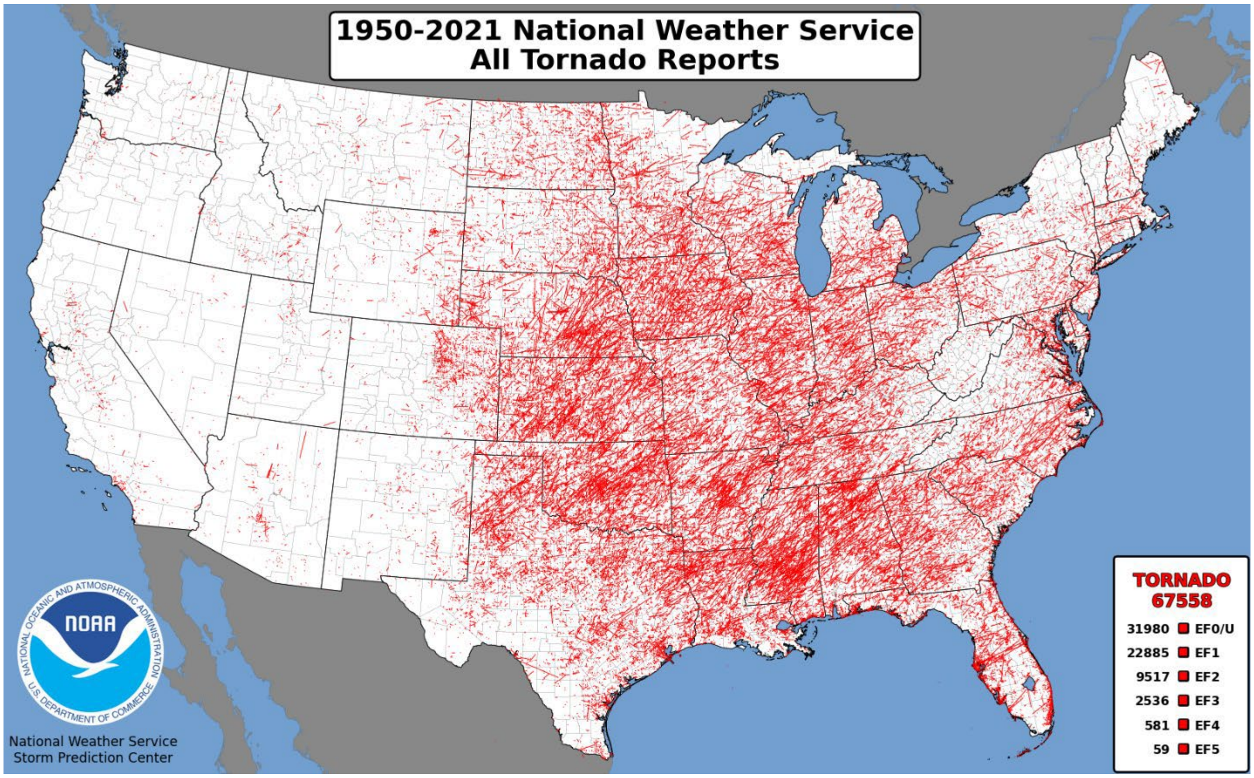

Figure 97: National Oceanic and Atmospheric Administration Storm Prediction Center Tornado Paths, 1950-2021[229]

[229] NOAA, Storm Prediction Center. SVRGIS. https://www.spc.noaa.gov/gis/svrgis/.

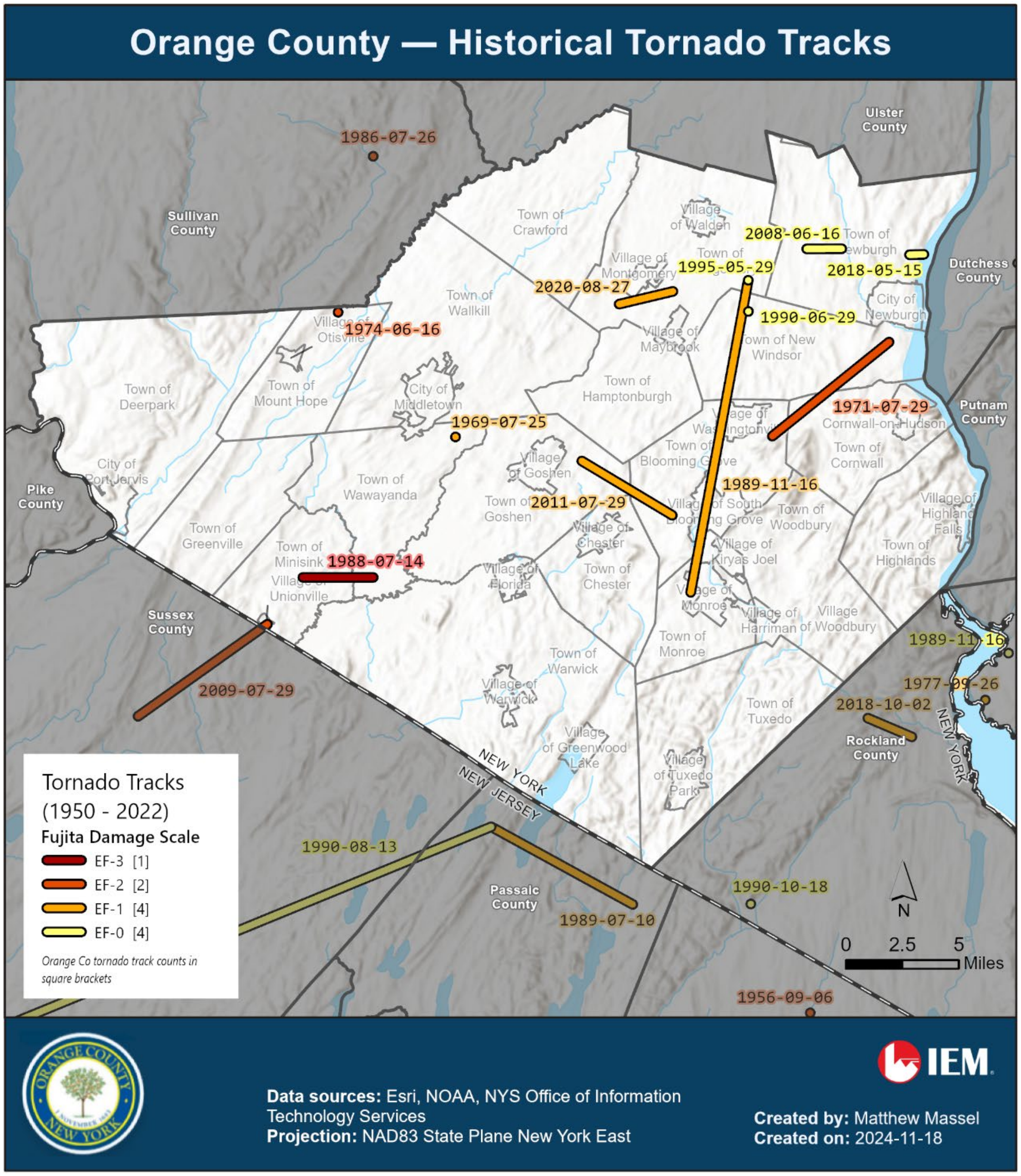

Figure 98: Historical Paths of Tornadoes in Orange County

Future Potential Events

The probability of future events is determined from the likelihood categories of the 2022 County Emergency Preparedness Assessment (CEPA). Tornadoes are ranked medium, meaning a potential occurrence once every 20 years.

Impact of Climate Change

It is likely that Orange County will continue to experience weak to moderate tornadoes, although their frequency of occurrence will be fairly low. Historical storm data made available through NOAA's NCEI indicate that Orange County tends to experience less than one tornado event per year (with three events in 22 years, resulting in an estimated annual number of 0.1 events per year). In New York, tornadoes are more likely to occur during March through August and tend to form in the late afternoon and early evening.

In terms of the impacts of climate change on the probability of tornadoes, the 2023 SHMP concludes the following:

- The connection between climate change and tornadoes is unclear.
- Because tornadoes are short-term events, lack reliable historical data, and are affected by localized nature (which is difficult to integrate into climate models), projecting the effects of climate change on them is difficult.
- A recent study used models to project that supercells-thunderstorms, from which most tornadoes are produced, will increase in frequency and intensity, become more common in the late winter and early spring, may be more likely to produce tornadoes, and may become somewhat more common in New York.
- Researchers hypothesize that, because of this, tornadoes may become increasingly frequent and intense.
- Changes in tornado duration due to climate change, if any, remain uncertain.

Vulnerability Assessment

EXPOSURE

To understand its vulnerability to natural hazards, a community must determine which of its assets are exposed or vulnerable. All of Orange County has been identified as a hazard area for tornadoes. Therefore, all of its assets (i.e., population, structures, critical facilities, and lifelines) are vulnerable. Due to the unpredictable nature of tornadoes, it is difficult to determine specific assets that might be impacted by a tornado. Damage to the built environment can be extensive and widespread, and any unsecured items in the path of a tornado are at risk of becoming flying debris, further increasing the probability of infrastructure damage. This flying debris may cause damage to vehicles, buildings, and other aspects of the built environment. Specific damage may include roof destruction, shattered windows, ripped siding, downed power lines, ripped pavement, and destroyed wastewater treatment plants, among others. Tornadoes in rural areas may cause some damage and destruction to buildings, but likely not as much as in urban areas, where buildings stand in closer proximity. If one building is damaged, it is possible for the debris to be picked up by the wind and thrown into other buildings nearby, causing damage even outside of a direct strike.

IMPACT ON COUNTY ASSETS

Structural vulnerability is related to building construction type and age. Tornadoes generally cause the greatest damage to structures of light construction (e.g., residential dwellings and vulnerable manufactured homes). HiFLD data indicates there are 48 mobile-home and RV parks within Orange County. These structures are most vulnerable to damage and their residents are at risk of significant injury or death. Furthermore, wood-frame structures, which make up the majority of residential housing, are more susceptible to high winds, while steel and concrete are more resistant.

Even when a building remains structurally sound, broken glass from windows can damage both a building's exterior and interior, destroy or damage building contents, or injure occupants. Failures of windows and doors greatly increase storm damage. As wind entering the building changes the pressure differential between its interior and exterior, additional windows will break. If wind-driven rain and water reach a structure's interior, materials can be damaged or ruined. Partially completed buildings are also vulnerable if their components are not fully connected, or structural features intended to withstand strong winds are incomplete.

Critical facilities, including emergency response facilities, hospitals, power, communications, water, government services, and transportation, could all potentially be damaged by a tornado. Disruption to these services can significantly impact the community that depends on them. Debris can block transportation routes, which can delay emergency response and access to services.

Orange County residents face significant risks to their safety from tornadoes. In addition to the physical harm that can be caused by the high winds and subsequent damage to structures, damage to residential structures may displace residents from their homes. Essential services, such as power and communications, may be disrupted.

Tornadoes are likely to carry economic impacts due to businesses being damaged or unable to operate due to power or other utility outages. Workers may be unable to return to work during the initial response and clean-up following a tornado. Agricultural businesses may also experience losses as high winds and debris can damage crops or injure livestock.

NATIONAL RISK INDEX

RISK SCORE

Tornadoes are not particularly common in Orange County and, while their potential consequences are high, they have not historically caused significant damages. The National Risk Index (NRI) includes data on the expected annual losses to individual natural hazards, historical loss, and overall risk at a county and Census tract level. Orange County has a relatively moderate rating on the NRI and a tornado score of **85.21**, which is relatively moderate in comparison to the national percentile (Figure 91).

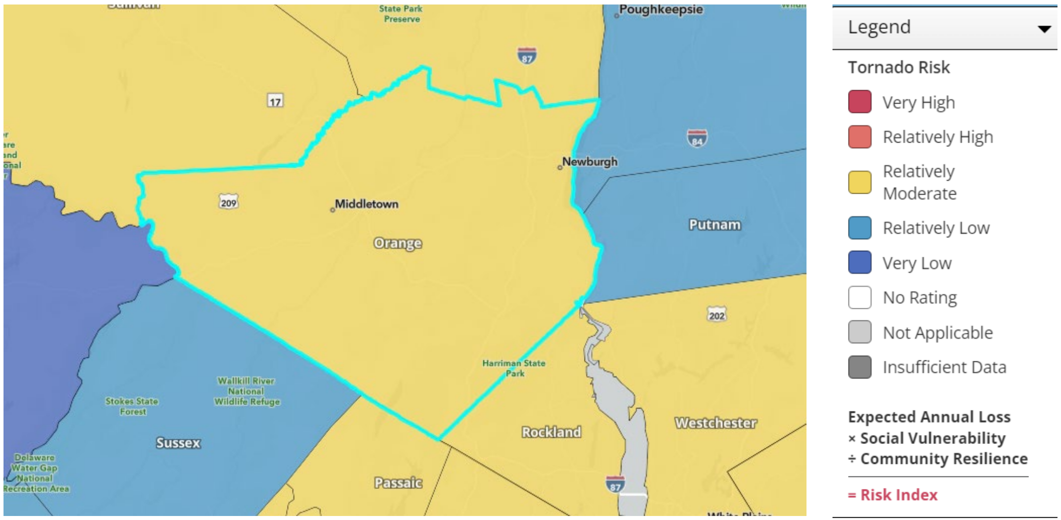

Figure 99: FEMA National Risk Index Orange County Tornado Score, Map, and Legend

ESTIMATED ANNUAL LOSSES

Communities impacted by tornadoes can be affected for long periods of time. In addition to fatalities, residents can be displaced for lengthy periods, or may even have to relocate outside of the community depending on the extent of the damage. When public and/or critical facilities (e.g., schools) are damaged or destroyed, community impacts are long term and substantial. Functional downtime of government operations and services (i.e., the type that would occur if schools, municipal buildings, and emergency services buildings are affected) can also be significant and long lasting. The local economy of tornado-hit communities can also be affected through impacts to businesses, employment, employees, and incomes. Moreover, the communities' farms can be destroyed. Impacts tend to be more extensive and longer in duration as the strength of the tornado increases, for tornadoes of longer width or duration on the ground (impacting the area affected), and in areas with greater development (with more people and property exposed). Figure 92 illustrates the (relatively moderate) NRI rating for the composite expected annual loss for Orange County at $24.5M from tornadoes and a risk score of 84.77.

