



Village of Wappingers Falls 2024 Climate Vulnerability

Assessment and Adaptation Plan



Photo from <https://upstatehouse.com/a-guide-to-wappingers-falls-ny/>

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Produced by the Village of Wappingers Falls Climate Smart Communities Task Force
with Assistance from the Hudson Valley Regional Council and
ICLEI – Local Governments for Sustainability US

Adopted on [Date TBD]

Credits and Acknowledgments

This document was prepared by the core CAPI Adapt team from CAPI-Village of Wappingers Falls, comprised of the following individuals: **Tom Morris- Village Climate Lead** and **Harrison Phipps – HVRC Intern**. It could not have been completed without the invaluable help of **Mary Lambert- Climate Action Planning Institute Coordinator at HVRC**. Special thanks to the residents of the CAPI-Village of Wappingers Falls, and local organizations for their willingness to contribute to this process, and to the CAPI-Village of Wappingers Falls municipal leadership for supporting this program, for allocating staff resources to this process, and for adopting this Climate Vulnerability Assessment and Adaptation Plan.

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This CVA was prepared using a template developed by HVRC, drawing on the work of the New York State Local Climate Change Adaptation and Resilience Plan Template, and CVAs from other municipalities. CAPI Adapt is a program of the HVRC. This document was prepared for the Hudson River Estuary Program, New York State Department of Environmental Conservation, with support from the New York State Environmental Protection Fund, in cooperation with NEIWPCC. The viewpoints expressed here do not necessarily represent those of NEIWPCC or NYS DEC, nor does mention of trade names, commercial products, or causes constitute endorsement or recommendation for use.

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Executive Summary

There are numerous hazards resulting from climate change. Based on many scientific data collected over decades, the largest threats to Dutchess County stem from increasing temperatures, rising sea levels, and changing precipitation patterns.

These hazards cause social, environmental, and infrastructure damage and losses outlined in this climate vulnerability assessment (CVA). To avoid such damage today and into the future, The Village of Wappingers Falls must work with partners, such as regional planning organizations, states, and federal agencies, to increase their resiliency and adapt to these conditions. Furthermore, the Village must center the experiences, concerns, and ideas of residents and local groups to employ a framework that is properly tailored and inclusive. Devastating storms, such as Tropical Storm and Irene and Superstorm Sandy, have reinforced this need and led communities in Dutchess County such as The Village of Wappingers Falls, to climate action resiliency planning to protect residents and mitigate risk. Ultimately, leadership on climate resilience will reduce the exposure and vulnerability of citizens, infrastructure, and ecosystems, and will serve as a model for communities across New York State and the country.

The Climate Smart Communities (CSC) Program provides a framework for implementing climate-smart resiliency actions. This CVA is one of the fundamental actions in the Pledge Element (PE) 7 category. The CSC Program ensures that recommendations to promote community resiliency are based on climate science and relevant data and address the top hazards in a community. The framework mandates an inclusive process, with public outreach and engagement each step of the way. Members of the Village of Wappingers Falls CAPI Adapt Team met with municipal officials and committees, leveraged the municipal web site and social media platforms to solicit feedback, attended CAPI Adapt cohort trainings and meetings, and reached out to a multitude of local groups and organizations to understand their needs in the face of a changing climate. Additionally, the team consulted earlier plans and workshops conducted within the community to inform their assessment and recommendations, including the [Community Resilience Building Workshop](#) of August 2019 and the [2016 Dutchess County Hazard Mitigation Plan Annex](#).

Among the Village of Wappingers Falls' key findings included the impact of rising temperatures and heat waves on vulnerable populations, such as the elderly, and the effects of sea level rise and flooding on local homes, roads, highways, dams, surface waters, wastewater treatment facilities, municipal drinking water supplies, and waterfront buildings. The assessment also considers the multitude of secondary effects from changing precipitation patterns, i.e., impacts of heavier downpours and winds on trees, wires, and cell towers creating power outages and communication disruptions, as well as on storm drains and the aging sewer system which can easily be overwhelmed.

Introduction

Vision Statement

Nurture a sustainable Village of Wappingers Falls by prioritizing performance, efficiency, carbon neutrality, conservation, and resilience in government operations, while creating space for inclusive community participation surrounding climate vulnerability and the opportunities present in adaptation.

Overview of the Village of Wappingers Falls

The Village of Wappingers Falls is in Dutchess County, a CAPI-County within the Mid-Hudson Region of New York. It is located on the ancestral homelands of the Wappinger or Wappani Indigenous peoples who today, despite tremendous hardship in being forced from their land, primarily reside in Wisconsin as members of the Stockbridge-Munsee Community. We pay honor and respect to their ancestors past and present as we strive to include Indigenous peoples and perspectives in the climate adaptation process.

The Village of Wappingers Falls has a population of 6,103 people, according to the 2020 census. The Village is 1.5 miles east of the Hudson River and has two important bodies of water (Wappinger Lake and Wappinger Creek) to its north and south. The Town of Poughkeepsie is located 7 miles to the north. The Village of Wappingers Falls is about 1.20 square miles, with 0.08 being water.

The 2022 median household income in the Village of Wappingers Falls was \$61,554. This is slightly below the median household income for New York State. About 6 percent of the population live in poverty and about 22 percent of the population are over 65. In 2022, an estimated 8 percent of residents lived in food insecure households.

Another important characteristic of the community is that 21.2% of residents identify as Hispanic or Latino, and 22.3% of residents live in households where a language other than English is spoken. For this reason, it is imperative that resident surveys and emergency communications are multilingual with a particular focus on providing materials in Spanish.

The Housing Stock of the Village is 39% single-family, 2% two-family, and 59% multi-family. The age of the housing stock should be noted, as 56% of housing was built before 1970, with 33% built before 1950. Interestingly, 60% of occupied housing in the Village is renter-occupied compared to only 29% for all of Dutchess County. Furthermore, housing affordability is of concern, especially for renters. Likely due to increasing rental costs and declining median household income, 54% of renters in the Village spent greater than 30% of their household income on housing costs.

The primary employers of Village residents include Local Government and education, the State of New York, HealthQuest, IBM, the Federal Government, Central Hudson Gas and Electric Corp., St. Francis Hospital, Vassar Hospital, Vassar College, Marist College, Texaco, the Culinary Institute of America, and Bard College. Local businesses and restaurants also support Village residents and benefit from tourism brought to the area by historic buildings, water-based recreation, and views of the Falls.

Regarding transportation access, the Village is conveniently connected to major cities like New York City and Albany through commuter train stations in New Hamburg, Poughkeepsie, and Beacon. Furthermore, State Routes 9 and 9D run through the Village north-to-south and link the Village to key locations across the region through Interstate 84 and the Taconic State Parkway. While Route 9 benefits Wappingers Falls through these connections, it likewise poses challenges, as significant commercial traffic runs through the Village and can put a strain on law enforcement and road maintenance services. Pedestrian safety is also a concern.

The Village of Wappingers Falls has a Police Department, two fire stations, several places of worship, the historic Grinnell Public Library, many small businesses and restaurants, and government buildings such as the Village Hall and Highway Department. The Village's drinking water comes from the Village of Wappingers Falls Water Treatment Facility which also provides water to two schools and some residents within the Towns of Wappinger and Poughkeepsie. Because this water originates from the groundwaters below Wappinger Lake, the Village has worked to rigorously protect this water source and manage contaminants. For example, the Village worked with the New York Rural Water Association to create a Source Water Protection Plan.

With a significant amount of commercial and residential development, including historic buildings, as well as key outdoor recreation spaces like Wappinger Creek, Wappinger Lake, and the Falls, the scope of the Village's community vulnerability assessment will address both natural/environmental and infrastructural and social assets, with a slight emphasis on the latter.

Background of Wappingers Falls' climate planning accomplishments.

The Village of Wappingers Falls has taken several steps to promote resiliency to improve quality of life for its residents and prepare for future climate hazards. The Village has also been an active participant in New York State's Climate Smart Communities (CSC) program. The CSC Program encourages local communities to act to mitigate greenhouse gas emissions and adapt to climate change. The Village of Wappingers Falls was designated as a Climate Smart Community (CSC) by New York State in 2015 and is working towards Bronze-level certification. Several existing documents were used to support this CVA. They include, but are not limited to, the Village of Wappingers Falls' [Community Resilience Building Workshop Summary of Findings](#), the [2016 Hazard Mitigation Plan](#), the 2022 [Comprehensive Plan](#), and the 2024 [Local Government Operations Climate Action Plan](#), all of which can be found online at

<https://wappingersfallsny.gov/>. Additional climate-related information for the Village can be found at <https://wappingersfallsny.gov/climate/>.

Efforts the Village has already taken to promote climate resiliency include the installation of a new pump station in 2014 in its facility shared with the Town of Wappinger, as well as the installation of a manufactured ecosystem using native species vegetation to treat runoff before it enters Wappinger Lake. This project was awarded a 2010 Green Innovative Grant Program Award from DEC. The Village has also used significant funding to begin updating its aging sewer lines and has worked to update its zoning code to manage flood risks.

One of the Village's most impressive accomplishments is the completion of its new water treatment facility which began operations in January of 2012. As part of the construction plan, the Village chose to move the water source 250 feet away from Wappinger Lake to prevent the infiltration of phosphorous-laden sediment present in the Lake. Importantly, the Village installed a solar field to support the treatment plant which can fully power the facility in sunlight. While efforts like these demonstrate the Village's commitment to sustainability and resiliency, the Village is ready to take further action to protect residents and community assets from climate impacts and to inspire other municipalities to take climate action.

The Village of Wappingers Falls released a [Comprehensive Plan](#) in 2022, and it completed a [Local Government Operations Climate Action Plan](#) in 2024 with a goal of reducing government greenhouse gas emissions by 33% of 2019 levels by 2030. Furthermore, the Village has outlined its Local Waterfront Revitalization Strategy in the Comprehensive Plan, which aims to transform the Bleachery, a former industrial complex along Wappinger Creek, into a commercial center with an emphasis on the arts and artisanal manufacturing. The plan also aims to connect the Bleachery to the waterfront more broadly through an existing greenway and proposed parks. This plan highlights the Village's commitment to adaptive reuse, as well as its goal of connecting residents to their natural environment and promoting walkability.

Figure 1: Building at the Bleachery



Figure from <https://www.poughkeepsiejournal.com/story/news/local/2014/09/13/taxes-work-bleachery/15598253/>

Recent Severe Natural Hazard Events in the Village of Wappingers Falls

August 26th-September 5th of 2011, the Village grappled with the impacts of Hurricane Irene. During this storm, the Wappingers Falls Fire Department responded to 49 calls regarding flooding. One home located on South Gilmore Blvd experienced a partial collapse from the flooding. The family who lived in the home was evacuated to Civic Center, while 40 additional residents who lived at the Brookside Apartment Complex were evacuated to Wappingers Junior High School, also due to flooding. In addition to flooding, the Village faced widespread power outages and \$350,000 worth of damage to the dam at Wappinger Creek.