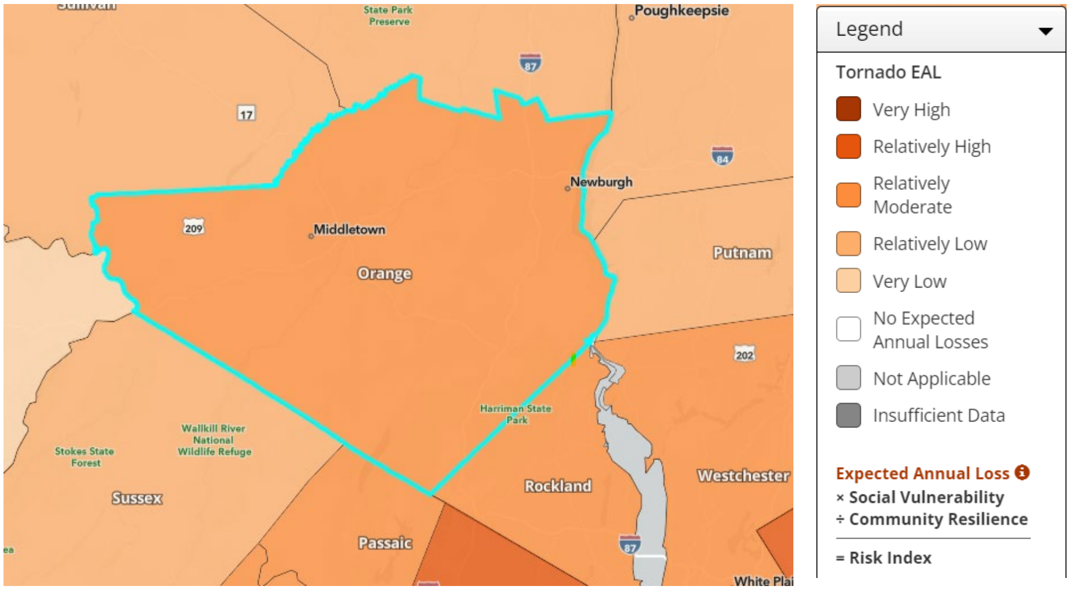

Figure 100: FEMA National Risk Index Orange County Expected Annual Loss, Score, Map, and Legend[230]

VULNERABLE POPULATIONS

Tornadoes can strike quickly with little or no warning, providing barely enough time to take shelter. Due to the unpredictable nature of tornadoes and severe storms, those affected typically experience emotional distress. Such feelings as overwhelming anxiety, sleeping difficulties, and depression-like symptoms are common responses to these types of disasters. The 2023 SHMP states that tornadoes can rip crops and vegetation from the ground, affecting food supplies. If pipelines with wastewater or chemicals are destroyed or water treatment facilities are damaged, water sources (groundwater, rivers, lakes, etc.) could be contaminated. This can lead to water shortages, resulting in widespread sickness and dehydration. A tornado can cause anywhere from minor damages to the complete destruction of a community. If a significant portion of a community is severely damaged or destroyed, residents may be displaced temporarily or permanently, and may need to relocate to other areas in order to find housing, jobs, schools, and essential services during the rebuilding process. Impacted businesses may permanently close, threatening the supply of goods and services and local revenue sources. Residential, commercial, industrial, transportation, and other infrastructure and power lines are susceptible to damage. The ability to respond promptly to clear debris, restore power, and begin building repairs is essential for recovery from this type of event. If a large number of residential structures were to be directly hit by a tornado, a shelter for displaced residents would likely need to be activated for an extended period of time.

DEVELOPMENT TRENDS

High-wind velocity and wind-blown debris, along with lightning or hail, cause tornado-related damage. Destruction caused by tornadoes depends on the size, intensity, and duration of the storm. Tornadoes cause the greatest damage to light structures, such as residential or mobile homes, and tend to remain

[230] FEMA, National Risk Index. Orange County Tornado Expected Annual Loss Score, Map, and Legend. https://hazards.fema.gov/nri/map.

localized during impact. Impacts are related to the strength of the storm. Weaker tornadoes cause minor impacts, such as loss of roof shingles, damage to rain gutters and siding, and broken tree branches, while stronger storms can tear off roofs, break windows, overturn vehicles, and strip bark from trees or completely uproot them. Extremely strong tornadoes can have catastrophic impacts—with homes completely blown away or leveled and steel-reinforced buildings damaged beyond repair. In addition, in the event of a tornado event, electrical power lines on the National Power Grid are likely to be damaged, leading to extended power outages. Downed telecommunication towers would result in loss of communications systems throughout the county. Moreover, tornado-related road debris (i.e., downed trees, powerlines, other structural debris) could block roads and limit access for emergency responders.

COMMUNITY LIFELINES

In Orange County, New York, the severity of a tornado greatly influences its impact on essential community lifelines, including safety and security, food, water, shelter, health and medical services, energy, water systems, communications, transportation, and hazardous materials management (see Figure 22). A low-intensity tornado may cause localized disruptions, such as downed trees and power lines or minor property damage. However, a high-intensity tornado can have devastating effects, damaging such critical infrastructure as hospitals, emergency response facilities, and transportation networks, and creating widespread power and communication outages. Severe damage to residential areas may also lead to a surge in demand for shelter and medical services.

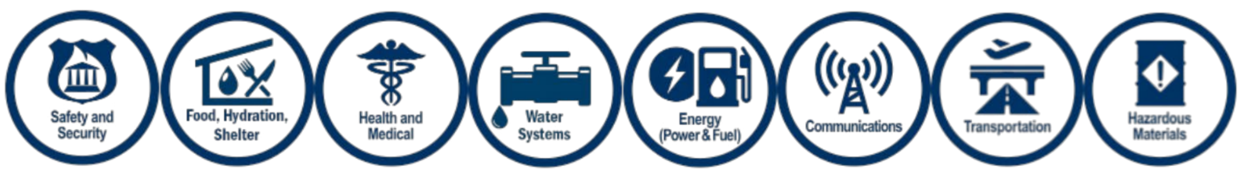

Figure 101: Community Lifelines

Wildfires

Hazard Description

A wildfire is defined as an uncontrollable combustion of trees, brush, or grass involving a substantial area of land. A wildfire event poses a potentially significant risk to human life, public health and safety, and property. Dry conditions throughout the year can increase the potential for wildfire events. Often, wildfires begin abruptly and spread quickly, creating a dense smoke that can fill the surrounding area for miles. The intensity and rate at which wildfires spread are directly related to wind speed, temperature, and relative humidity. Wildfires can occur at any time of the year, but are more common during warmer and dryer months. About 90% of wildfires are caused by people (i.e., through debris burns, equipment malfunctions, and carelessness). Lightning strikes are the most common natural cause of wildfires.[231] As reported by the Wildland Fire Assessment System (WFAS), wildfires resulting from a lightning strike largely depend on the duration of the current and the kind of fuel the lightning hits. The spread of the wildfire after ignition usually depends primarily on fuel moisture.[232]

Location and Extent

Areas that are typically considered to be safe from wildfires include those which are highly urbanized and developed and are not contiguous with vast areas of wild lands. Areas typically considered to be prone to wildfires include large tracts of wild lands containing heavier fuels with high continuity, at steeper slopes. Wildfires have the potential to occur throughout Orange County, especially in the forested areas to the southeast and extreme west of the county. Many of the at-risk areas are also popular with hikers and campers. Several major transportation routes, such as the New York State Thruway (I-87) US Routes 6 and 9W, and State Routes 218 and 293, traverse forested areas, leaving them vulnerable to closure during wildfires due to smoke conditions. Areas in Orange County with the greatest magnitude and severity of the hazard tend to exhibit the lowest population densities in the county; as a result, exposure of people living and working in the highest hazard areas is often relatively low. According to WildfireRisk.org, Orange County has, on average, a greater wildfire likelihood than 38% of counties in the United States.[233]

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[231] Western Fire Chiefs Association. "What Causes Wildfires?" July 5, 2022. https://wfca.com/wildfire-articles/what-causes-wildfires/#:~:text=Humans%20cause%20nearly%2090%25%20of,lightning%20strikes%20and%20volcanic%20eruptions.

[232] U.S. National Park Service. "Understanding Fire Danger." https://www.nps.gov/articles/understanding-fire-danger.htm#:~:text=Ignitions%20in%20fuels%20with%20long,usually%20depends%20on%20fuel%20moisture.

[233] Wildfire Risk to Communities. Orange County: Wildfire Likelihood. https://wildfirerisk.org/explore/wildfire-likelihood/36/36071/.

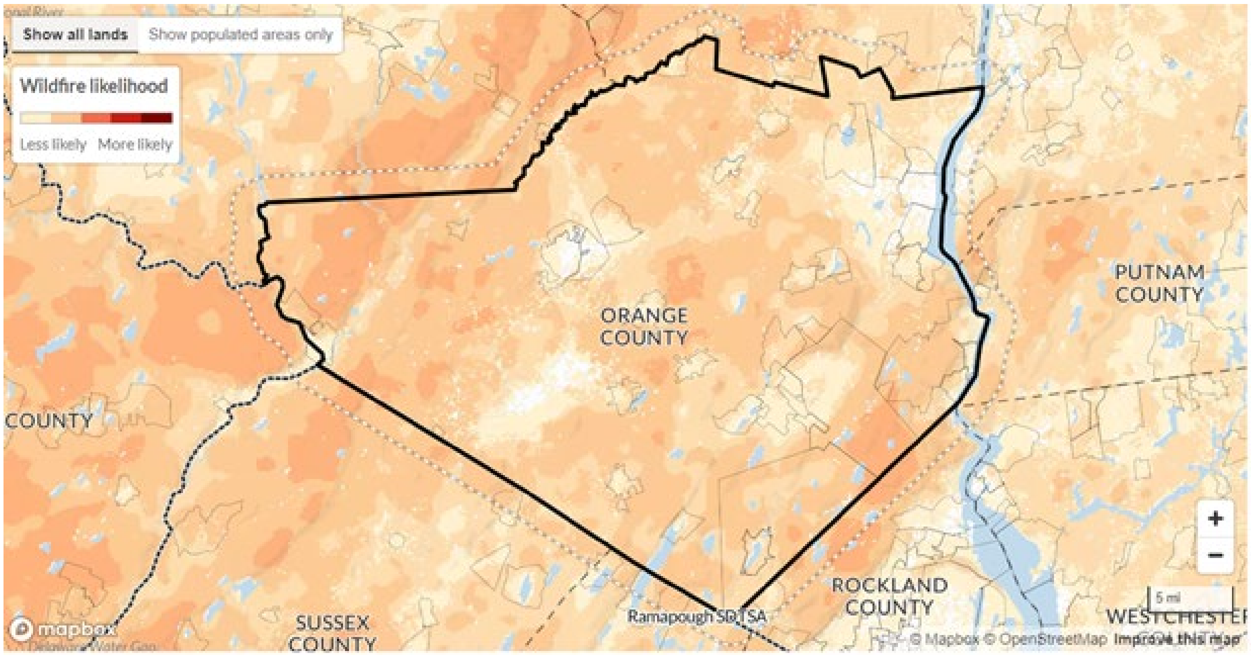

Figure 102: Wildfire Likelihood for Orange County

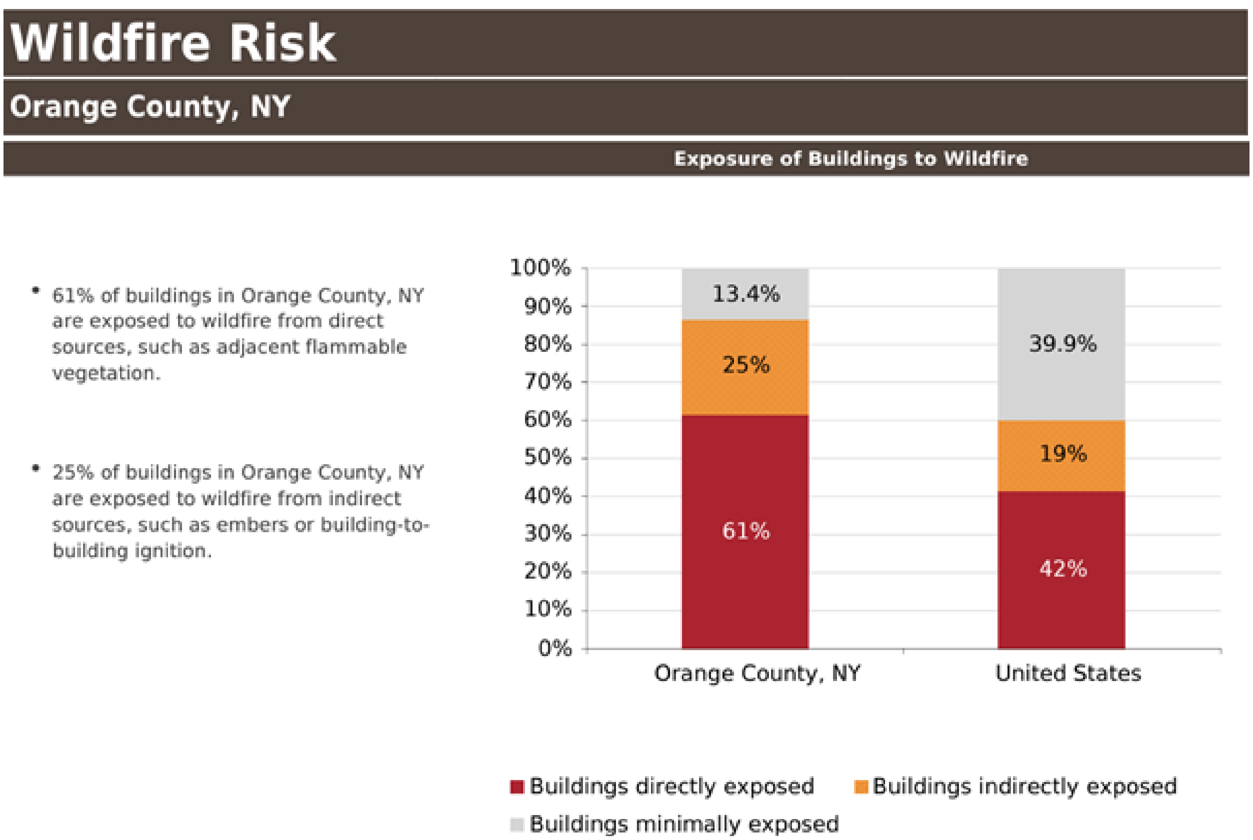

Figure 103: Exposure of Buildings to Wildfire in Orange County

In Orange County, New York, the presence of the Wildland-Urban Interface (WUI) significantly influences the region's vulnerability to wildfires. The WUI is where human development and natural, undeveloped lands meet, creating areas with a higher risk of fire spreading between structures and surrounding vegetation. As residential communities expand into wooded and brush-covered regions, this interface increases both the frequency and intensity of wildfire risk due to the proximity of homes and infrastructure to combustible natural areas. In these zones, vegetation serves as potential fuel, while structures and human activities—such as outdoor burning or the use of machinery—can inadvertently ignite fires. The WUI makes firefighting efforts more complex as responders must prioritize both community protection and fire containment, often in challenging terrain. As such, Orange County's expanding WUI underscores the need for fire-resistant building practices, community awareness, and proactive vegetation management to mitigate the elevated wildfire vulnerability in these areas.

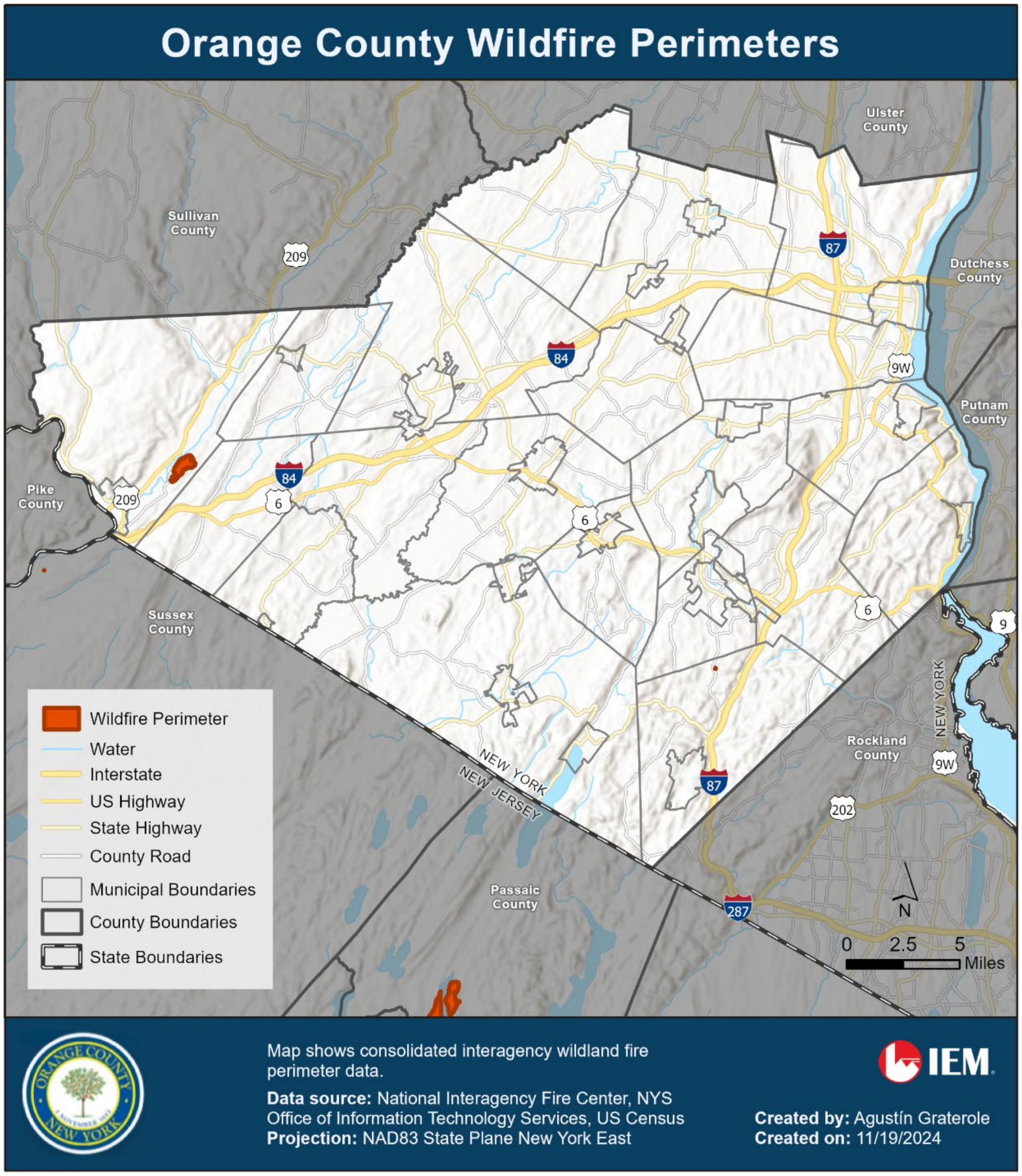

Figure 104: Orange County Wildfire Perimeters

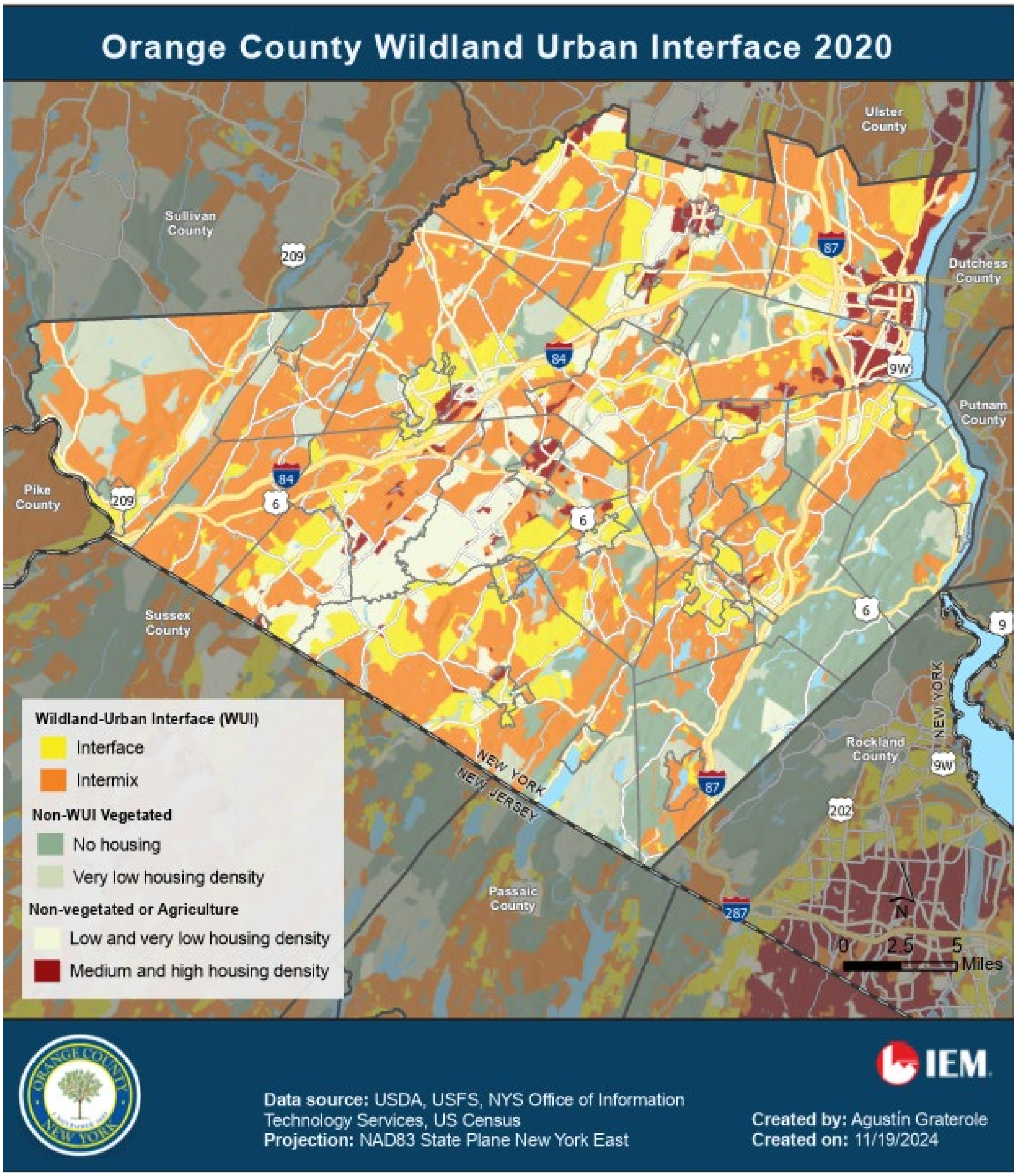

Figure 105: Wildland Urban Interface in Orange County

Previous Historical Occurrence

While the NCDC database does not specifically report any wildfire incidents in Orange County, several wildfire events affecting the region have been uncovered during general internet research:

- **April 13, 2023:** A brushfire ignited on Round Hill, in the Town of Blooming Grove, New York, near Washingtonville. Although firefighters were challenged by dry vegetation and slight winds, they were able to contain the fire, which covered roughly 80 acres.

- **April 13, 2021:** A significant wildfire in Deerpark, Orange County, New York, burned approximately 350 acres over the course of three days. The fire was likely caused by illegal debris burning, despite a state-wide burn ban in effect from March to May. The fire spread rapidly due to dry conditions and challenging terrain.
- **August 9, 1999:** Wildfires in the West Point area resulted in FSA Disaster Declaration 2269, under which Orange County became eligible for Public Assistance funds. New York State made a request for federal assistance after the fire had already burned 1,500 acres and was threatening Palisades State Park and developed land in the Town of Cornwall.
- **May 31, 1998:** Severe thunderstorms in lines and clusters formed and moved over the Lower Hudson Valley of New York. Frequent lightning strikes caused numerous brush fires across Orange County.

Table 28: Wildfires Events, 1998–2023

Affected Location	Date	Impact
Mechanicsville	05/31/1998	68 people injured $71 million in damage
West Point	08/09/1999	$728,217.43
Deerpark	04/13/2021	350 acres burned
Town of Blooming Grove	04/13/2023	13 acres burned

Future Potential Events

The probability of future events is determined from the likelihood categories of the 2022 County Emergency Preparedness Assessment (CEPA). Wildfires are ranked high, meaning that such events are expected to occur in the county within the next 5 years. It is hard to predict the likelihood of wildfires, as there are many factors which contribute to their ignition. Debris burning is common across the county, as are camping and backpacking, whose accompanying harmless fires are often the sources of wildfires. It is likely that wildfires will continue across the county, particularly if drought conditions become more prevalent in the future. The U.S. Environmental Protection Agency (EPA) lists some reasons why wildfire risks are increasing[234]:

- Fuels like trees, shrubs, grasses, and forest debris that lack moisture have the potential to feed a fire
- Increasingly hot, dry weather in the United States
- Changing wildfire patterns across the country
- More people live in and near forests and other natural areas where wildfires can occur
- Climate change

[234] U.S. Environmental Protection Agency. "Climate Change Indicators: Wildfires." https://www.epa.gov/climate-indicators/climate-change-indicators-wildfires.

According to the 2023 New York State Hazard Mitigation Plan, in 2010, NYS DEC revised its open burning policies to ban brush burning during the spring, resulting in a 46% reduction in spring fires in the state.[235] Regulatory advancements such as these will help reduce future wildfire risks.

Impact of Climate Change

Climate change is expected to significantly increase the risk of wildfires.[236] The impacts associated with a wildfire are not limited to direct damage. While wildfires are often a natural phenomenon and part of the normal cycle of the environment, they can result in significant deforestation, wildlife death, and water and air pollution. Wildfire-induced environmental damage can take decades, or longer, to be fully restored. Climatic conditions, such as severe freezes and drought, can significantly increase the intensity of wildfires since these conditions kill vegetation, creating a prime fuel source for wildfires. Forests, grasslands, and other ecosystems strained by increasing temperatures and water scarcity are becoming more susceptible to fires. These conditions, coupled with an abundance of dry vegetation, act as fuel for the flames, enabling fires to spread faster and farther than before.

The 2023 NYSHMP update states that wildfire occurrence is projected to increase throughout the state, but impacts to the duration and intensity of wildfire in New York are currently unclear.[237]

The more frequent and intense wildfires projected in the western U.S. may lead to more common instances of both low and high levels of wildfire smoke migrating to the East Coast, which has implications for air quality and public health.