Just two months after Hurricane Irene, a nor'easter brought heavy snow to the Village and knocked out all power and phone service. The storm resulted in several road closures from downed trees and cost the Village \$37,744 for cleanup and response.

While the Village was fortunate to not experience devastating impacts from 2012's Hurricane Sandy, the event highlighted the vulnerability of Wappinger Lake, as increased upstream runoff delivered an influx of sediment. This sedimentation occurred again during a winter storm in February of 2014.

Another important event to highlight is a thunderstorm which occurred on July 23rd, 2014. During this event, electric service was lost three times at the Givens Avenue Sewer Pump Station, and \$2,602 was required to pump out the water. The pump station also required \$4,139 worth of repairs to electric systems and controls. The event cost the Village \$27,700 total.

The above events demonstrate the importance of preparing for natural hazards, particularly those exacerbated by climate change. While climate impacts are occurring today, we can make a productive effort to understand climate vulnerability and implement adaptation strategies to protect the community moving forward. This Climate Vulnerability Assessment and Adaptation Plan is an integral step in that direction.

What is a CVA and why complete one?

A climate vulnerability assessment identifies community assets, systems, and populations that are susceptible to climate change. A vulnerability assessment is a necessary step in developing a climate adaptation strategy because it identifies and characterizes the environmental, infrastructural, and social elements of a community that need adaptive measures. Completing a vulnerability assessment includes the following steps:

- Identify climatic hazards occurring and likely to occur within the geographic boundary of interest.
- Identify community assets, systems, and populations currently and likely to be exposed to the identified climatic hazards while taking social and health disparities into account.

- Conduct outreach to gather feedback from residents and other local stakeholders.
- Assess the sensitivity and adaptive capacity of each exposed asset, system, and population to each applicable hazard and rank by priority level.

A CVA increases local awareness and literacy of climate vulnerability and resilience and encourages a community to take ownership and support implementation of actions.

Vulnerability Assessment Background and Considerations

Methodology

Anticipated shifts in climate and environmental conditions, such as changes in storm intensity, heat waves, and sea level rise, are expected to impact interactions with natural resources, infrastructure and social assets. Many resources are available to aid in understanding and assessing the potential impacts of different climate change scenarios on communities in our region. This assessment process incorporated a variety of tools and data sources, selected based on their practicality, comprehensiveness, and potential for future updates. Those include:

- [New York State's 2024 Climate Impacts Assessment](#)
- [NYSERDA's ClimAID Report](#)
- [NOAA National Centers for Environmental Information, 2023 Global Climate Report](#)
- [Scenic Hudson's Sea Level Rise Mapper](#)
- [The US Fifth National Climate Assessment](#)

These tools, along with others used in this report, highlight numerous potential future scenarios. A complete list of tools used is included in the reference section. Given the complexity of both global and local factors influencing these outcomes, predicting specific scenarios is challenging. Therefore, it is crucial to prepare for a range of possibilities. Despite this uncertainty, general trends and approximate estimates can guide adaptation planning efforts.

The methodology's context and components are elaborated upon in subsequent sections. The approach taken in this vulnerability assessment aligns with the criteria of the New York State Climate Smart Communities program and ICLEI's GreenClimateCities framework.

Process

The Village of Wappingers Falls CAPI Adapt team undertook the climate adaptation planning process in four primary phases, each guided by ongoing stakeholder engagement. This CVA and Adaptation Plan are the result of the comprehensive process outlined in the figure below.

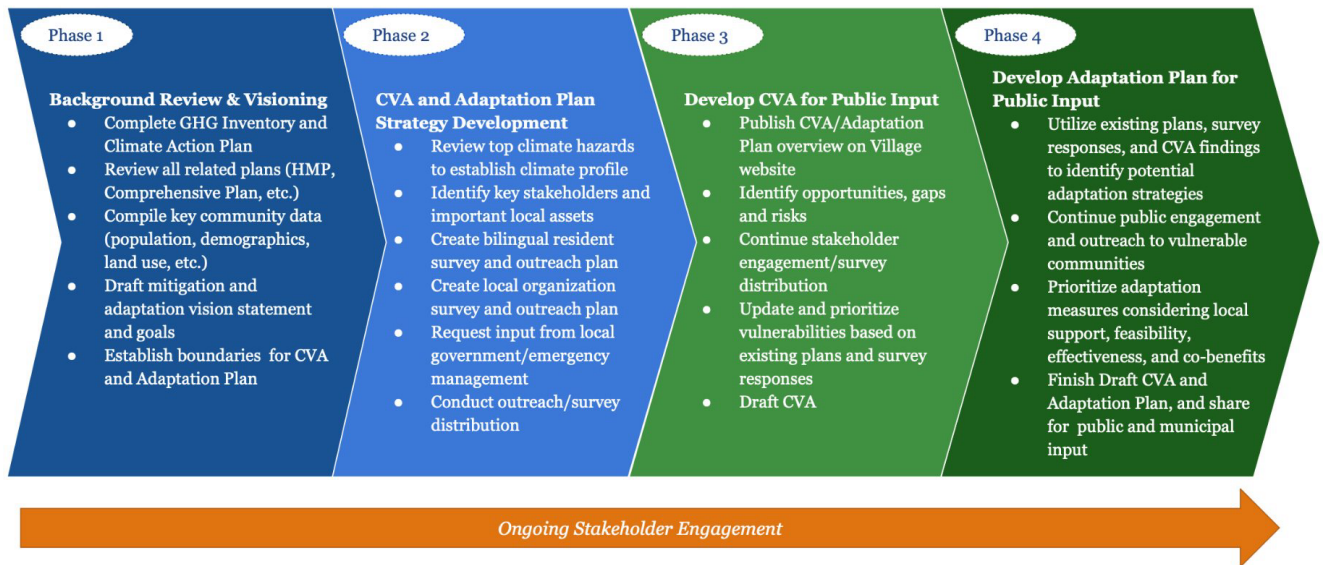


Figure 2: The Village of Wappingers Falls Climate Adaptation Planning Process

Summary of Findings: Hazards

The Hudson River Estuary Program prepared the summary of local climate hazards in this chapter as a part of the Climate Action Planning Institute (CAPI). The chapter identifies historic climate trends and introduces future projections to address the climate hazards most likely to affect Dutchess County in the coming decades.

The data serves as a starting point for recognizing important climate hazards and risks in Dutchess County but is limited to information available to the New York State Department of Environment Conservation (NYS DEC) and its partners at the time of this writing and is not a substitute for on-site survey and assessment. New York's changing climate presents new challenges and opportunities for communities in the State. It is vital for local decision-makers and community members to understand their community's vulnerability to a changing climate and take steps to increase their climate resilience.

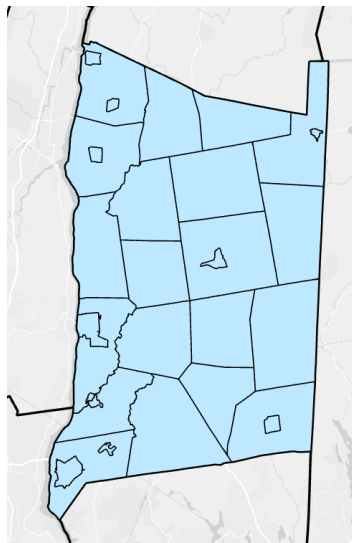


Figure 1: Map of Dutchess County

Using the Governors' 2100 Commission report and the NYS Climate Impacts assessments, this document presents the Dutchess County primary climate hazards and the risks and opportunities they present. A lot can change in a century, so it is never too early to start.

Climate Hazards in New York State

Three significant climate hazards (trends) are expected to affect New York State residents during the 21st century: *increasing temperatures*, *rising sea level*, and *changing precipitation patterns*. These trends are leading to three primary climate risks (human impacts): *flooding*, *heat waves* and *drought*. Communities can plan and implement resilience strategies to reduce their vulnerability and thrive under changing conditions. Risks and resilience opportunities are discussed later in this document.



Increasing Temperatures

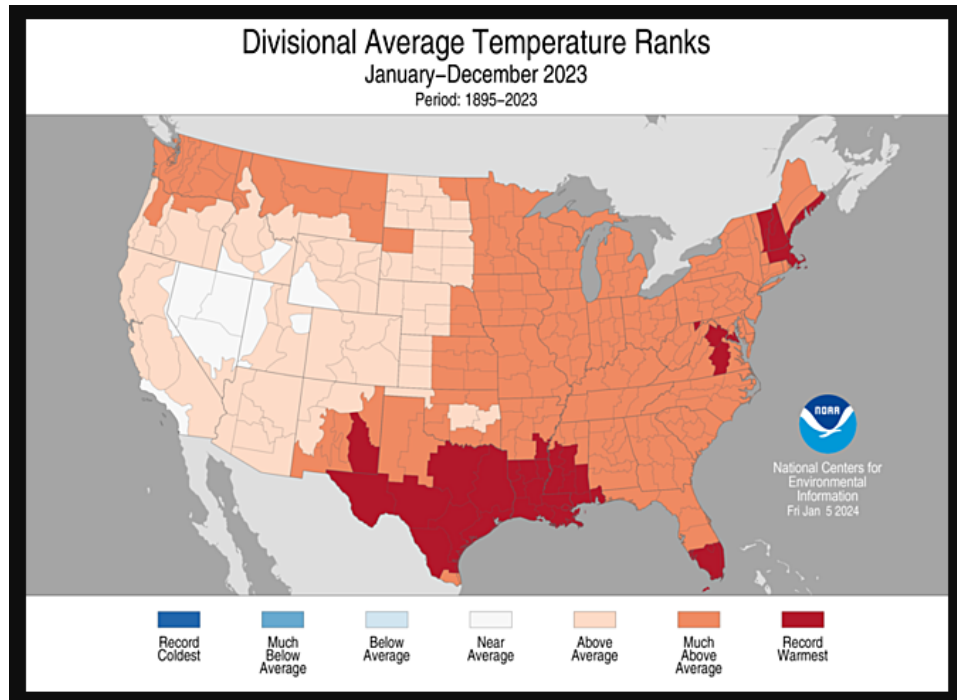


Figure 2: Divisional Average Temperature Ranks. Source: National Centers for Environmental Information

Annual average temperatures have been steadily increasing in New York State, posing new challenges to human health, electricity demand, and many of our industries, including tourism, recreation, and agriculture. Since 1970, temperature increases in New York have surpassed national and global averages:

- 2023 Global annual average temperature up **2.12°F** above 20th century average.¹
- 2023 U.S. annual average temperature up **2.4°F** above 20th century average.²
- 2023 NY annual average temperature up **2.2°F** above the average from 1991 - 2020.²