In a *USA Today* article,[238] Seth McGinnis, an associate scientist at the University Corporation for Atmospheric Research, suggested that fire scientists are working to disentangle the factors influencing large fires to learn more about the role of climate change, land management, and other human influences. He pointed out that climate change is "almost certainly a factor." McGinnis is part of a National Science Foundation University of Washington-based research team studying the effects of climate change and how simultaneous large wildfires might affect firefighting.

Vulnerability Assessment

EXPOSURE

To understand its vulnerability to natural hazards, a community must determine which of its assets are exposed or vulnerable in the hazard area. All of Orange County has been identified as a hazard area for wildfires. Therefore, all of its assets (i.e., population, structures, critical facilities, and lifelines) are

[235] 2023. New York State Hazard Mitigation Plan. Wildfire Mitigation Strategy. https://mitigateny.org/hazards_of_concern/wildfire/wildfire_mitigation_strategy.
[236] Ibid.
[237] Ibid.
[238] Pulver, Dinah Voyles. "Climate change helping drive an increase in large wildfires in the US." USA Today. April 22, 2024. https://www.usatoday.com/story/news/nation/2024/03/24/more-big-fires-blamed-in-part-on-climate-change/73043583007/.

vulnerable. Assets closer to undeveloped grasslands or other open space are at increased risk due to proximity to vegetation and other fuels.

IMPACT ON COUNTY ASSETS

Wildfires pose significant risks to public health and safety, particularly if the wildfire spreads quickly. Fire can damage or destroy structures, including homes, businesses, critical facilities, and other community assets such as historical or cultural resources. Residents may be temporarily evacuated, and longer-term displacements are likely if residences are damaged. Individuals near the wildfire and responders are at risk to burns or other injuries or death. Poor air quality and smoke inhalation is a health concern that can affect people across a large area, particularly for those with respiratory or other underlying medical conditions.

Wildfire can directly damage business facilities, inventory, or equipment, and utility service failures may disrupt business operations. Employees may not be able to report to work. Wildfire could damage crops or other agricultural assets. Fire suppression is costly and can strain the financial resources of the community. Economic disruption and negative impacts to the services provided to the community may cause significant loss in revenue and slow economic recovery.

Emergency response may be disrupted during a wildfire if critical facilities are impacted, roadways are inaccessible, or if responding agencies are overwhelmed. Power, communication, or other utility systems may be damaged or otherwise disrupted by a fire, which can delay the response and recovery process. City or county departments may not be able to provide normal services depending on the location of the fire and personnel affected.

Wildfire is very destructive to natural environments. Vegetation and wildlife habitats can be destroyed over large areas. Areas burned by wildfire are subject to increased erosion after a fire. The ground cannot easily absorb rainwater, and increased runoff and potential debris flows are possible. Ash and debris can reduce water quality and may have negative impacts on water supply.

NATIONAL RISK INDEX

RISK SCORE

In Orange County, wildfires are not particularly common and, while their potential consequences are high, they have not historically caused significant damages. The National Risk Index (NRI) includes data on the expected annual and historical losses to individual natural hazards, and overall risk at a county and Census tract level. Orange country has a very low NRI rating and a score of **60.3** for wildfires.

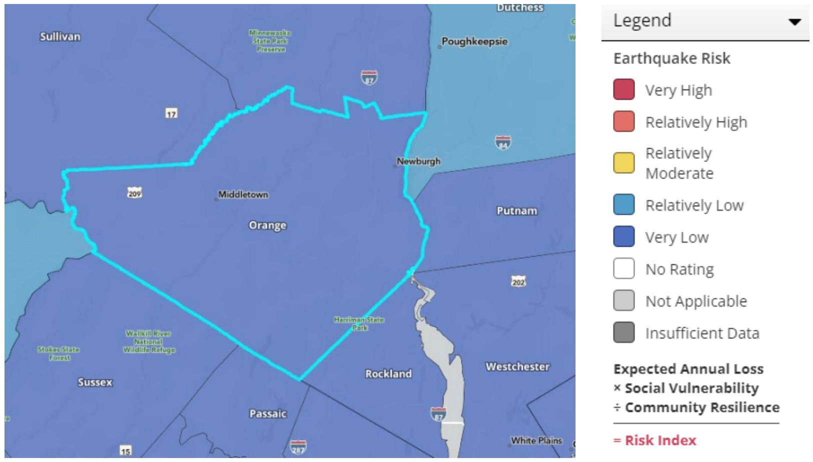

Figure 106: FEMA National Risk Index Orange County Wildfires Score, Map and Legend[8]

ESTIMATED ANNUAL LOSSES

According to the NRI, the expected annual loss from a wildfire in Orange County is $85,000.00. The expected annual loss from wildfires is relatively moderate, and agricultural loss is not applicable. The frequency for Orange County is a 0.024% chance per year. Historical losses have not been recorded for Orange County.[239] According to the 2023 NYS Hazard Mitigation Plan, Hazus-MH software estimates that, out of the 62 counties in the state, Orange County ranks 5th highest in terms of expected annual losses associated with wildfire hazard events.[240]

Figure 107 illustrates the relatively moderate NRI rating for the expected annual loss for Orange County from wildfires.

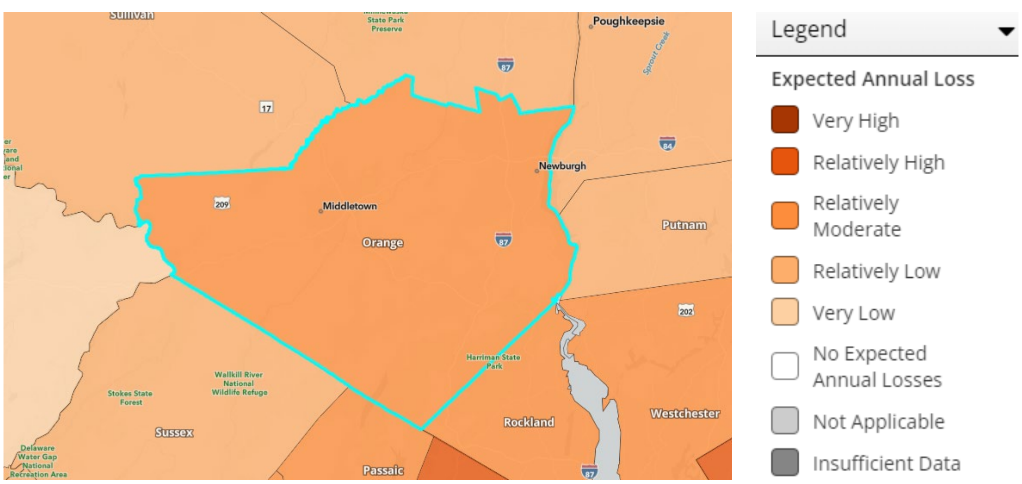

Figure 107: Wildfires National Risk Index—Expected Annual Loss

239 FEMA, National Risk Index. Wildfires. https://hazards.fema.gov/nri/map.
240 MitigateNY. Wildfire – Risk Profile. https://mitigateny.org/hazards_of_concern/wildfire/wildfire_risk_profile.

VULNERABLE POPULATIONS

For more information on vulnerable populations, please see the Orange County Profile section of this plan.

Wildfires with the potential to impact New York's air quality are of particular concern for sensitive populations, such as those with existing respiratory health conditions, low-income households, the elderly, pregnant individuals, and children, who are more vulnerable to impaired air quality. The following lists those who may be more susceptible to the impacts of wildfire:

- People 65 years or older with disabilities are more susceptible to air pollution and particulates associated with wildfire smoke.
- Individuals with compromised respiratory systems may be more vulnerable to the effects of diminished air quality after a wildfire event.
- People with language barriers may find it difficult to follow directions during an evacuation or to access support after a disaster.
- People who live in poverty are disproportionately impacted by wildfires due to inadequate housing and limited financial resources to afford evacuation or relocation expenses.
- Cultural and institutional barriers, limited mobility, or medical conditions can increase the impacts of wildfires.
- Disparities in access to healthcare and to disaster recovery aid and resources have been strongly correlated to race and ethnicity.

According to the 2023 American Community Survey, over 83,000 people in Orange County are considered "vulnerable populations" based on age—that is, cohorts under the age of 5 and over the age of 65. This accounts for 20.7% of the total county population. Table 29 provides statistical information on vulnerable populations in Orange County.

Table 29: Vulnerable Populations Statistics—All Areas in Orange County[241]

Indicator	Number	Percent (%)
Families in Poverty	58,676	14.4
People with Disabilities, Under 65 Years	32,598	8
People Over 65 Years	61048	15
People Under 5 Years	27,144	6.8
Black	45,543	15
American Indian and Alaska Native	2,949	1
Asian	12,025	3.3

[241] U.S. Census Bureau. Quick Facts: Orange County, NY. https://www.census.gov/quickfacts/fact/table/orangecountynewyork,US/IPE120223.

Indicator	Number	Percent (%)
Hispanic or Latino	99,573	24.4
Difficulty with English	110,017	27

DEVELOPMENT TRENDS

The biggest concern regarding development is the establishment of building codes. In 2010, the population was 372,813, which increased to 407,470 by 2023 (a growth of 34,657 people). With population growth comes the need for more housing. In 2023, 1,445 building permits were issued for new housing. However, it is not apparent whether the County builds to wildfire code. The Regional Housing Needs Assessment was written in 2023.[242]

COMMUNITY LIFELINES

During a wildfire event in Orange County, New York, multiple community lifelines (see Figure 108) can be significantly impacted, including safety and security, food, water, shelter, and energy. The extent of these disruptions is largely dependent on the intensity and spread of the fire, which are directly influenced by the heat and wind conditions. High temperatures and intense heat can amplify fires, accelerating the rate at which they consume vegetation and structures, increasing risks to life and property. Wind direction and speed also play a critical role, as strong winds can carry embers over long distances, igniting new fires and further complicating containment efforts. These factors can lead to more widespread evacuations, interruptions in emergency services, and damage to infrastructure (e.g., power lines and water supplies). The interdependence of these lifelines means that disruptions in one area, such as power outages or road closures, can have cascading effects, impacting residents' access to essential services and impeding recovery efforts.

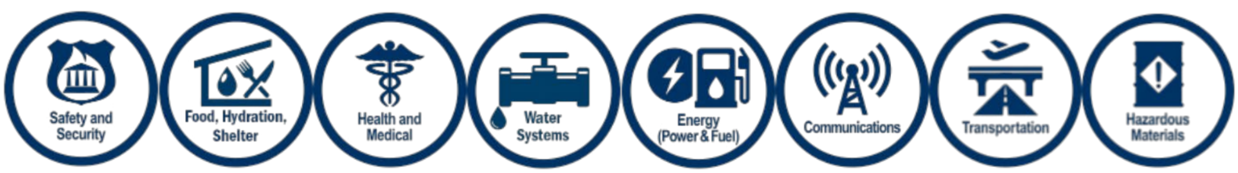

Figure 108: Community Lifelines

[242] Camoin Associates. "Regional Housing Assessment and Strategy for New York State's North Country." April 14, 2023. https://camoinassociates.com/projects/regional-housing-assessment-and-strategy-for-new-york-states-north-country/.

Mitigation Strategy

The overall approach used to update the County and local hazard mitigation strategies was based on FEMA and NYS regulations and guidance regarding local mitigation plan development, which include:

- DMA 2000 regulations, specifically 44 CFR 201.6 (local mitigation planning) and 44 CFR 201.7 (tribal mitigation planning)
- 2022 New York State Hazard Mitigation Planning Standard
- FEMA "Local Mitigation Planning Handbook" (April 2023)
- FEMA "Integrating Hazard Mitigation into Local Planning" (March 2013)
- FEMA "Mitigation Planning How-To Guide #3, Identifying Mitigation Actions and Implementing Strategies" (FEMA 386-3)
- FEMA "Mitigation Ideas" (January 2013)

The mitigation strategy update approach includes the following steps, which are further detailed in later subsections:

- Review and update mitigation goals and objectives.
- Identify mitigation capabilities and evaluate their capacity and effectiveness to mitigate and manage hazard risk.
- Identify progress on previous County and local mitigation strategies.
- Develop updated County and local mitigation strategies.
- Prepare an implementation strategy, including the prioritization of projects and initiatives in the updated mitigation strategy.

Mitigation Actions

Participating jurisdictions proposed numerous mitigation actions to reduce the impact of potential hazard events. These actions were evaluated in a public process and resulted in the identification of at least one key action to be taken by each jurisdiction to help achieve the goals outlined in the plan update. Although the proposed mitigation actions are varied, they can be grouped into six broad categories as indicated by FEMA 386-3:

- **Prevention:** Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital government programs, open space preservation, and stormwater management regulations.

- **Property Protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.
- **Natural Resource Protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Emergency Services:** Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.
- **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

All mitigation actions included in this HMP update have been reviewed by plan participants to ensure that they meet the goals of the plan. The proposed actions represent a range of projects that are well distributed throughout the six categories of mitigation. It is acknowledged that some of the proposed actions included in this plan represent maintenance actions or post-hazard actions, which are generally not eligible for funding under FEMA's Hazard Mitigation Assistance Program. Nonetheless, such actions were deemed important to the community and are included in this plan. Other grants and funding sources will be sought to complete such proposed efforts.

Each jurisdictional annex provides a table identifying (1) their prior mitigation strategy, (2) the status of those actions and initiatives, and (3) their disposition within their updated strategy. Additionally, each participating jurisdiction proposed at least one implementable, pre-disaster mitigation activity to be included in this document. This information is also listed in each jurisdictional annex.