The average annual temperature around Dutchess County is expected to increase about four to six degrees by mid-century and 11 degrees by 2100.² As a reference point, by the 2080s, New York City's average temperature is projected to be on par with the 20th century average for Birmingham, Alabama.³

Air Temperature Projections for the South Hudson River Valley

	Baseline 1981 -2010	2030s	2050s	2080s	2100
Annual average air temperature	50.8° F	52.8 – 55.7°F	54 – 58°F	55.6 – 62.7°F	56° – 64.7°F



Increase in annual average		2.0 – 4.9°F	3.2 – 7.2°F	4.8 – 11.9	5.2 – 13.9°F
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Table 1. Like all projections, these climate projections have uncertainty embedded within them. Sources of uncertainty include data and modeling constraints, the random nature of some parts of the climate system, and limited understanding of some physical processes. Levels of uncertainty are characterized using state-of-the-art climate models, multiple scenarios of future greenhouse gas concentrations, and recent peer-reviewed literature. Even so, the projections are not true probabilities, so the specific numbers should not be emphasized, and the potential for error should be acknowledged. Source: Climate Impacts Assessment.³

Figure 5: Wappingers Falls' Predicted Climate in 60 Years (comparable to today's Ola, Arkansas)

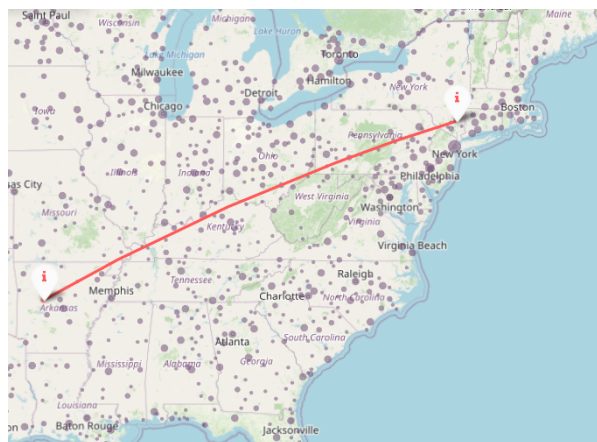


Figure from: <https://fitzlab.shinyapps.io/cityapp/>



Rising Sea Level

Global sea level is rising due to various factors, including thermal expansion from warmer water temperatures, and melting of land-based ice. The Hudson River is connected to and influenced by the sea; therefore, it experiences tides and contains saltwater in its lower reaches. This is why the river south of the federal dam at Troy is considered an estuary. It is also the reason why the Hudson River's water level is rising with global sea level.

Since 1900, sea level in the lower Hudson has risen over 13 inches.⁴ Below are the Albany sea level rise projections taken from the 2023 Climate Impacts Assessment for New York State which are based on the results from the [IPCC 6th Assessment report](#) and show the range from the low-estimate (10th percentiles) to the high-estimate (90th percentile). The table showing the projections of the sea-level rise with rapid ice melt were taken from NYS 2100 Commission Report. The rapid-ice melt scenario is based on acceleration of recent rates of ice melt in the Greenland and West Antarctic Ice sheets and paleoclimate studies. These projections are consistent with the most recent projections released by New York State in the Governor's 2100 Commission report (<https://www.adaptationclearinghouse.org/resources/nys-2100-commission-recommendations-to-improve-the-strength-and-resilience-of-the-empire-state-s-infrastructure.html>).⁵

	Baseline 1981 -2014	2030s	2050s	2080s	2100
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Albany Sea Level Rise - Inches		5" – 12"	11" – 21"	18" – 41"	21" – 60"
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Table 2. Like all projections, these climate projections have uncertainty embedded within them. Sources of uncertainty include data and modeling constraints, the random nature of some parts of the climate system, and limited understanding of some physical processes. Levels of uncertainty are characterized using state-of-the-art climate models, multiple scenarios of future greenhouse gas concentrations, and recent peer-reviewed literature. Even so, the projections are not true probabilities, so the specific numbers should not be emphasized, and the potential for error should be acknowledged. Source: [NYS Climate Impacts Assessments](#).³

		2020s	2050s	2080s	2100
Sea- Level Rise with Rapid Ice Melt	No baseline	4"-9"	17"- 26"	37"- 50"	52" – 68"

Table 3. Values are the central range (middle 67%) of model-based probabilities rounded to the nearest inch. The rapid-ice melt scenario is based on acceleration of recent rates of ice melt in the Greenland and West Antarctic ice sheets and paleoclimate studies. These projections are consistent with the most recent projections released by [New York State in the Governor's 2100 Commission report](#). Source: [NYS 2100 Commission Report](#).⁵

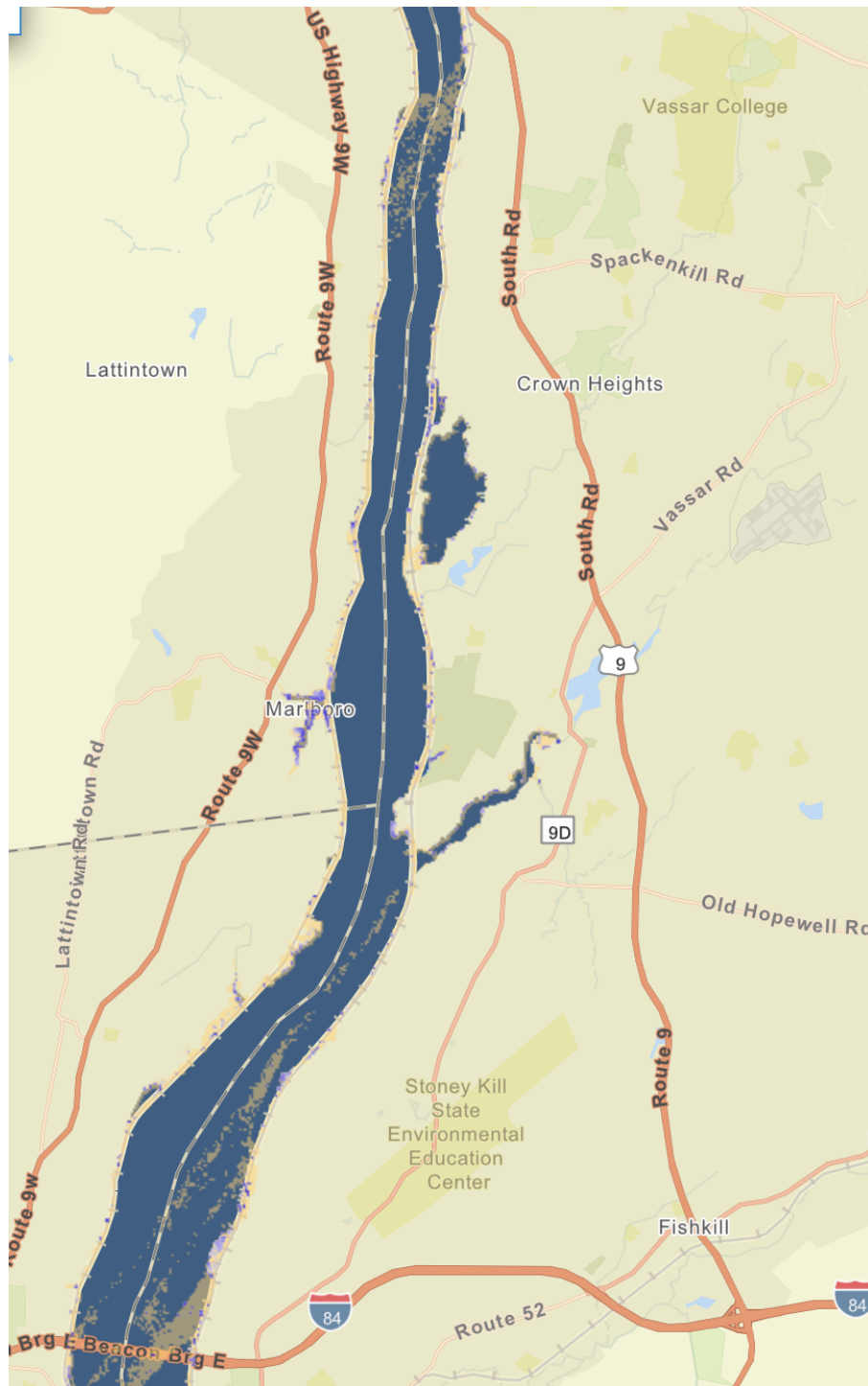


Figure 3: Map of Sea level rise projections for Village of Wappingers Falls and Surrounding Area⁶

Sea Level Rise in the Village of Wappingers Falls

The following scenarios are based on the Scenic Hudson Sea Level Rise Mapper



(<https://scenichudson.maps.arcgis.com/apps/MapJournal/index.html?appid=3a3d0dc3884c4637ad0a51f4aa912189#>).

The following projections represent the “likely outlook” estimates.

Figure 7: Current Condition

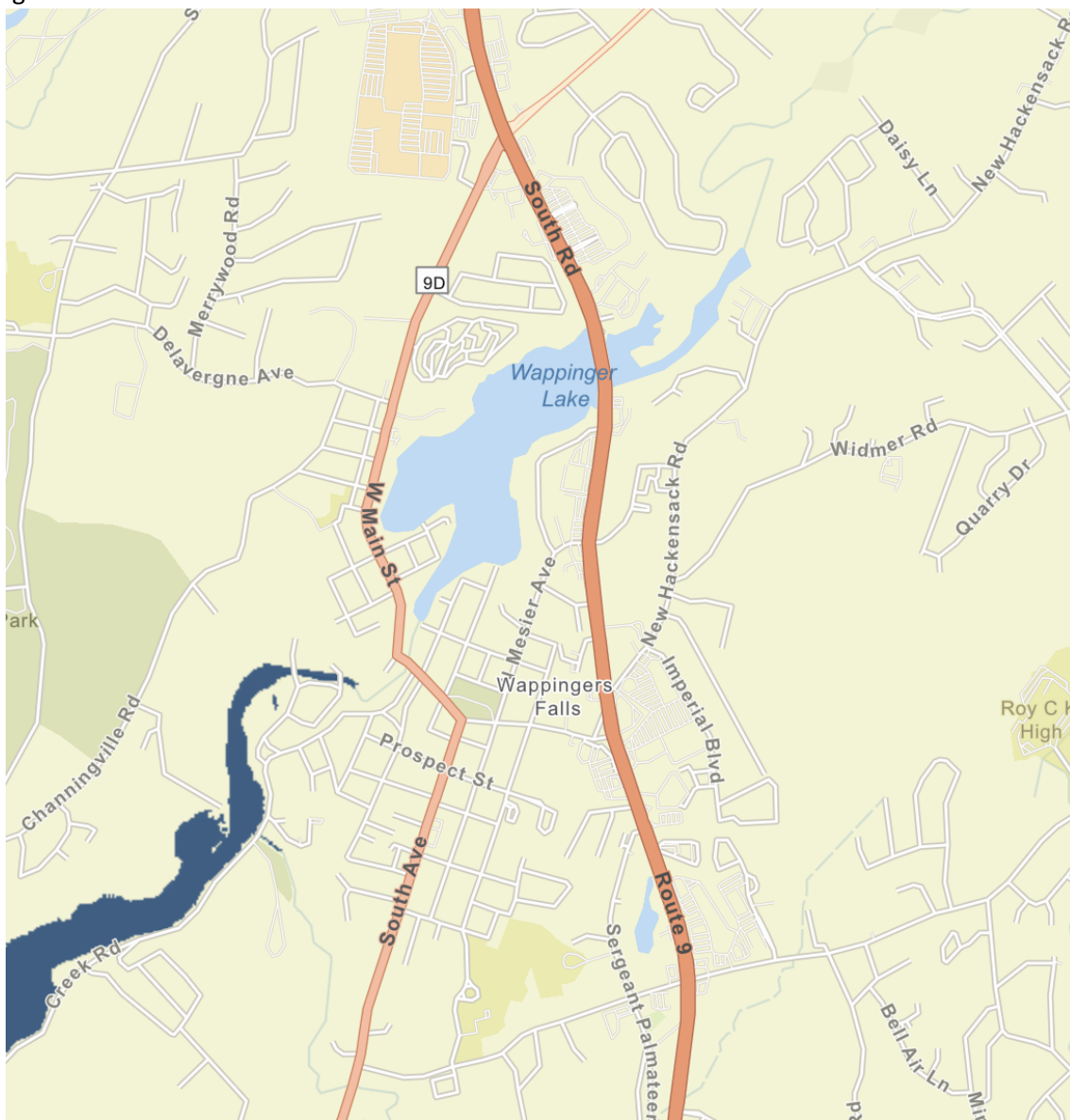


Figure 8: 2020s Projection

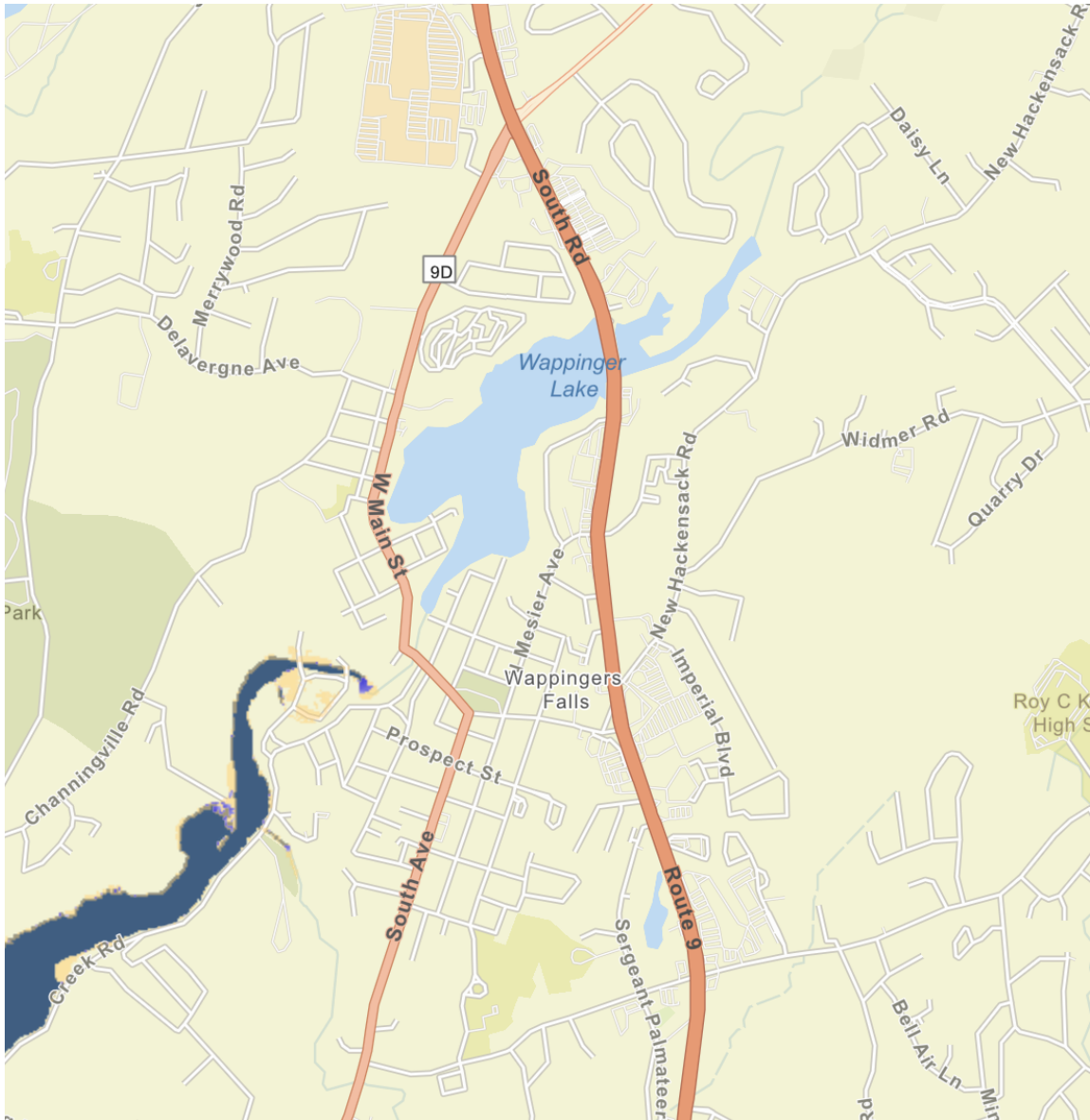


Figure 9: 2050s Projection

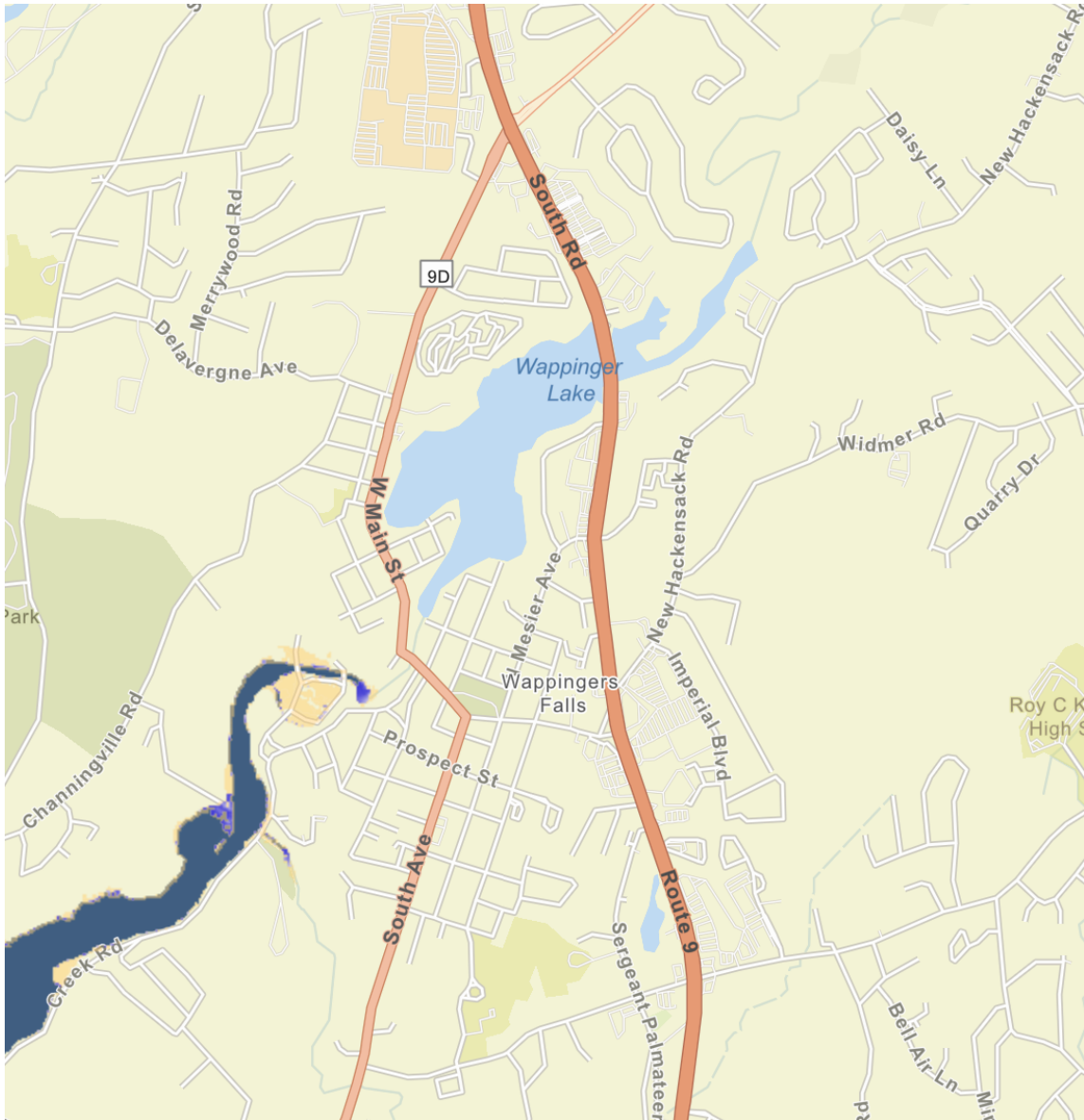
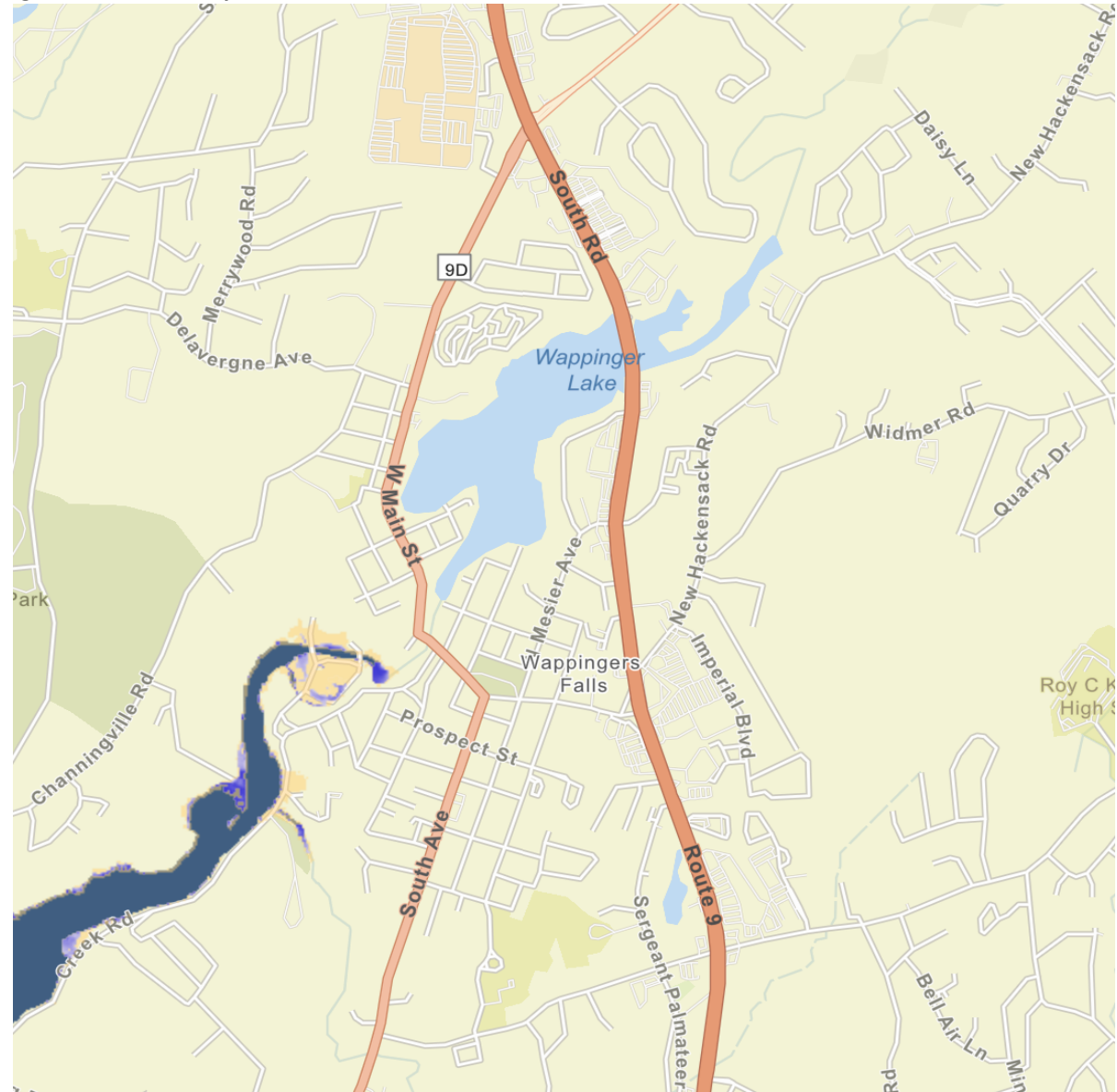