Mitigation Goals

Because the prime objective of setting hazard mitigation goals is to reduce or eliminate losses and damages from hazard events, it is important that these goals be tangible. The goals identified below represent what the participants and municipalities are hoping to achieve through the implementation of this hazard mitigation plan. According to the FEMA Local Hazard Mitigation Guidelines (2023), plans, goals, and actions are either reaffirmed or else updated based on current conditions, including the completion of hazard mitigation initiatives, new or revised risk assessments, or changes in state or local priorities.

The Orange County HMP goals are broad, long-term statements of what the County will work to achieve over time through implementation of the plan. These goals, enumerated below, are based on the findings of the risk assessment. They will apply to the Orange County government as well as to each participating jurisdiction.

- Promote disaster-resistant development.
- Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters.
- Reduce the possibility of damages and losses to government-owned assets, including buildings, infrastructure, and protected land.
- Reduce the possibility of damage and losses from all hazards of concern.
- Enhance public safety and reduce flood risks by addressing vulnerabilities associated with high hazard potential dams.
- Prioritize reaching vulnerable populations by targeting outreach strategies and inclusive communication methods.

Mitigation Strategy

There are many factors that must be considered when implementing a mitigation action or project. Action listings in each jurisdictional annex contain specific implementation details associated with each proposed action including goals achieved, implementing agency (or agencies), estimated costs, possible funding sources, and implementation timeframes.

When detailed costs were not available, estimated price ranges were considered for each mitigation action. The levels for the cost estimates are as follows:

- **Low:** Cost is estimated to be below $10,000
- **Medium:** Cost is estimated to be between $10,000 and $100,000
- **High:** Cost is estimated to be more than $100,000

The implementation timeframes provided for each mitigation action are also estimated. Smaller, locally funded projects are easier to implement and therefore have shorter timeframes, while larger, complicated actions that involve funding applications, agency reviews, etc., will likely take five years or longer to complete. The levels for the timeframe estimates for each mitigation action are as follows:

- **Short:** Completion anticipated within 1–2 years
- **Moderate:** Completion anticipated within 5 years
- **Long:** Completion anticipated in greater than 5 years
- **Ongoing:** Action involves continued coordination or effort

For some mitigation actions, timeframe is presented as a range. This indicates that the action is currently being implemented or should be implemented as soon as possible and that it will continue for an extended period of time.

Action Prioritization

A cost-benefit analysis was completed for each proposed mitigation action as a way to prioritize the many actions included in this document. The priority level indicated for each action is based on the current knowledge of the mitigation actions, including their estimated costs, timeframes, and funding availability. Prioritization criteria will continue to be reviewed and revised on an annual basis during the five-year plan update timeframe. By implementing the proposed actions as part of pre-disaster mitigation, and not as an afterthought, the implementation will be more cost effective and the incorporation of these actions into normal planning processes and operational procedures will naturally occur.

Each proposed mitigation action was evaluated against the following considerations (FEMA, 2023):

- Compatibility with goals and objectives identified in the 2023 NYS Hazard Mitigation Plan
- Compatibility with goals of the plan update
- Assessment of the impact of identified actions on jurisdictions within the entire planning area or region
- Cost/benefit reviews of potential actions
- Funding priorities identified in the current NYS Hazard Mitigation Plan
- Compatibility with other local and regional plans and programs

Each participating jurisdiction evaluated the mitigation actions that applied to their jurisdiction using the "STAPLEE" chart worksheet for guidance.[243] These evaluations considered the six elements addressed above. Depending on the results of the action evaluations, each mitigation action is recognized as a high priority project, medium priority project, or low priority project.

Actions recorded as having a benefit level equal to or higher than the cost level were viewed as cost-beneficial actions, therefore receiving a high priority ranking. This priority-ranking process should be viewed as a preliminary analysis, as the ranking system used during this evaluation will evolve based on input from participating jurisdictions, agency representatives, and other branches of state and federal government as the implementation of mitigation strategies progresses. Additional funding sources will be required for many of the proposed mitigation actions. Coordination with agencies such as NYS DHSES and FEMA will be necessary to secure funds for proposed mitigation actions, especially those with high costs and long-term implementation schedules.

Tables in each jurisdictional annex list the highest-priority multi-jurisdictional actions being proposed as part of this HMP update. The plan update project team identified these actions as those with most importance for implementation in the next five years. In addition to reflecting the re-inclusion of some actions from the original plan that are still relevant, this list further incorporates many new actions that would also minimize potential impacts to life and property resulting from hazard events. This list represents mitigation actions that were proposed by participating jurisdictions, agencies, and members of

[243] "STAPLEE" refers to the following lenses of evaluation: social, technological, administrative, political, legal, economic, and environmental.

the public, based on need. Some of the proposed actions relate to a specific type of hazard event or specific jurisdiction, while others are proposed to mitigate an array of hazards or will apply to multiple jurisdictions.

Additional NYS DHSES Mitigation Action Requirements

As required by NYS DHSES, Orange County and its participating jurisdictions in this plan analyzed their critical facilities located within the 100 and 500-year floodplain and ensured that proposed mitigation actions addressed the vulnerability of such facilities. The name, location, and associated mitigation action of each critical facility in each participating jurisdiction located within the 100 and 500-year floodplain can be found in tables in each of their respective jurisdictional annexes.

Each listed critical facility has an associated mitigation action, with the exceptions of the privately owned critical assets as well as state for federal infrastructure. For example, the Danskammer Power Plant and the Roseton Generating Station, both of which are located in the Town of Newburgh. The Danskammer is a coal-fired electricity-generating facility owned by a private equity firm, Danskammer Holdings, LLC, a subsidiary of Tiger Infrastructure and Agate Power. The Roseton facility is owned by Castleton Commodities International, LLC (CCI). These facilities are regulated and permitted by the NYS Public Service Commission, and they operate beyond the jurisdiction of the Town of Newburgh or Orange County. However, the Town of Newburgh and Orange County will pursue on-going consultation with the operators of both Danskammer and Roseton to ensure that local officials understand the risks and the operators’ response plans in the event of a disaster.

Given the for-profit and regional utility nature of these facilities, the County has requested that New York State consider whether the facilities would benefit from future mitigation actions in the State Hazard Mitigation Plan.

Capability Assessment

As part of the planning process for Orange County and each of its participating jurisdictions, each participant was required to prepare a capability assessment. This capability assessment examines the ability of Orange County to implement and manage a comprehensive mitigation strategy, which includes a range of mitigation actions. The strengths, weaknesses, and resources are identified in this assessment as a means to develop an effective hazard mitigation program. According to FEMA Mitigation Planning How-To Guide #3, a capability assessment is an inventory of a community's missions, programs and policies; and an analysis of its capacity to carry them out.

The County and each participating jurisdiction identified and assessed their capabilities in the areas of: Planning and Regulatory, Administrative and Technical, and Fiscal. County and municipal capabilities in the areas of Planning and Regulatory, Administrative and Technical, and Fiscal may be found in the Capability Assessment section of their jurisdictional annexes.

A summary of the definitions of the various federal, state, county and local planning and regulatory, administrative and technical, and fiscal programs available to promote and support mitigation and risk reduction in Orange County are presented below.

Planning and Regulatory Capabilities – County and Local

Municipal Land Use Planning and Regulatory Authority

The county and its constituent municipalities have various land use planning mechanisms that can be leveraged to mitigate flooding and support natural hazard risk reduction, as shown in Table 2 and Table 3. These tools are valuable instruments in pre- and post-disaster mitigation in that they facilitate the implementation of mitigation activities through the existing legal and regulatory framework.

Building Code

Building codes regulate construction standards and are developed for specific geographic areas of the country. They consider the type, frequency, and intensity of hazards present in the region. Structures built to applicable building codes are inherently resistant to many hazards such as strong winds, floods, and earthquakes. Due to the location specific nature of the building codes, these are very valuable tools for mitigation.

Only Orange County regulates construction through the use of a building code; the remainder of the towns, cities, and villages adhere to a building code through County authority. The authority for enforcing the building code comes from the New York State Unified Code.

Zoning Ordinance

Zoning is a useful tool to consider when developing a mitigation strategy. It can be used to restrict new development, require low-density development, and designate specific uses (e.g., recreational) in the hazard prone areas. Private property rights must be considered, but enacting a zoning ordinance can reduce or potentially eliminate damages from future hazard events.

Subdivision Ordinance

Subdivision ordinances offer an opportunity to account for natural hazards prior to the development of land as they formulate regulations when the land is subdivided. Subdivision design that incorporates mitigation principles can reduce the exposure of future development to hazard events.

Special Purpose Ordinance

A special purpose ordinance is a form of zoning in which specific standards dependent upon the special purpose or use must be met. For example, many special purpose ordinances include basic development requirements such as setbacks and elevations. The special purpose ordinance is a particularly useful mitigation technique when it is implemented to reduce damages associated with flooding and coastal erosion. Floodplain ordinances were the only special purpose ordinance recognized by any of the participating jurisdictions.

Site Plan Review Requirements

Site plan review requirements are used to evaluate proposed development prior to construction. An illustration of the proposed work—including its location, exact dimensions, existing and proposed buildings, and many other elements—is often included in the site plan review requirements. The site plan reviews offer an opportunity to incorporate mitigation principles, such as ensuring that the proposed development is not in an identified hazard area and that appropriate setbacks are included.

Comprehensive Plan

A comprehensive plan or a master plan is a document that illustrates the overall vision and goals of a community. It serves as a guide for the community’s future and often includes projected demographics, land use, transportation, and actions to achieve desired goals.

Integrating mitigation concepts and policies into a comprehensive plan or master plan provides a means for implementing initiatives through legal frameworks and enhances the opportunity to reduce the risk posed by hazard events.

Capital Improvement Plan

Capital Improvement Plans (CIPs) schedule the capital spending and investments necessary for public improvements such as schools, roads, libraries, and fire services. These plans can serve as an important mechanism to reduce growth in identified hazard areas through limited public spending and can be used as a to develop a match for mitigation projects.

Economic Development Plan

Economic Development Plans (EDPs) offer a comprehensive overview of the local or regional economic state, establish policies to guide economic growth, and include strategies, projects, and initiatives to improve the economy in the future. Furthermore, EDPs, similar to capital improvement plans, offer an opportunity to reduce development in hazard prone areas by encouraging economic growth in areas less susceptible to hazard events.

Emergency Response Plan

Emergency response plans (ERPs) provide an opportunity for local governments to anticipate an emergency and plan the response accordingly. In the event of an emergency, a previously established ERP can improve response and reduce negative effects as the responsibilities and means by which resources are deployed has been previously determined.

National Flood Insurance Program (NFIP)

The Federal Emergency Management Agency (FEMA), the government entity that administers the National Flood Insurance Program (NFIP), has mapped the known floodplains within much of the United States. When a flood study is completed for the NFIP, the information and maps are assembled into a Flood Insurance Study (FIS). A FIS compiles flood risk data for specific waters or hazard areas within specific communities and includes the main causes of flooding in these areas. The FIS delineates Special Flood Hazard Areas (SFHAs), designates flood risk zones, and establishes base flood elevations (BFEs) within certain areas. BFEs are based on the flood event that has a 1% chance of occurring annually, or the 100-year flood. At present, every individual municipality in Orange County is an active member of the NFIP except for the Village of Otisville.

NFIP Community Rating System (CRS)

The Community Rating System is a voluntary incentive program that recognizes and encourages floodplain management activities at the community level. CRS participants receive discounted flood insurance premium rates that reflect the reduced flood risk resulting from community actions to meet the three goals of the CRS: (1) reduce flood damage to insurable properties, (2) strengthen and support the insurance aspects of the NFIP, and (3) encourage a comprehensive approach to floodplain management.[244] No Orange County communities are participants in the CRS.

Local Waterfront Revitalization Program (LWRP)

The Waterfront Revitalization of Coastal Areas and Inland Waterways Act offers local governments the opportunity to participate in the state's Coastal Management Program (CMP) on a voluntary basis by preparing and adopting a Local Waterfront Revitalization Program (LWRP), providing more detailed implementation of the state's CMP through use of such existing broad powers as zoning and site plan review (NYS Department of State – Office of Planning & Development, No Date [2]).

When an LWRP is approved by the New York State Secretary of State, state agency actions are required to maximize alignment with the approved LWRP. When the federal government concurs with the incorporation of an LWRP into the CMP, federal agency actions must be consistent with the approved addition to the CMP. Title 19 of NYCRR Part 600, 601, 602, and 603 provide the rules and regulations that implement each of the provisions of the Waterfront Revitalization of Coastal Areas and Inland Waterways Act, including (but not limited to) the required content of an LWRP, the processes of review and approval of an LWRP, and LWRP amendments.

An LWRP consists of a planning document prepared by a community, and the program established to implement the plan. An LWRP may be comprehensive and address all issues that affect a community's entire waterfront, or it may address the most critical issues facing a significant portion of its waterfront.

An approved LWRP reflects community consensus and provides a clear direction for appropriate future development. It establishes a long-term partnership among local government, community-based organizations, and the state. Also, funding to advance preparation, refinement, or implementation of Local Waterfront Revitalization Programs is available under Title 11 of the New York State Environmental Protection Fund Local Waterfront Revitalization Program (EPF LWRP) among other sources.

In addition, state permitting, funding, and direct actions must align as closely as possible with an approved LWRP. Within the federally defined coastal area, federal agency activities are also required to be consistent with an approved LWRP. This "consistency" provision is a strong tool that helps ensure all government levels work in unison to build a stronger economy and a healthier environment.

Planning and Regulatory Capabilities – State and Federal

New York State Floodplain Management

There are two departments that have statutory authorities and programs that affect floodplain management at the local jurisdiction level in New York State: the New York State Department of

[244] Federal Emergency Management Agency. "Community Rating System Overview and Participation." June 30, 2021. https://www.fema.gov/fact-sheet/community-rating-system-overview-and-participation.