Figure 10: 2100s Projection



The impact of Sea Level Rise to the Village of Wappingers Falls is projected for the lower portion of Market Street, McKinley Street and the Bleachery. These areas are along the Wappingers Creek Estuary near the Hudson River. As seen from the projections above, this will be minimal. Land immediately along this portion of Wappingers Creek will require mitigation to minimize the effects of Sea Level Rise. The rest of the Village of Wappingers Falls has an elevation high enough to minimize any potential impact from Sea Level Rise.



Changing precipitation patterns

Precipitation has become more variable and extreme, whereas total rainfall has changed only marginally. **The total annual precipitation in New York State from 1901 – 2022 has increased by 10% to 20%.** Overall, while New York is projected to remain a “water-rich” state, water quality can be affected by the increase in total precipitation.³

The below table depicts the projections for average precipitation (mean precipitation) for the South Hudson River Valley, in which Westchester County is located. These projections were taken from the NYS Climate Impacts Assessment and are based on the global climate model (GCM) simulations from the latest version of the world climate research program’s Coupled Model Intercomparison Project. (<https://www.wcrp-climate.org/wgcm-cmip>)³

Precipitation Projections for the South Hudson River Valley

	Baseline 1981-2010	2030s	2050s	2080s	2100
Mean Precipitation	45.8 in.	45.8” – 50.4”	46.3” – 51.8”	46.7” – 55.9”	44.9” – 58.6”
% Increase in precipitation		0 – 10%	1-13%	2 – 22%	2 – 28%

Table 4. Like all projections, these climate projections have uncertainty embedded within them. Sources of uncertainty include data and modeling constraints, the random nature of some parts of the climate system, and limited understanding of some physical processes. Levels of uncertainty are characterized using state-of-the-art climate models, multiple scenarios of future greenhouse gas concentrations, and recent peer-reviewed literature. Even so, the projections are not true probabilities, so the specific numbers should not be emphasized, and the potential for error should be acknowledged. Source: [NYS Climate Impacts Assessments](#).³

Climate Risks and Opportunities for Dutchess County

An analysis of historical trends in annual average temperature and precipitation was conducted for 27 weather stations across New York State. Below are the results from the Southern Hudson River Valley’s Poughkeepsie weather station in New York State taken from the latest New York State Climate Change Projections.³

Annual Average Temperature form 1901-2020 from observed weather stations

Temperature increase for Southern Hudson River Valley - Poughkeepsie: 0.42 °F/decade
Trends in Annual Precipitation from 1901–2020 for Observed Weather Stations in New York State
Precipitation increase for Southern Hudson River Valley – Poughkeepsie: 0.32 inches/decade

Table 5. Trend is significant at the 99% significance level. Source: Weather Station Data: Poughkeepsie, NY

Projected Changes in Extreme Events for Region 5

Table 6 & 7. The following projections are taken from the *Responding to Climate Change in New York State ClimAID Report* written in 2011 and updated in 2014. The report delineates climate projections by region. Region 5 (east of the Hudson River and the Mohawk River region), covers Albany, Columbia, Dutchess, Fulton, Herkimer, Madison, Montgomery, Oneida, Putnam, Rensselaer, Saratoga, Schenectady, Washington, and Westchester counties.⁴

PRECIPITATION PROJECTIONS FOR REGION 5

	Baseline 1971-2000	2020s	2050s	2080s	2100
Total annual precipitation	51"	52" - 54.5"	53" - 57"	53.5" - 58.5"	53.5" to 61.5"
% Increase in annual precipitation	-	2 - 7%	4 - 12%	5 - 15%	5 - 21%
# Days with precipitation > 1"	10	14 - 15	14 - 16	15 - 17	*
# Days with precipitation > 2"	1	3 - 4	4	4 - 5	*

HEAT WAVE PROJECTIONS FOR REGION 5

	Baseline 1971-2000	2020s	2050s	2080s	2100
# Days per year above 90°F	10	26 - 31	39 - 52	44 - 76	*
# Days per year above 95°F	1	2 - 4	3 - 10	6 - 25	*
# Heat waves per year	1	3 - 4	5 - 7	6 - 9	*
Average # days of each heat wave	4	5	5 - 6	5 - 7	*
# Days per year ≤ 32°F	155	127 - 136	104 - 119	84 - 109	*

As it is projected that New York will remain a “water rich” state with some increase in precipitation in the coming years, the concern is with the change in precipitation regularity. Long periods of drought followed by heavy precipitation foster more runoff and flooding. As the soil excessively dries out it becomes a barrier to precipitation absorption. This barrier blocks the recharging of the Village’s aquifer directly impacting the water supply which depends on wells.



Water Infrastructure

Although significant progress has occurred in recent years, a recurring concern cited by both residents of the Village and existing plans is the vulnerability of water distribution, collection, and treatment systems. For example, water mains in the village are 85 years old. Because they are outdated, sudden changes in pressure can cause breaks. This possibility is concerning because such pressure changes can accompany firefighting efforts, and climate-change-induced heat and drought increase the risk of wildfires. Notably, the Village only has one water main which crosses a gorge by way of a bridge which is over 145 years old. The vulnerability of this aging bridge is cause for concern, as a break at this main would result in a loss of water supply to 80% of village residents. Moreover, this aging system's disconnected nature makes restoring water to residents in the case of breaks particularly laborious.

Of even greater concern is the state of the Village's 100-year-old sewer lines. When these lines are met with a higher water table from heavy rainfall and/or sea level rise, they may be overwhelmed and cause backups in basements and low-lying areas. These backups can discharge raw effluent, which threatens human health, as well as the health of the aquatic ecosystems of Wappinger Lake and Wappinger Creek. These water bodies can become uninhabitable for key species when nutrient levels are in excess. This is not to mention that this effluent could contaminate key water sources for the Village and the surrounding region, including the groundwater under Wappinger Lake and the Hudson River. An upstream concern with water infrastructure is the presence of leaking and/or overflowing septic systems. Although the Village does not allow the installation of septic tanks, such leaks and overflows upstream along Wappinger Creek can similarly harm water resources.

Finally, the dam at Wappinger Lake should be noted. The dam was built in 1840, and despite updates in 1987, it has demonstrated its vulnerability in the wake of storms like Hurricane Irene and Tropical Storm Lee. If key repairs are not made to the dam before future severe storm events, failure would threaten 30 businesses, as well as a hydroelectric facility. These losses would have a serious negative impact on the livelihoods of residents and the local economy.

Transportation Infrastructure

A further area of vulnerability which residents and recent plans highlight is transportation infrastructure. For example, heavy rainfall events compounded by blocked culverts can cause flooding on important roads, including Route 9. Additionally, heavy winds from severe storms may lead to downed trees/branches, powerlines, traffic lights, etc. on roads and highways. These conditions not only threaten the safety of residents but can lead to delays and road closures, which complicate the work commutes of many residents, especially those who work outside of the Village. During extreme weather events, such road blockages and closures can increase emergency response times.

Also important to consider is the location of the Wappingers Falls Highway Department along Wappinger Creek and Market Street in an area vulnerable to flooding and rising sea levels. While the Village Garage is more protected across the street at a higher elevation, it too could become difficult to access in the case of severe flooding along Market Street. Therefore, the potential for flooding in this area raises concerns about the Village's ability to respond to dangerous road conditions in a severe storm.

Passenger rail represents an additional area of transportation vulnerability. Although no rail lines run through the Village, the Metro North Railroad provides residents with an important, accessible means of transportation both upstate and downstate, particularly through nearby New Hamburg Station. The

Railroad's location directly beside the Hudson River means it is vulnerable to rising sea levels and storm surge. Therefore, the current location and elevation of the tracks will likely prove unsustainable if measures are not taken to boost resiliency. Furthermore, in many areas, the tracks are located adjacent to steep slopes which can produce landslides during heavy rainfall events and lead to significant delays and closures. These events are particularly concerning for residents who depend on access to the Metro-North Railroad for their work commute and/or to visit family and friends.

Energy and Communications Infrastructure

The importance of energy and communications infrastructure must not be overlooked. To begin, most of the Village's current energy system relies on the delivery of fossil-fuel-derived energy and lacks efficiency. In the case of prolonged heat waves, this type of system is particularly vulnerable to becoming overburdened and disrupted when residents need plenty of energy to cool their homes. Furthermore, because the system lacks diversity of energy sources, it is more vulnerable to climate change impacts that may disrupt one form or location of energy production more than others. A lack of energy efficiency and diversity is only compounded by a lack of backup generators at key sites and a reliance upon above-ground power and telephone lines. Currently, while the Village's firehouses and water plant have backup generators, other key buildings like the Village Hall, Highway Department, and Police Department do not have backup power sources. Importantly, despite serving as a designated cooling center, Grinnell Library also lacks backup power. The location of power and telephone lines above ground is a source of vulnerability, for, unlike underground lines, these lines can quickly be damaged by severe winds and lead to service disruptions, as well as dangerous road conditions and electric shock danger. The vulnerability of existing cell towers should also be considered, as well as the potential disruption of internet services from power outages.

Historic Buildings

Figure 11: Mesier Homestead



Figure from <https://www.iloveny.com/listing/mesier-homestead-and-museum/17562/>

Lastly, the historic nature of many of the Village's buildings represents both a key asset and vulnerability. Some of the Village's most famous historic buildings include the Mesier Homestead built in 1742, and Grinnell Library built in 1887, while many homes, places of worship, and businesses likewise retain their historical character. While these sites and buildings make the Village unique and attract visitors who support the local economy, these buildings were not constructed with climate

resiliency in mind. As one survey participant noted, “Historical buildings were not built to withstand this weather. The character of the Village suffers.” Therefore, it is important to thoughtfully build the resiliency of these buildings with preservation in mind, or their damage will harm the local economy and the appeal of the Village to both residents and visitors.

A representative from the Wappingers Historical Society voiced these concerns in greater detail. The primary concern they shared was the vulnerability of the 1742 Mesier Homestead to “heavy snows, wind, heavy rains, falling trees, leaking roof, etc., and damage to our collections/artifacts/photos/ephemera from extreme heat, cold and water damage.” Furthermore, they shared that they have experienced tour and event cancelations from extreme heat and air quality concerns during the 2023 Canadian wildfires. Falling trees in the park from severe winds as well as heavy rains are a potential threat to the structural integrity of the buildings on-site. Although Mesier Homestead has installed heating and cooling and a sump pump in the basement, these concerns remain, especially as water accumulation has continued to occur.

Environmental Assets

Figure 12: Wappinger Lake



Wappingers Creek, NY; Photo: @arijkurzum, retrieved from <https://dutchesstourism.com/spotlights/top-fishing-spots-in-dutchess-county>

Environmental or Natural Assets

Some of Wappingers Falls’ natural assets include Wappinger Lake, Wappinger Creek, the Falls, Mesier Park, and the Wappinger Creek Greenway Trail. Some parks have recently been completed, such as Eugene Darrigan Park which caters to residents and visitors interested in paddle sports on Wappinger Creek. Many of these natural resources serve as floodwater storage and offer essential ecosystem services. They also have immense recreational value as they attract tourism and promote greenspace access and a healthy lifestyle. However, they are also susceptible to flooding and damage from heavy rains, severe winds, and storm surge.

Wappinger Lake

Wappinger Lake is an illustrative example of both a natural asset and vulnerability. The Lake has been designated as one of 34 Significant Natural Areas within the *Dutchess County Natural Resource Inventory*. Moreover, the Lake was designated a Critical Environmental Area (CEA) in 1998. Despite the Lake’s recreational potential for fishing, swimming, etc., most of this potential must go unrealized until the issues of weed overgrowth, fertilizer runoff, runoff of road salts, fecal-coliform contamination,

proliferation of contaminated sediment, and the presence of invasive water chestnuts are remedied. Note that these issues are all related to stormwater runoff, to which the Lake is particularly vulnerable, as the Village's topography directs excess water in its direction. The runoff is worsened by the increasing number of impervious surfaces in the Village. As one resident expressed, "I am concerned that the Village has too much impervious surfaces for its small size." Even the increase in invasive plants is worsened by sediment runoff which lowers the depth of the lake and allows these species to receive the sunlight they need to grow rapidly. Thus, as sea levels rise and heavy rainfall events become more frequent, this runoff and its effects will only become more challenging to mitigate. This is especially true if issues like sewer system backups, septic tank leaks, and road/highway flooding go unremedied. The Village of Wappingers Falls has already been awarded significant grant funding to address both localized and upstream pollution, and it will continue to seek new funding opportunities, as it ultimately aims to dredge the lake, removing contaminants and boosting flood-storage capacity. However, these efforts must unfold with a consciousness of the ways in which climate impacts are exacerbating pollution. Furthermore, although the Village has constructed a filtration system to remove many contaminants coming from upstream, the continuing runoff of contaminants and sediment into the lake threatens the viability of its underground aquifers as a drinking water source. Extreme heat is a further concern, as warmer water temperatures can decrease oxygen levels and harm aquatic species.

Wappinger Creek

Unlike Wappinger Lake in its current state, Wappinger Creek is a popular location for a range of recreational activities, including fishing and canoeing. Furthermore, the Creek is of great ecological importance, as it drains around one quarter of Dutchess County and has been defined as a "Designated Inland Waterway." The lower two miles of the Creek have, likewise, been designated as a Significant Coastal Fish and Wildlife Habitat, as they are home to an impressive range of vegetation, fish species, as well as waterfowl, turtles, and more. Much like Wappinger Lake, Wappinger Creek is vulnerable to runoff of contaminants and sediment from heavy rainfall and erosion, and sedimentation and rising sea levels will decrease its flood storage capacity, particularly if action is not taken to prevent irresponsible uses of land along the Creek. This scenario must be prevented to protect important plant and animal species and maintain recreational access to the Creek, especially as the Village aims to take advantage of the Creek's *Local Waterfront Revitalization Program* eligibility with projects like Darrigan Park. Flood mitigation should also be taken seriously to protect the Wappinger Greenway Trail which connects pedestrians at New Hamburg Train Station to the Village.

Parks

While the vulnerability of the Village's inland parks, like the 5.5-acre Mesier Park, may be less obvious, heavy winds from severe storms have potential to damage trees and other vegetation, as well as parks infrastructure and historic buildings like Mesier Homestead. Moreover, with increasing temperatures and extreme heat events on the rise, attendance at the Village's Parks in warmer months will likely experience a decrease. This will be especially true if these spaces continue to lack adequate natural and/or constructed shade and drinking fountain access.

Social Assets

Figure 13: Cascading Impacts of Climate Events

CASCADING IMPACTS OF CLIMATE EVENTS

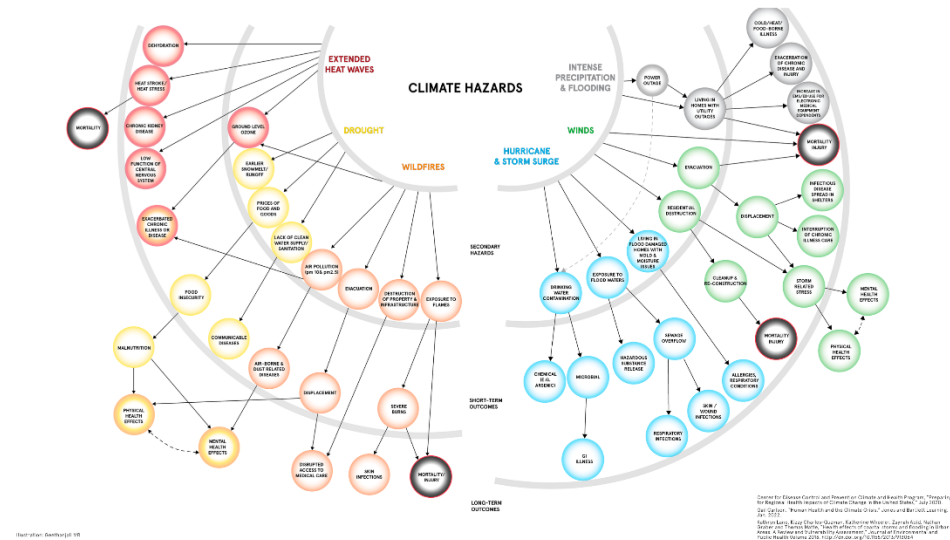


Figure from https://rebuildbydesign.org/wp-content/uploads/2023/02/NEW-YORK_Web.pdf.

Social assets encapsulate the aspects of our community that a conventional assessment of physical infrastructure and systems fails to incorporate. Social assets include vulnerable residents, social and medical services, domestic animals, and economic well-being. To view a list of Dutchess County resources related to social and other assets and vulnerabilities, please refer to Appendix E at the end of this document.

Extreme Heat and Vulnerable Populations

Likely due to the Village's relatively safe elevation and location 1.5 miles east of the Hudson River, survey participants reported the greatest concern about extreme heat events. Undoubtedly, extreme heat has potential to exacerbate existing social vulnerabilities. For example, extreme heat disproportionately harms the health of elderly residents and residents with chronic illnesses, especially if these residents do not have access to reliable air conditioning. Moreover, the Village is in the 72%ile for persons with disabilities according to the EPA's EJScreen mapping tool, and disabled residents, elderly residents, and residents with chronic illnesses face additional obstacles to accessing cooling centers due to special mobility needs and the difficulty of transporting some essential medical equipment. The Village has designated the Grinnell Library at 2642 East Main Street as a community cooling center.

If extreme heat events are accompanied by power outages, this reality is especially concerning. Furthermore, residents with medical conditions who need to store medicines in refrigerators, such as insulin, are at increased risk from extreme heat. Importantly, power outages in general from flooding, heavy rains, strong winds, grid overload, etc. Increase vulnerability for residents who require any form of electrical medical equipment. Central Hudson offers several assistance programs for Seniors, customers on Life Support Equipment and for Medical Emergencies. More details can be found at the Central Hudson website (cenhud.com).

Lastly, attention must be given to the health and safety of outdoor workers, including construction

workers and Parks staff. The New York State Department of Labor (NYSDOL) provides guidance on some of the best ways to protect outdoor workers during hot weather. According to federal Occupational Safety and Health Administration (OSHA), employers have a legal and moral responsibility to protect workers from heat injury and illness, including not to assign work in high heat conditions without protections in place for workers. More information can be found at New York State Department of Labor (NYSDOL) website (<https://dol.ny.gov/system/files/documents/2024/08/p198-extreme-heat-8-5-24.pdf>).