Environmental Conservation (NYS DEC) and the Department of State's Division of Code Enforcement and Administration (DCEA).

In 1992, the New York State Legislature amended an existing law, finding that "it is in the interests of the people of this state to provide for participation" in the NFIP (New York Laws, Environmental Conservation, Article 36). Although the Legislature recognized that "land use regulation is principally a matter of local concern" and that local governments "have the principal responsibility for enacting appropriate land use regulations," the law requires all local governments with land use restrictions over SFHAs to comply with all NFIP requirements. The law clearly advises local governments that failure to qualify for the NFIP may result in sanctions under federal law, and specifies that the state "will cooperate with the federal government in the enforcement of these sanctions."

The 1992 law providing for local government participation in the NFIP also requires state agencies to "take affirmative action to minimize flood hazards and losses in connection with state-owned and state-financed buildings, roads and other facilities, the disposition of state land and properties, the administration of state and state-assisted planning programs, and the preparation and administration of state building, sanitary and other pertinent codes." In particular, the NYS DEC commissioner is to assist state agencies in several respects, including reviewing potential flood hazards at proposed construction sites.

The NYS DEC is charged with conserving, improving, and protecting the state's natural resources and environment as well as preventing, abating, and controlling the pollution of New York's water, land, and air. Programs with the potential to impact floodplain management are managed by the Bureau of Flood Protection and Dam Safety, which cooperates with federal, state, regional, and local partners to protect lives and property from floods, coastal erosion, and dam failures. These objectives are accomplished through floodplain management and both structural and nonstructural means.

The Coastal Management Section works to reduce coastal erosion and storm damage to protect lives, natural resources, and properties through structural and nonstructural means. The Dam Safety Section is responsible for "reviewing repairs and modifications to dams, and assuring [sic] that dam owners operate and maintain dams in a safe condition through inspections, technical reviews, enforcement, and emergency planning." The Flood Control Projects Section is responsible for reducing flood risk to life and property through construction, operation, and maintenance of flood control facilities.

The Floodplain Management Section is responsible for reducing flood risk to life and property through management of activities, such as development in flood hazard areas, and for reviewing and developing revised flood maps. The Section serves as the NFIP State Coordinating Agency and in this capacity is the liaison between FEMA and New York communities that elect to participate in the NFIP. The Section provides a wide range of technical assistance.

Administrative and Technical Capabilities – County and Local

Orange County Department of Emergency Services (OCDES) – Office of Emergency Management

The five divisions of the OCDES are Emergency Communications (911), Emergency Management, Fire Services, Police Liaison Services, and Emergency Medical Services. The OCDES is a county-chartered agency. The OCDES Commissioner, who oversees the five divisions listed above, reports to the County Executive. The Department has 66 full-time employees, 56 of whom are assigned to the Division of Emergency Communications.

The Orange County Department of Emergency Services is responsible for the following county-wide services:

- Oversees emergency dispatch and communications system that allows residents to dial 911 to receive emergency medical, fire, police, or other emergency help from any phone in the county
- Implements County Mutual Aid and Disaster Plans, which provide fire, emergency medical, and other agency assistance when local services have exceeded their local equipment and personnel resources
- Provides emergency medical personnel training in coordination with fire training with the NYS Office of Fire Prevention and Control

Orange County Department of Planning (OCDP)

The Orange County Department of Planning provides leadership in the overall planning and strategy for the future development of Orange County, including the preparation of County Comprehensive Plans and the commissioning or development of other documents and studies involving transportation, agriculture, housing, resource management, open space preservation, and economic issues in general. The County acts as an administrator and monitor of federal, state and regional initiatives and programs and generally acts as a facilitator and spokesman for all local communities. While the regulation of land use is essentially the responsibility of the individual municipalities, some regulatory measures are still carried out by the County, including overview of projects deemed referable under New York State General Municipal Law (GML) 239-l, 239-m, and 239-n, as well as their potential inter-municipal or county-wide impacts. Such referable projects include (but are not limited to) subdivisions, area and use variances, local laws, zoning codes and other development types that meet certain criteria.

The County provides technical support in addition to decision-making advice for individual municipalities, thereby underscoring the Planning Department's primary objective to identify common interests in county-wide matters of growth and development while providing comprehensive oversight throughout planning for future growth in the county. The County Planning Department also actively supports the Orange County Municipal Planning Federation (OCMPF), which was established in 1974 to provide educational programs and information on the purposes and techniques of municipal planning, including zoning, land use, subdivision regulation, state environmental quality review procedures, and related subjects. The OCMPF studies and recommends new and proposed legislation and existing laws, rules, and regulations concerning planning and zoning and reports findings to its members. The OCMPF also undertakes to advance the collective views and ideas of its members to foster improved techniques and methods for sound planning and zoning practices and administration.

At the local level, municipalities have a range of planning tools and regulatory mechanisms at their disposal with which can be used to influence and manage development so as to minimize damages and losses from natural hazards.

Orange County Soil & Water Conservation District (OCSWCD)

The OCSWCD is a special purpose district created to develop and carry out a program of soil, water and related natural resources conservation. Environmental planners and other OCDP staff provide support to the Board of Directors. The district was created in 1967 by a resolution from the County Legislature, with a mission to protect the natural resources of Orange County, particularly our soil and water. Originally, almost all of the district's work was with the agricultural community. As the county has grown and the landscape has changed over the years, our services have expanded and we now provide conservation assistance to municipalities and landowners as well as farmers.

Orange County Department of Public Works (OCDPW)

The Department of Public Works is responsible for planning, design, operations, maintenance, construction and general administration of the county’s highways, bridges and related infrastructure; County buildings and properties; Orange County Sewer District #1 (OCSD #1), including the operation of the Sewer Plant in the Village of Harriman as well as the one in the Village of Kiryas Joel; three solid waste collection facilities located in the hamlet of New Hampton in the Town of Wawayanda and in the Cities of Newburgh and Port Jervis; the County Airport; County Commuter Parking facilities; the County motor vehicle fleets; and a variety of watershed protection and special districts.

Orange County Department of Information Technology

The Department of Information Technology exists to provide Orange County government departments and agencies with the means to efficiently and effectively collect, store, manipulate, and communicate County information and records.

Information Technology is staffed by computer professionals and business analysts who support all County computer technology and data information needs by identifying business problems and implementing solid cost-effective solutions. Also supported are all Orange County Assessors (towns, villages, and cities) and the Emergency Communications office (known as Enhanced 911).

A division of Information Technology is the Records Management Department, which has a staff of record professionals who store, preserve, and safeguard inactive County records for historical, legal, and auditing compliance.

Administrative and Technical Capabilities – Local Governments

Local capabilities are discussed in their respective annexes.

Administrative and Technical Capabilities – State and Federal

New York State Division of Homeland Security and Emergency Services (NYS DHSES)

The NYS DHSES (formerly New York State Office of Emergency Management) is responsible for coordinating activities to protect New York's communities, economic well-being, and environment from natural, man-made, and technical disasters and emergencies. DHSES routinely assists local governments, voluntary organizations, and the private sector through a variety of emergency management programs that include hazard identification and mitigation, planning, training, exercises, operational response to emergencies, technical support, and disaster recovery (public) assistance.

DHSES initiates and promotes mitigation planning and project implementation to protect lives and reduce the impact of disasters on developed land including roads, bridges, and buildings in New York State. DHSES provides project management and technical assistance for planning, project identification, application development, environmental review, and cost–benefit analysis. Major mitigation programs include the Hazard Mitigation Grant Program, the Flood Mitigation Assistance Program, the Pre-Disaster Mitigation Program, and the Repetitive Flood Claims and Severe Repetitive Loss Programs. DHSES also develops and maintains the State Hazard Mitigation Plan, leading a team of state, federal and academic-based partners through an ongoing review and update process.

The latest State Hazard Mitigation Plan was completed in 2023, maintaining the state’s eligibility for recovery assistance from FEMA’s Public Assistance. The 2023 State Hazard Mitigation Plan was also used as guidance in the development of this plan update.

New York State Department of Environmental Conservation (NYS DEC) – Division of Water – Bureau of Flood Protection and Dam Safety

The Bureau of Flood Protection and Dam Safety cooperates with federal, state, regional, and local partners to protect lives and property from floods, coastal erosion and dam failures through floodplain management and both structural and non-structural means; and provides support for information technology needs in the division. The Bureau comprises the following sections:

- **Coastal Management:** This section works to reduce coastal erosion and storm damage to protect lives, natural resources, and properties through structural and non-structural means.
- **Dam Safety:** This section is responsible for reviewing repairs and modifications to dams as well as ensuring that dam owners safely operate and maintain their dams via inspections, technical reviews, enforcement, and emergency planning.
- **Flood Control Projects:** This section is responsible for reducing flood risk to life and property through construction, operation and maintenance of flood control facilities.
- **Floodplain Management:** This section is responsible for reducing flood risk to life and property through proper management of activities, including development in flood hazard areas as well as the review and revising of flood maps.
- **Fiscal Planning and Management:** This section manages FEMA grants, Bureau of Flood Protection and Dam Safety contracts, Great Lakes Restoration Initiative grants, Capital Projects, Temporary Service Contracts, WQIP Contracts, and office operations.

Department of State's Division of Code Enforcement and Administration (DCEA)

The Division of Building Standards and Codes (BSC) administers the mandatory statewide Uniform Fire Prevention and Building Code (Uniform Code) and State Energy Conservation Construction Code (Energy Code). The BSC provides a variety of services related to the Uniform Code and Energy Code. It provides technical assistance, administers variances, delivers educational courses, oversees the enforcement practices of local governments, and serves as secretariat to the State Fire Prevention and Building Code Council. The DCEA publishes technical bulletins, model reporting forms, plan review and inspection checklists, and other publications that aid local code enforcement authorities related to flood hazard areas and reducing flood losses.

Fiscal Capabilities –County and Local

Municipal Fiscal Capabilities

Jurisdictions in Orange County can implement mitigation activities through existing local budgets, local appropriations via referendums or bonding, and—when available—through several state and federal loan or grant-funding opportunities. In the current municipal fiscal climate, characterized by budgetary constraints and tax caps, it is important for local jurisdictions to be creative in devising mitigation strategies that leverage inter-municipal cooperation and shared services in both grant applications and locally financed projects. This includes collaborating with Orange County departments and staff.

Fiscal Capabilities – State and Federal

New York Rising Community Reconstruction Program

The NY Rising Community Reconstruction program was established to provide additional rebuilding and revitalization assistance to communities severely damaged by Hurricanes Sandy and Irene as well as Tropical Storm Lee. The NY Rising Community Reconstruction program enables communities to identify resilient and innovative reconstruction projects and other needed actions based on community-driven plans that consider current damage, future threats and the communities' economic opportunities. Communities successfully completing a recovery plan will be eligible to receive funds to support the implementation of projects and activities identified in the plans.

Each NY Rising Community has a Planning Committee that includes, among others, a representative from the county, town or village, elected legislative representatives, local residents, and leaders of other organizations and businesses in the community. The Planning Committee will take the lead in developing the content of the plan. The state has provided each NY Rising Community with a planning team to help prepare a plan.

Consultants have been hired through a state process administered by New York State Homes and Community Renewal (NYS HCR) through its Office of Community Renewal (OCR) and the Housing Trust Fund Corporation (HTFC). Planning experts from the Department of State and Department of Transportation have been assigned to each community to provide assistance to the community and help oversee the planning consultants.

The City of Middletown and the Village of Washingtonville are designated NY Rising Communities, both eligible for between $3 million and $25 million in Community Development Block Grant (CDBG) Program funding. Such funding will be implemented to bolster economic development, civic infrastructure, and hazard mitigation efforts, as well as further community development planning reports, plans, and studies.

Federal Hazard Mitigation Funding Opportunities

Hazard mitigation funding from the federal government is available to all municipalities with a current FEMA-approved hazard mitigation plan. This plan, the 2024 Orange County HMP update, will be the current plan for the County and its participating jurisdictions when it is approved by FEMA and adopted locally.

Grant programs from FEMA are available but usually require local share funding percentages: 10% to 25% of the total project costs will need to be provided by the applicant while the awarding grant program will fund 75% to 90%. Hazard mitigation grant programs sponsored by FEMA are described below.

Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) can provide grants to state and local governments after a disaster has been declared. These grants provide funds to assist with the cost of mitigation measures such as strengthening buildings to withstand earthquakes or raising furnaces, storage areas, or entire buildings above flood elevations. Hazard mitigation refers to measures that protect lives and property from future damages caused by natural disasters. In the long term, mitigation measures reduce personal loss, save lives, and reduce the future difficulty and cost of responding to and recovering from disasters.

Examples of types of mitigation measures eligible for HMGP funding include:

- Acquisition of real property in high hazard areas, demolition or relocation of structures, and conversion of land to open space use
- Strengthening existing structures against high winds
- Seismic rehabilitation and structural improvements to existing structures
- Elevation of flood-prone structures
- Implementing vegetation management programs to reduce wildfire hazard to high-risk structures

Individuals can work with their communities to identify potential mitigation measures. The communities in a declared state can apply for HMGP funding for these measures from the state. The state is responsible for selecting and prioritizing local projects and then forwarding selected applications to FEMA for approval. The amount of funding available for the HMGP under a disaster declaration is 15% of FEMA's estimated total grants for all other categories of assistance from that disaster. The state sets funding priorities and allocates funds among communities. The HMGP can provide grants to assist with 75% of the total cost of mitigation projects. Once a project is approved, the state and local community are responsible for implementing it and providing a 25% funding match. This match is from state and local sources.

Flood Mitigation Assistance Program

The Flood Mitigation Assistance (FMA) grant program provides funding to states, federally recognized Indian tribal governments, and other communities so that cost-effective measures are taken to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the National Flood Insurance Program (NFIP). The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities. Three types of grants are available under FMA: Planning, Project, and Technical Assistance .

The FMA program is funded on an annual basis and no federal disaster declaration is required for eligibility. However, only NFIP-insured homes and businesses are eligible for mitigation projects. Individuals must apply via local governments or other eligible organizations. Applicant municipalities must have a FEMA-approved local flood mitigation plan. The FMA program funds 75% of the total project cost, while the remaining 25% must come from non-federal sources.

Pre-Disaster Mitigation Program

The goal of the Pre-Disaster Mitigation Grant Program is to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on federal funding in future disasters. This program awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes. PDM grants are funded annually by Congressional appropriations and are awarded on a nationally competitive basis. The program requires a 25% local share, and no disaster declaration is required. As with the HMGP and FMA programs, a FEMA-approved local hazard mitigation plan is required.

Building Resilience Infrastructure and Communities (BRIC)

Building Resilient Infrastructure and Communities (BRIC) supports states, local governments, tribes and territories as they work to reduce their hazard risk. The BRIC program aims to support communities as they build capability and capacity. BRIC also encourages and aids innovation. It helps partnerships grow; supports infrastructure projects; and fosters flexibility and consistency.

The BRIC program also offers communities, territories and tribes non-financial direct technical assistance. This support helps with hazard planning and projects. BRIC DTA does not require a previous grant sub-application or award. Communities also don’t need an approved hazard mitigation plan to apply.

The FY23 BRIC selections further underscore FEMA's commitment to equity and environmental justice. These awards will assist the most disadvantaged communities in building resilience to climate change and extreme weather events. Aligning with the Justice40 Initiative, BRIC will advance the goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities that may be overburdened by pollution and under-investment.

Federal and State Disaster and Recovery Assistance Programs

Disaster recovery funding is available from local, state, and federal levels in the aftermath of a disaster. The extent and severity of the disaster dictates the variety and quantities of funding available in a given event. According to the 2023 NYS Hazard Mitigation Plan, the following general types of funding assistance may be available following a major disaster:

- Public Assistance (PA) Grant Program
- Individual Assistance (IA) Grant Program
- Community Development Block Grant (CDBG) – Department of Housing and Urban Development
- Federal Highway Administration – Emergency Relief Program

Additional sources of funding from the state and federal levels may be sought from the following programs:

- Social Services Block Grant (NYS)
- Homeland Security Grant Program (NYS)

- U.S. Economic Development Administration
- Homeownership Repair and Rebuilding Fund – HRRF (NYS)
- Empire State Relief Fund (NYS)
- Governor's Office of Storm Recovery – GOSR (NYS)
- Empire State Development (NYS)

National Flood Insurance Program

Long-term mitigation of potential flood impacts can be best achieved through comprehensive floodplain management regulations and enforcement, particularly at a local level. The National Flood Insurance Program (NFIP), which is regulated by FEMA, has the goal of reducing the impact of flooding on public and private 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.

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:

1. It creates safer environments by reducing loss of life and decreasing property damage;
2. It allows individuals to minimize post-flood disaster disruptions and to recover more quickly (homes built to NFIP standards receive less damage from flood events, and, when damage does occur, the flood insurance program protects the homeowner's investment); and
3. It lessens the financial impacts on individuals, communities, and other involved parties.[245]

There are two non-participating communities in the county, the Village of Otisville and the Town of Woodbury. The Village of Otisville contains no significant watercourses considered to be a potential source of flooding, and there are no reported localized drainage issues. The Village of Woodbury was incorporated in 2006 and covers all of the Town of Woodbury except for a portion within the Village of Harriman. On incorporation, the Village of Woodbury assumed the Town's obligations and authority over local building and zoning, as well as the administration of the Floodplain Management Ordinance and other responsibilities associated with NFIP membership. Hence, there would be little benefit in the Town also joining the NFIP since this would result in the duplication of existing efforts. For these reasons, neither community has elected to participate in the NFIP at this time.

Local NFIP participation is addressed in the respective annexes of each of the participating jurisdictions in this plan. This section summarizes NFIP data across the county.

Orange County Floodplain Management

In order to participate in the NFIP, communities are required to adopt and enforce a local floodplain management ordinance. In New York, counties do not participate in the NFIP because there is no unincorporated land for them to manage. Therefore, the responsibility to manage and enforce the NFIP is the responsibility of the local jurisdictions including the cities, towns, and villages that participate in this plan update. The New York State Department of Environmental Conservation (DEC) has developed three model local laws for flood damage prevention that can help communities meet this legal requirement.

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245 FEMA. National Flood Insurance Program Fact Sheet. https://www.fema.gov/sites/default/files/2020-05/National-Flood-Insurance-Program-Fact-Sheet-May-2016r.pdf.

Specific reference to when and how the plan participants have adopted minimum NFIP floodplain management criteria via local regulation can be found in their respective annexes.

Two important factors are typically outlined in the flood damage prevention local law. First, there is the designation of a local floodplain administrator or an office, agency, or department who will be responsible for reviewing and ensuring all development complies with local floodplain laws. Second, for communities that have a designated Special Flood Hazard Area (SFHA), or areas that are at high risk of flooding according to FEMA floodplain mapping, these laws provide the legal framework to review and permit development in the floodplain. The designation of a specific floodplain administrator and permitting process is identified in each annex as well.

Another element of the minimum NFIP floodplain management regulations is addressing not only new development, but structures that are built that may not comply with current codes and regulations. When these types of structures are damaged or improved for elective reasons, the local floodplain administrator may classify them as the following:

1. *Substantial damage* means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50% of the market value of the structure before the damage occurred.
2. *Substantial improvement* means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the "start of construction" of the improvement. This term includes structures that have incurred "substantial damage," regardless of the actual repair work performed.[246]

Communities that participate in the NFIP adopt floodplain ordinances that, at a minimum, require that all insured structures that incur damages with repair costs of more than 50% of the property's market value must comply with the floodplain ordinance when the structure is repaired/rebuilt. These repairs could mean changes to the elevation of the structure, acquisition and demolition by the municipality, or relocation to an area outside of the floodplain. Insured structures that are located within floodplains identified on FEMA's Flood Insurance Rate Maps (FIRMs) receive funds if impacted by a flooding disaster. These distributed funds are to be used to mitigate the risk of future flooding by implementing pre-disaster mitigation actions, such as those previously referenced. The substantial damage/substantial improvement process for each participating jurisdiction is noted in their annex.

State and FEMA resources are available to expand local NFIP capabilities and the ability to implement this program. One recent resource that was developed in 2023 is the NYS Floodplain Management Quick Guide. This tool can be used by community officials to understand the essential components of floodplain management and the resources available to them for implementing local floodplain management programs within their own community.

[246] Cornell Law School. 44 CFR § 59.1 – Definitions. https://www.law.cornell.edu/cfr/text/44/59.1.

Orange County Flood Mapping

FEMA's Q3 flood data, which is derived from their FIRMs, was reviewed for Orange County. Flood hazard mapping associated with Orange County was updated and effective as of August 2009. All municipalities within Orange County have been mapped and data is available online at FEMA Flood Map Service Center.

There are an estimated 57,795 acres of land in the county that are located within 100-year or 500-year mapped flood zones. A 100-year flood indicates a flood elevation that has a 1% chance of being equaled or exceeded each year. Similarly, a 500-year flood indicates a flood elevation that has a 0.2% chance of being equaled or exceeded in any given year.

The land area in Orange County that is mapped within either of these flood zones accounts for, at least portions of, 14,540 tax parcels. A Hazus study identified 120,132 buildings in the region with an aggregate total replacement value of $43,504,565. By occupancy, the buildings are largely residential at 74.2%, with commercial (17.1%) and industrial (4.2%) following. The remaining categories (agricultural, religion, government, and education) fall between 0.5–1.6%. The Wallkill and Hudson Rivers influence the majority of the hydrology.

Orange County NFIP Policy and Loss Statistics

NFIP records and claims were analyzed to determine the extent of participation, flood losses, and flood insurance policies within Orange County. All of the jurisdictions within the county are current participants in FEMA's NFIP, except for the Village of Otisville and the Town of Woodbury. NFIP Policy Data and Loss statistics for all participating jurisdictions in Orange County are included in Table 31and X. This data is current as of January 31, 2018.

The information included in Table 31 documents the number of flood insurance policies, coverage amounts, and premium amounts for all jurisdictions within Orange County as of January 31, 2018. The Village of Otisville and the Town of Woodbury have no data because they currently do not participate in the NFIP. The Town of Newburgh has the highest number of policies in-force, while the City of Port Jervis has the greatest insurance amounts in-force. The flood loss data included in Table X documents the number of losses and payment amounts associated with flood losses from January 1, 1978, to February 28, 2017. NFIP Loss Statistics indicate that the Village of Washingtonville has experienced the highest incidence of loss from flood events (240); the Village has also sustained the most total damage ($4,507,977.51). The Town of Deerpark also has a large amount of total loss (182) and a high total payments value ($3,747,900.82). The Town of Greenville has not reported any loss claims since the collection of this information began in 1978.

Table 30: NFIP Statistics for Orange County

Municipality	CID #	Policies In-Force	Insurance In-Force (whole $)	Written Premium In-Force	Total Losses	Total Payments
Blooming Grove, Town of	360608				15 residentials 1 commercial	
Chester, Town of	360870				7 residential	
Chester, Village of	361541					
Cornwall, Town of	360611				6 residential	
Cornwall-on-Hudson, Village of	360610				2 residential	
Crawford, Town of	361250					
Deerpark, Town of	360612				1 commercial 22 residential	
Florida, Village of	360613				1 commercial 1 residential	
Goshen, Town of	360614				4 residential	
Goshen, Village of	361571				4 residential	
Greenville, Town of	360615					
Greenwood Lake, Village of	360616				6 residential	
Hamptonburgh, Town of	360617				5 residential	
Harriman, Village of	360618					
Highland Falls, Village of	361453					
Highlands, Town of	360822					

Municipality	CID #	Policies In-Force	Insurance In-Force (whole $)	Written Premium In-Force	Total Losses	Total Payments
Kiryas Joel, Village of	361610					
Maybrook, Village of	360241					
Middletown, City of	360619				6 residential	
Minisink, Town of	360620					
Monroe, Town of	360621				5 residential 1 commercial	
Monroe, Village of	360622				11 residential 1 commercial	
Montgomery, Town of	360623				1 commercial	
Montgomery, Village of	360624				2 commercial	
Mount Hope, Town of	360625				1 commercial	
New Windsor, Town of	360628				5 residential 1 commercial	
Newburgh, City of	360626				2 residential	
Newburgh, Town of	360627				6 residential	
Otisville, Village of	N/A					
Port Jervis, City of	360976				12 residential	
South Blooming Grove, Village of	360194				2 residential	
Tuxedo, Town of	360631				6 residential	
Tuxedo Park, Village of	361595					

Municipality	CID #	Policies In-Force	Insurance In-Force (whole $)	Written Premium In-Force	Total Losses	Total Payments
Unionville, Village of	360633					
Walden, Village of	360635					
Wallkill, Town of	360634				4 residential	
Warwick, Town of	360636				2 residential	
Warwick, Village of	360637				5 residential	
Washingtonville, Village of	360638				36 residential 6 commercial	
Wawayanda, Town of	360639					
Woodbury, Town and Village	360640				3 residential	

There are no communities in Orange County that are participants in the Community Rating System (CRS). The CRS is a voluntary incentive program that recognizes and encourages floodplain management activities at the community level. As a result of CRS participation, flood insurance premium rates are discounted between 5–45% to reflect the reduced flood risk that results from community actions to meet the three goals of the CRS: reduce flood loss, facilitate accurate insurance ratings, and promote flood insurance awareness.[247]

Risk Rating 2.0

In 2023, FEMA fully implemented their new Risk Rating 2.0 pricing approach. The intent of this program was to make policy rates more accurately reflect each individual property's rate and more accurately reflect their risk and the costs to insure them. FEMA shared that this pricing methodology was expected to make some policies become more affordable for those who were previously overpaying but other policies would increase. In Orange County, approximately 42% of policy holders were expected to experience a premium decrease, 47% would stay the same or go up by $10 or less, and 11% were expected to increase.

Table 31: Risk Rating 2.0 Premium Changes in Orange County[248]

Price Difference Under New Methodology	Percentage of Policies
Decrease <$100	10.2%
Decrease $100–90	1.1%
Decrease $90–80	1.4%
Decrease $80–70	0.7%
Decrease $70–60	0.9%
Decrease $60–50	1.3%
Decrease $50–40	1.1%
Decrease $40–30	1.4%
Decrease $30–20	4.5%
Decrease $20–10	4.4%
Decrease $10–0	14.9%
$0–10 Increase	47.2%
Increase $10–20	4.8%
Increase $20–30	2.7%

[247] FEMA. Community Rating System. https://www.fema.gov/floodplain-management/community-rating-system#visualizations.
[248] FEMA. NFIP's Pricing Approach State Profiles. 2021. https://view.officeapps.live.com/op/view.aspx?src=https%3a%2f%2fwww.fema.gov%2fsites%2fdefault%2ffiles%2fdocuments%2ffema_risk-rating-county-breakdown-newyork_2021.xlsx&wdorigin=browselink.