Air Quality and Vulnerable Populations

Residents also cited air quality as a primary concern which must be considered. As the Village witnessed during the Summer of 2023, the impacts of changing climate conditions across borders can have serious implications for environmental quality at home. While Canada was experiencing intense wildfires fueled by higher temperatures and drought, much of the Northeast was blanketed in smoke. This event and future similar events are of great concern to all residents, but especially those with medical conditions like asthma. Special attention should be given to this area, as Wappingers Falls is in the 69th percentile for asthma according to EJScreen. Furthermore, air quality is closely connected to extreme heat. During extreme heat events, air pollution is exacerbated, leaving vulnerable residents at an increased risk from poor air quality. Importantly, one resident who responded to the survey shared that they experience lasting impacts from COVID-19 which make it difficult to breathe in hot, humid weather. They stated that during ozone alerts, they are barely able to breathe, and they are unable to leave their home in either of these conditions.

Figure 14: View of Wildfire Smoke from Central Park in 2023



Figure from: <https://www.nbcnewyork.com/local/wildfire-smoke-photos-in-nyc-show-apocalyptic-sepia-landscape/4405485/> by Timothy A. Clary | AFP | Getty Images

Emergency Response and Social Services Disruptions

The potential for road obstructions and closures from severe storms, heavy rainfall, and/or flooding presents its own vulnerabilities. It should be noted that residents expressed significant concern about severe storms. During these events, emergency response times will likely be increased, and social services provision delayed. This means that residents who are already especially vulnerable to climate hazards for medical/social reasons may face additional barriers to receiving emergency care in the case of home medical equipment failures, etc. Moreover, residents who rely on meal delivery services and residents who cannot afford to keep excess amounts of food in their homes may face increased food insecurity when roads are inaccessible and local government groups and non-profit organizations may

experience service disruptions. Finally, poor road conditions could result in the closure of schools and/or after school programs which would require working parents to find childcare. Likely, these parents would have to take off work or find another option for care, which are both options that could come at a financial cost.

Communication Barriers

An additional social vulnerability that must be highlighted is communication barriers. To begin, the Village is home to a significant number of Spanish-speaking residents, and if emergency communications are only provided in English, Spanish-speaking residents and other residents with limited English fluency will likely miss key information or not have enough time to seek translation assistance before a hazard is acute.

The Village of Wappingers Falls Police Department has partnered with Nixle to implement its Community Notification System to alert residents in real-time about localized emergency situations and relevant community advisories. Community residents can sign up for this service in either English or Spanish at the Police Department website (<https://www.wappingersfallspolice.org/>). General notifications are also available on the Village of Wappingers Falls Community Discussion Facebook page.

Further attention must be given to visually impaired and hearing-impaired residents for whom it is especially pertinent that emergency communications be delivered by various media.

Unhoused Residents and Residents in Residential Care Facilities

Unhoused residents also face increased vulnerability. Not only are residents without consistent, guaranteed shelter from inclement weather at an increased risk from the health impacts of hazards like extreme heat and heavy rainfall, but an overwhelming demand upon temporary housing providers may make it difficult for residents in need of shelter to access these services.

Likewise, residents seeking shelter from unsafe living conditions, such as domestic violence, and the shelters that serve them should be paid special attention, as disruption in the operations of these facilities from power outages, storm damage, etc. could leave those seeking safety without a safe place to live. This vulnerability should be considered, even if such facilities are located outside the Village's boundaries. The same should be considered for LGBTQ+ youth who may not be accepted or feel safe in their primary places of residence.

Furthermore, nursing homes and medical facilities with patients residing on site are at an increased vulnerability, as a significant proportion of these residents require essential medical equipment that requires power to operate and/or medicines that require refrigeration. If these facilities experience power outages and do not have adequate backup power, the consequences could be serious. Additionally, if such facilities experience damage from severe storms, flooding, etc., moving residents to alternative areas of shelter would be complicated due to special mobility needs and the need to move medical equipment along with residents.

Domestic Animals and Extreme Weather

It is important to remember that Wappingers Falls' human residents aren't the only ones impacted by extreme weather. In addition to wild animals' increased vulnerability to habitat destruction from

climate change impacts, domestic animals like dogs and cats are also endangered by severe weather and experience serious health impacts from heat stress, especially if they spend most of their time outdoors and/or if they are without a home. As a representative from a Dutchess County animal care organization shared, “The suffering of animals is a direct reflection of the suffering of their owners.” The vulnerability of domestic animals cannot be remedied without adequate support to animal shelters and provision of pet-friendly cooling centers and emergency shelters.

Rising Energy Costs

A final point that proved very concerning to Village residents is the likelihood of rising energy costs. Certainly, if average temperature rise occurs as predicted, energy demand will reach new heights, especially in warmer months. This new demand will come with a greater cost for energy, particularly if energy sources are not diversified and efficiency is not increased. It is understandable why residents are concerned about these rising energy costs when so many residents are already burdened by increasing rental costs and declining income. A further financial burden would, therefore, be especially harmful to low-income residents who would have to choose between allowing their homes to remain uncomfortably warm or paying a higher price to cool it.

Prioritization of Vulnerabilities

The following chart highlights the Village Climate vulnerabilities and were prioritized based on the possibility of the event happening (Exposure), the impact if it were to happen (Sensitivity), and the ability to be mitigated (Adaptive Capacity). These assessments were then merged, and a Priority Level assigned.

Table 8: Prioritization of Vulnerabilities (Note: Exposure, Sensitivity, Adaptive Capacity, and Priority Level are ranked Low, Medium, or High)

Community Asset/Population	Associated Vulnerability	Classification(s)	Exposure	Sensitivity	Adaptive Capacity	Priority Level
Aging water mains and sewer lines	Flooding, sea level rise, severe storms	Infrastructure	Medium	High	Medium	High
Roads/highways	Flooding, sea level rise, severe storms, blocked culverts	Infrastructure	Medium	Medium	Medium	High
Passenger rail (outside of Village jurisdiction)	Flooding, sea level rise, severe storms	Infrastructure	High	High	Medium	Low
Energy & communications infrastructure	Extreme heat, flooding, sea level rise, severe storms	Infrastructure, social	Medium	Medium	Medium	Medium
Historic buildings	Flooding, severe storms	Infrastructure	Medium	Medium	Medium	Medium
Wappinger Lake	Flooding, severe storms	Environmental	High	High	Medium	High
Wappinger Creek	Flooding, sea level rise, severe storms	Environmental	High	Medium	Medium	Medium
Parks	Flooding, sea level rise, severe storms, extreme heat	Environmental, Social	Medium	Medium	Medium	Low
Wappinger dam	Flooding, sea level rise, severe storms	Infrastructure	Medium	High	Medium	Medium
Elderly residents, disabled residents, and residents with health conditions	Extreme heat, flooding, severe storms	Social	Medium	High	High	High
Low-income residents	Extreme heat, flooding, severe storms	Social	Medium	Medium	High	High



Residents with communication barriers	Extreme heat, flooding, severe storms	Social	Medium	Medium	High	High
Nursing homes & Shelters	Extreme heat, flooding, severe storms	Social	Medium	High	High	High
Medical facilities	Extreme heat, flooding, severe storms	Social	Low	High	High	Medium
Domestic animals/Animal shelters	Extreme heat, flooding, severe storms	Social	Medium	Medium	High	Medium
Fire Departments and Police Department	Extreme heat, flooding, severe storms	Infrastructure, Social	Low	Medium	Medium	Medium
Highway Department	Flooding, sea level rise, severe storms	Infrastructure	High	Medium	Medium	Medium
Public buildings without backup power (Village Hall, Police Department, Grinnell Library)	Extreme heat, flooding, severe storms	Infrastructure, Social	Low	Medium	High	Medium



Summary of Findings: Recommendations for Adaptation

Vision Statement

Nurture a sustainable Village of Wappingers Falls by prioritizing performance, efficiency, carbon neutrality, conservation, and resilience in government operations, while creating space for inclusive community participation surrounding climate vulnerability and the opportunities present in adaptation.

This vision aims to reflect the aspirations and values of the community. It helped inform and inspire the development of the recommended strategies (or specific actions) listed below. This vision is backed by the four (4) E's of sustainability: economy, equity, environment and energy which create the ability for a community to meet its needs without compromising the ability of future generations to meet their own needs. The Village of Wappingers Falls' Comprehensive Plan and the Climate Action Plan share this same vision. For more on the steps taken in developing this vision, see Process section below.

The adaptation strategies or recommended actions listed in the following sections aim to achieve the Village's vision. These strategies are broken out into three categories or sectors: infrastructure, environmental and social. In each sector, a detailed description is included for each strategy, information on the strategy's co-benefits, owner, strategy cost and timing estimates, and other information relevant to the proposed strategy.

Table 9: Co-Benefit Symbols

Symbol	Co-Benefit
	High potential to save money
	High potential to enhance resource security
	High potential to create jobs
	High potential to improve public health
	High potential to deliver benefits to frontline communities
	High potential to lower greenhouse gas (GHG) emissions and/or sequester carbon

Recommended Actions - Infrastructure

Strategy 1: Backup Power Installation	Owner	Cost Estimate	Timeframe
Purchase and install back-up generators for Village Hall, Highway Department, Police Department, and Grinnell Library (a designated cooling center)	Description: Ensure that the Village Hall, along with all other buildings including the Highway Department, Police Department, and Grinnell Library are equipped with back-up generators. Equipping all municipal buildings with back-up power generation will not only allow the buildings to run electricity during a power outage but is an important step towards potentially designating these buildings as official cooling centers and/or emergency shelters. Potential Cost: Medium; generators are expensive but there are Federal, State, and regional grants available for this expenditure. Additional research is needed, including replacing or supplementing a generator with a back-up battery storage unit.		
Co-Benefits: 	Mayor/Village Board	\$\$	2025-2027
Strategy 2: Water Distribution Updates	Owner	Cost Estimate	Timeframe
Update/replace aging water distribution system	Description: Seek needed funding, and update/replace the Village's water mains and pumps, prioritizing residential areas. Also consider installing a second water loop downhill under Wappinger Creek to boost resiliency and firefighting resources. This strategy will create jobs and promote public health by establishing a more reliable water distribution system using safer materials. Potential Cost: High; this is a major infrastructure project that will take a large amount of money and time to complete, but progress has already been made, and significant funding has already been utilized.		
Co-Benefits: 	Mayor/Village Board/Water Department	\$\$\$	2026-2030