Price Difference Under New Methodology	Percentage of Policies
Increase $30–40	1.1%
Increase $40–50	0.9%
Increase $50–60	0.5%
Increase $60–70	0.3%
Increase $70–80	0.3%
Increase $80–90	0.2%
Increase $90–100	0.1%
Increase >$100	0.1%

Another change since Risk Rating 2.0 is that since mapped flood zones are not directly tied to policy price, the discounts awarded due to community participation in the CRS will be applied to all policies in the community, not just those in the high-risk areas. Therefore, if a community in Orange County were to join the CRS, all policy holders regardless of their flood risk would benefit. This is important to note considering that an estimated 40% of flood insurance claims come from outside of the SFHA, but flood insurance is not typically required outside of the SFHA by mortgage lenders.

NFIP Mitigation Actions

According to MitigateNY, the site for New York’s 2023 State Hazard Mitigation update, the following actions represent mitigation strategies that can be taken in alignment with the NFIP floodplain management recommendations:

- Modify human susceptibility to flood impacts by avoiding hazardous use of floodplains.
  - Adopt, enforce, and use regulations (including zoning, subdivision and site plan review, etc.).
  - Establish policies related to the design and siting of public services, utilities, and critical facilities/infrastructure.
  - Acquire land in the floodplain in order to preserve open space and permanently relocate buildings.
  - Elevate or floodproof new buildings and retrofit existing structures.
  - Prepare people and property for flooding through forecasting, warning systems, and emergency plans.
  - Inventory, restore, and preserve the natural resources and functions of floodplains.
- Modify flooding itself by developing projects that control floodwater.
  - Construct and maintain dams and reservoirs that store excess water upstream from developed areas.

- Construct and maintain dikes, levees, and floodwalls to keep water away from developed areas;
- Alter channels to divert high flows around developed areas so overbank flooding will be less frequent.
- Increase pervious surface land cover to retain as much rain as possible where it falls, so it can infiltrate the soil instead of running off.
- Store excess runoff with on-site detention measures.
- Protect inland development with shoreline protection measures that account for the natural movement of shoreline features.

- Preserve and restore natural resources and renew the vitality and purpose of floodplains by reestablishing and maintaining the natural state of floodplain environments.
  - Implement nature-based solutions and hybrid projects that restore floodplains and wetlands.
  - Use floodplain, wetlands, and coastal barrier land use regulations to steer development away from natural areas.
  - Conduct land acquisition, relocation of buildings, and open space preservation.
  - Implement tax adjustments to provide financial benefits for preserving lands or restoring lands to their natural state.
- Modify the impact of flooding by assisting individuals and communities to prepare for, respond to, and recover from floods.
  - Establish plans and programs to educate residents and business owners.
  - Develop plans and programs to assist community implementation of mitigation measures to protect against future flood events.
  - Create funds to provide disaster assistance, flood insurance, and tax abatements.

Plan Maintenance Process

This section details the future maintenance process that will be followed for subsequent plan updates. The Disaster Mitigation Act (DMA) of 2000 requires that adopted mitigation plans define and document the processes and mechanisms for maintaining and updating the hazard mitigation plan at least once every five years for the participating jurisdictions to remain eligible for federal funding. This hazard mitigation plan maintenance process must include monitoring and evaluating the plan, updating the plan, providing an implementation schedule, and outlining steps for continued public involvement.

Plan Monitoring and Evaluation

The 2024 Orange County HMP will be monitored annually to ensure that the goals and objectives remain relevant and that the proposed mitigation actions are implemented efficiently. The Emergency Planner in the Orange County Department of Emergency Services (OCDES) who is coordinating this mitigation planning project will monitor and progress overall plan maintenance for this plan. OCDES will lead on plan monitoring, evaluation, and implementation, and both OCDES and the Orange County Department of Planning will work together to oversee and schedule the initiation of required plan updates going forward.

The Orange County HMP Implementation Committee will be established. It will continue to hold annual meetings to review and discuss this document, recent hazard events, and how to incorporate this plan into other county-wide planning efforts. These annual meetings will be publicized and open to the public to promote continued public involvement in this process. OCDES will schedule and moderate the Implementation Committee's annual meetings and will compile a meeting summary and annual report at the end of every year. This annual report should detail changes made to the HMP document, if any, and how and when these changes will be made. The meeting summary will provide important information regarding hazard events that occurred during the previous year and implementation details associated with the proposed mitigation actions included in the HMP.

Implementing proposed mitigation actions is vital to determining whether the plan is correctly executed. Items that should be reviewed and recorded for each completed mitigation action include the ultimate cost of the activity, the successes and failures of the action in minimizing hazard impacts, and the funding sources used. During each annual meeting of the Implementation Committee, the following HMP components will be assessed:

- Whether the goals and objectives address current and expected conditions
- Whether the nature, magnitude, and/or type of risks have changed
- Whether the current resources are appropriate for implementing the plan
- Whether there are implementation problems or coordination issues with other agencies
- Whether the outcomes have occurred as expected

- Whether agencies and other partners participated as initially proposed

Plan Updating

The 2024 Orange County HMP will be updated by addendum at any time during the five-year execution period in which the Implementation Committee determines that a significant change has occurred that warrants such an action. In the event of a hazard occurrence, the goals, actions, and procedures outlined in the plan will be reviewed as necessary. If any revisions or changes are warranted, the plan will be updated immediately or at the following five-year update timeframe, depending on the importance of the proposed change(s) or revision(s). During the updating process, the participating jurisdictions will be contacted to provide updated information concerning the elements of the plan applicable to their community. This process will be completed by issuing a questionnaire to be returned to the Implementation Committee for review before their annual meeting.

The plan update process should be initiated approximately 18 months before the end of the current five-year execution period. Participant and public review will continue to be completed during each five-year plan update process. All future plan updates will be submitted for re-approval in accordance with the five-year review schedule dictated in DMA 2000. Following FEMA conditional approval, each participating jurisdiction must formally adopt the new plan by resolution. These resolutions should be collected, filed with Orange County for documentation, and submitted to FEMA and the NYS DHSES for final HMP approval.

Local Planning Considerations

By adopting a resolution to accept the HMP, each participating jurisdiction agrees to reference and incorporate the document into their future local planning documents, codes, decisions, processes, and regulations. Plan elements will be considered during municipal and county-wide development actions and comprehensive planning. Table 33 shows how this HMP will be incorporated into each jurisdiction's existing and future planning mechanisms and opportunities. A similar, locally relevant hazard mitigation plan integration mechanism table can be found in each jurisdiction’s annex.

Table 32: Planning Mechanism Incorporation

Mechanism	How Plan Will be Incorporated
Emergency Planning	• The plan will be added/referenced as an appendix to the County’s Emergency Response/Evacuation Plan. • Hazard risk assessment and vulnerability data included in the mitigation plan will be reviewed during emergency planning and Emergency Response/Evacuation Plan updates.
Annual Budget	• Mitigation actions will be considered when setting the annual budgets within participating jurisdictions.
Plans and Programs	• Each participating jurisdiction will consider Hazard Mitigation Plan information during program and protection updates and revisions.

Mechanism	How Plan Will be Incorporated
	• Programs and plans will be compared to the Hazard Mitigation Plan to ensure the goals and objectives are consistent across all documents.
Grant Applications and Other Funding Opportunities	• Data and maps from the HMP may be used as supporting documentation in grant applications. • Mitigation actions included in the Plan will be considered during application submission and fund allocation.
Economic Development	• Hazard vulnerability information will be reviewed and utilized during the siting of local development efforts within each participating jurisdiction.
Capital Improvement Planning	• Current and future projects will be reviewed for hazard vulnerability. Hazard-resistant construction standards will be incorporated into the design and location of potential projects, as appropriate.

Numerous changes and additions were made to this document as part of the five-year HMP update process. These updates and the reorganization have made the 2024 HMP more valuable as a planning tool and more easily implementable. Over the next five years, such efforts will be emphasized. The incorporation of this document in local planning efforts and processes will be reviewed and discussed on an annual basis.

Public Involvement

Orange County and participating jurisdictions intend to keep the public informed about the County's hazard mitigation planning efforts, actions, and projects. To accomplish this goal, and in addition to the public involvement already incorporated into the completion and review of this document, the following opportunities for ongoing public involvement will be made available:

- A web link provided on Orange County's website that will include a digital copy of the hazard mitigation plan and a list of upcoming planning activities and plan updates
- Public announcements of, and invitations to, annual mitigation committee planning meetings and five-year mitigation plan update events
- Completion of public outreach and mitigation training events throughout the county, especially in higher-risk hazard areas

Future plan updates will document public outreach efforts by including samples, copies of notices, flyers, web announcements, and/or meeting minutes. Additional ways to expand participation will be considered if public response is lacking during subsequent update processes. Public outreach ideas that may be implemented to increase participation include:

- Distributing targeted questionnaires to local civic, community, and nonprofit groups to receive public feedback
- Organizing topic-specific meetings with key individuals and experts to discuss concerns and brainstorm solutions
- Holding education programs during various community events to disseminate information and engage the public in mitigation planning and hazard preparation discussions

Plan Integration

While this HMP integrates hazard awareness and risk management strategies, it builds tangible value only when integrated into public activities and decision-making. The plan's hazard mitigation actions, recommendations, and goals must be integrated into planning, policy, and budgeting procedures at all levels of government throughout Orange County and into the private sector where appropriate.

The Planning Mechanisms and Capabilities section of this plan provides a summary and description of the existing plans, programs, and regulatory mechanisms at all levels of government (federal, state, county, and local) that support hazard mitigation within the County. The County will work with participating municipalities to identify how they can integrate hazard risk management into their existing planning, regulatory, and operational/administrative frameworks. The 2018 Orange County Hazard Mitigation Plan recommended several strategies for implementing the plan into existing planning and operational mechanisms in the County government. It is logical to continue these procedures to ensure all planning documents across the County are maintained with hazard mitigation issues in mind.

The following recommendations will be carried over from the 2018 Hazard Mitigation Plan into the new 2024 HMP update:

- Within six months after adopting the Hazard Mitigation Plan, OCDES will issue a letter to each County's department heads to solicit their support and explore opportunities for integrating hazard mitigation planning objectives into their daily activities. Specifically, letters can include:
  - The Orange County Department of Planning is engaged in land use planning, transportation, agriculture, training, resource management, open space, and economic issues that affect the county. The Hazard Mitigation Plan Update Steering Committee members will work with the Department of Planning to educate them on the Hazard Mitigation Plan and encourage the department to take action(s) to ensure applicable County plans will address hazard mitigation for natural hazards where possible on the next update.
  - New York State General Municipal Law requires that certain types of municipal planning, zoning, and subdivision proposals be referred for County Planning agency review before local action can occur. This requirement (Article 12-b; §239 l, m, n) seeks to promote coordination of land use decision-making and to enhance consideration of potential inter-community and county-wide impacts. The Orange County Planning Department will:

    - Work with municipalities to ensure they have adopted and enforced the minimum standards established in the state-adopted International Building Code.
    - Coordinate with local municipal Floodplain Administrators to determine if enforcement beyond FEMA NFIP minimum requirements would be practical and beneficial for the community.
    - Work with local zoning boards to educate them on the HMP and encourage consideration of low occupancy, low-density zoning in hazard areas, when practicable.
- OCDES will work with department or agency heads to encourage revising job descriptions of government staff to include mitigation-related duties to institutionalize hazard mitigation further. This change would not necessarily result in great financial expenditures or programmatic changes. For example, FEMA presents the following language that could be considered for adding into job descriptions for a community planner, floodplain manager, emergency manager, building code official, or water resources engineer in the Department of Public Works:
  - Knowledge, Skills, and Abilities
    - **Knowledge:** Knowledge of the principles of emergency management, specifically hazard mitigation. Knowledge of sustainable development principles and practices and how they are incorporated into hazard mitigation planning. Knowledge of FEMA's pre- and post-disaster mitigation programs and other federal agency programs (HUD, EPA, SBA) that provide technical and/or financial assistance for implementing pre- or post-disaster mitigation planning. Knowledge of private/nongovernmental programs that can support reconstruction and mitigation strategies.
    - **Skills:** Consensus building and team building, communication (verbal and written), and interpersonal skills.
    - **Abilities:** Ability to apply planning principles and tools to the goals of hazard loss reduction.
- Instead of solely relying on funding from hazard mitigation programs or other external sources of grant monies, the Orange County Division of Budget will consider a line item for mitigation project funding in their capital or operational budgets. Having a line item in these budgets may not guarantee funding every year, but it is certainly easier to get the money allocated if it is already there. Examples include:
  - A revolving fund to finance a buyout program
  - A low-interest loan program to fund retrofits
- Orange County currently has a Comprehensive Plan (adopted in 2019). The Planning Department will add a hazard element to the comprehensive plan at its next update or amendment as one of the most effective mechanisms to institutionalize hazard mitigation for new construction. A primary benefit of combining these processes is that they influence the location, type, and characteristics of physical growth, specifically buildings and infrastructure. While planning in and of itself may not be regulatory, it uses regulatory mechanisms (zoning, development ordinances, etc.) to implement goals and objectives. Additionally, in many parts of the country, the comprehensive planning process is an

established activity that is already familiar to the public, and it usually generates a great deal of interest and public participation.

- Similar efforts will be made to integrate hazard mitigation-related discussions in updates or amendments to the Orange County Open Space Plan.
- The Orange County Municipal Planning Federation (OCMPF), supported by the Orange County Department of Planning and the Vision Hudson Valley Foundation, provides educational programs and information on planning, zoning, land use, and related topics. OCDES and the Department of Planning will coordinate with OCMPF to incorporate key aspects of hazard mitigation planning into existing programs.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day operations of local government. The 2024 Orange County HMP update is intended to allow for integrating its recommendations and data into local plans. A table within each annex lists several planning and policy mechanisms that lend themselves to integrating materials and objectives from this hazard mitigation plan.

Mechanisms considered include the following: capital improvement budget, operating budget, building and zoning ordinances, comprehensive land use plans, human resource manual, grant applications, fire plan, local school service projects, and economic development.