Strategy 3: Sewer /Wastewater Updates	Owner	Cost Estimate	Timeframe
Work with utilities and upstream communities to update/replace aging sewer system and septic tanks (Note: septic tanks are not allowed in the Village, but collaboration is needed upstream)	Description: Seek needed funding and finish updating/replacing the Village’s aging sewer lines, prioritizing residential areas and the lowest-lying areas in the Village. Also, contact municipalities upstream along Wappinger Creek to encourage updates to their sewer system and the phase out of septic systems. This effort will boost resiliency, create jobs, protect residents' health, and help mitigate fecal coliform contamination in the Creek and Wappinger Lake. Potential Cost: High; this is a major infrastructure project that will take a large amount of money and time to complete, but considerable progress has already been made, and significant funding has already been utilized.		
Co-Benefits: 	Mayor/Village Board	\$\$\$	2026-2030
Strategy 4: Underground Utility Lines	Owner	Cost Estimate	Timeframe
Work with utility companies/developers to bury utility lines underground wherever possible, and consider requiring underground utilities for any new development	Description: Work with utilities to bury existing utilities underground wherever possible, with special attention to utility lines along high-traffic roads. Moving forward, a measure requiring all new developments to use buried utility lines should be considered. This effort would improve energy/communications resiliency and security and create jobs. Potential Cost: High; the process of burying utility lines is often expensive, as it involves assessments of existing infrastructure, extensive digging, and special equipment. Grant funding opportunity.		
Co-Benefits 	Mayor/Village Board/Utilities (Central Hudson)	\$\$\$	2026-2030

Strategy 5: Energy Infrastructure (Microgrid)	Owner	Cost Estimate	Timeframe
Energy resiliency and efficiency improvements: develop plan for islanded microgrid powered with solar, hydropower, and natural gas generators	Description: Resume developing a plan for an islanded microgrid incorporating renewable energy sources. Building this system would provide an additional, diversified energy source which could decrease energy costs in the long term, promote energy resiliency, and help emergency shelters to continue operating during extreme weather events. Construction would also create jobs and bring down the Village's carbon emissions if renewable energy is incorporated. This effort will pursue private industry for implementation. Potential Cost: High; while the initial costs of this initiative will likely be high, the plan should increase energy affordability in the long term, and the existing Wappingers Falls Hydroelectric plant could serve as an energy source for the grid. Grant funding opportunities should be explored.		
Co-Benefits: 	Mayor/Village Board/DPW	\$\$\$	2026-2030

Strategy 6: Wappinger Dam	Owner	Cost Estimate	Timeframe
Assess the structural integrity of the Wappingers Dam and implement a plan to repair as needed.	Description: The dam was built in 1840, and despite updates in 1987, it has demonstrated its vulnerability in the wake of storms like Hurricane Irene and Tropical Storm Lee. If key repairs are not made to the dam before future severe storm events, failure would threaten 30 businesses, as well as a hydroelectric facility. These losses would have a serious negative impact on the livelihoods of residents and the local economy. Potential Cost: High; while the initial costs of this initiative will likely be high, the plan should focus on both tactical and strategic initiatives to protect the existing Wappingers Falls Hydroelectric plant as well as existing down stream business and residents. Grant funding opportunities should be explored.		
Co-Benefits: 	Mayor/Village Board/Utilities (Central Hudson)	\$\$\$	2026-2030

Strategy 7: Roadway Access and Culverts	Owner	Cost Estimate	Timeframe
Assess Roadways and Culverts for potential flooding and blockages. Develop a plan to address possible flooding areas and to resolve causes such as blocked culverts.	Description: Heavy rainfall events compounded by low elevation buildings (i.e. DPW Highway Garage) and blocked culverts can cause flooding on important roads, including Route 9 and access to the Village Highway Garage. These conditions not only threaten the safety of residents but can lead to delays and road closures. During extreme weather events, such road blockages and closures can increase emergency response times. Also, create a written protocol of strategies to adapt if the DPW Highway Garage were to be inaccessible due to flooding. Possible examples exist for Kingston and Piermont. Also, connect with the Flood Resilience Network (FRN) for guidance. Potential Cost: Medium; while the initial costs of this initiative (i.e. Assessment) will likely be low. An effort should focus on developing an assessment, inspection, and resolution plan. Grant funding opportunities should be explored.		
Co-Benefits: 	Mayor/Village Board/DPW	\$\$\$	2026-2030

Recommended Actions – Environmental

Example sectors addressed in this section: natural resources and recreation, shoreline, forests, open spaces, parks and recreation areas, and drinking water resources.

Strategy 1: Natural Resource Protection	Owner	Cost Estimate	Timeframe
Protect existing natural assets: stream corridor overlay districts or protection ordinances	Description: The development of a local zoning ordinance will help the Village ensure that development is not harming key ecosystems or natural spaces in the community such as Wappinger Creek and Wappinger Lake. Protecting these natural spaces and resources will ensure the security of ecological and community public health for the present and future. This action will also ensure accessibility of natural resources for everyone, promoting ecological equality in the community and recreational tourism. Potential Cost: Low; local ordinance would entail no cost, although there may be an immediate cost associated with the prevention of development in the protected area.		
Co-benefits: 	Mayor/Village Board/Planning Board	\$	2025-2026 (ongoing)



Strategy 2: Natural Resource Protection	Owner	Cost Estimate	Timeframe
Amend zoning law to establish a buffer zone along Wappinger Lake	Description: Establishing a buffer zone along Wappinger Lake will prevent excessive development around the Lake and help to limit runoff and sediment, nutrient, and road salt pollution using nature-based mitigation. An assessment should be completed to determine planting locations for additional trees and native plants within the buffer zone, and lakefront homeowners should be encouraged to plant native plants along the edge of their property by the Lake. Potential Cost: Low; amending the zoning law and establishing a buffer zone would entail no cost, although there may be an immediate cost associated with the prevention of development in the protected area, and the Village might have to cover the costs of planting more trees/vegetation in the buffer zone. Grant funding opportunities should be explored.		
Co-benefits: 	Mayor/Village Board/Planning Board/Homeowners	\$	2025-2026

Strategy 3: Green Infrastructure	Owner	Cost Estimate	Timeframe
Encourage use of green infrastructure techniques in all development, and require “zero runoff” for all areas of the Village with appropriate enforcement mechanisms (encourage upstream communities to do the same)	Description: Encourage green infrastructure techniques such as permeable pavement, bioswales, and tree/native vegetation planting along roads and parking lots for existing developments and require such measures whenever possible for new developments. This strategy will increase local infiltration rates, reduce runoff from impervious surfaces, improve groundwater recharge, and reduce flooding and pollution problems in Wappinger Creek and Wappinger Lake. The Village should encourage upstream communities to adopt similar policies to boost effectiveness. Cost: Medium; while much of the costs will be covered by private owners, the Village will likely need to pay for implementation on public properties and along roads. Grant funding opportunities should be explored.		
Co-benefits: 	Village Board, Planning Board, private owners	\$\$	2025-2026 (ongoing)

Strategy 4: Wappinger Lake Study	Owner	Cost Estimate	Timeframe
Seek funding for a biological study of Wappinger Lake to inform best practices for restoration	Description: A biological study of Wappinger Lake will be an important step toward understanding the best strategies for remediation of overgrowth, pollution, and sedimentation without harming aquatic life. Through this study, experts can determine if chemical and/or mechanical solutions are safe for Wappinger Lake. Cost: Low; the costs for the study should be minimal if the Village is able to secure necessary funding		
Co-benefits: 	Mayor/Village Board/Grant Writer/ Partner with organization/experts	\$	2025-2026

Strategy 5: Tree Planting/Protection	Owner	Cost Estimate	Timeframe
Launch an effort to plant new trees along sidewalks, formalize a tree replacement policy, and protect trees along roads and Village properties	Description: The Village should launch a coordinated effort to plant new trees, protect existing trees, and replace downed trees. This project will be most feasible for Village-owned properties, including parks, and along sidewalks, but efforts should also be made to communicate with neighborhoods and individual residents who lack adequate tree cover and would like assistance with planting trees on their property. While trees on Village properties should be protected, exceptions may be made for trees which could damage historic buildings, such as Mesier Homestead, during extreme storms. This initiative has potential to increase shade and reduce heat impacts, especially in those neighborhoods which currently lack shade, create jobs, and sequester carbon. Cost: Low; although this initiative would entail some costs for the Village, tree plantings are generally not expensive, and business owners, homeowners, and state or federal government may help to cover some costs depending on location. Grant funding opportunities should be explored.		
Co-benefits: 	Village Board, Highway Department, homeowners and businessowners, federal and state government	\$	2025-2026 (ongoing)

Recommended Actions - Social



Example sectors addressed in this section: vulnerable communities, emergency response services, public health and healthcare, food security, as well as recreation and tourism.

Strategy 1: Communications System Updates	Owner	Cost Estimate	Timeframe
Update Village's communications systems: utilize social media, encourage residents to sign up for alerts, and provide information in multiple formats and languages (particularly Spanish) whenever possible	Description: The Village should update/modernize its communication system to efficiently notify residents when a hazard arises or when public input is requested. A staff member or a small group of staff members should be trained to operate the alert system and leverage social media. Residents should be encouraged through social media to sign up for alerts on the Village website, and a concerted effort should be made to provide information in multiple languages and formats (audio and visual) to reach as many residents as possible. The communication system can also be used to educate residents about climate impacts and hazards and steps residents can take to limit vulnerability. Cost: Low; while this effort might require staff to use work hours to leverage social media and the communication system, the overall cost of implementing these updates will be low. The Village may also consider hiring a new staff person dedicated to social media, communications, and grant writing. This person could be an intern.		
Co-Benefits: 	Mayor/Village Board/Emergency Management	\$	2025-2026

Strategy 2: Neighborhood	Owner	Cost	Timeframe
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Networks		Estimate	
Organize neighborhood networks for emergency preparedness, planning, and training (including a “buddy system” for vulnerable residents)	Description: The Village should organize a program to partner less-vulnerable residents with vulnerable residents, like elderly residents. The less vulnerable residents who participate in the program will be responsible for calling the vulnerable residents they’re paired with to check in on them during extreme weather events. These participating residents should be trained in how to contact a variety of emergency services. Possibly implement a program like Piermont’s (https://www.piermont-ny.gov/services/piermont_n2n.php) Neighbor2Neighbor. Cost: Low; the costs of implementing this program should be low, as participating residents would be volunteers. Village staff time would be needed to contact interested residents and create necessary training resources. The Village might be able to partner with non-profits and health organizations to coordinate this effort.		
Co-Benefits: 	Mayor/Village Board/interested residents/community organizations	\$	2025-2026

Strategy 3: Cooling Centers	Owner	Cost Estimate	Timeframe
Assess need for additional cooling centers and emergency shelters and determine best locations	Description: The Village should determine additional cooling center locations, prioritizing areas of the Village which are farthest from existing cooling centers to promote equity. These proposed locations should be easily accessible for elderly and disabled residents. Also, these shelters should accommodate pets, as domestic animals are highly vulnerable to extreme heat. Cost: Low; the assessment and dedication of new cooling centers will be low-cost, but future assessments are recommended to determine feasibility of backup power installation at these locations. If backup power is installed, initial costs may be high.		
Co-Benefits: 	Mayor/Village Board/Participating Locations	\$	2025-2026

Strategy 4: Social Support Collaboration	Owner	Cost Estimate	Timeframe
Continue engagement with local organizations and Dutchess County departments/programs which provide social support (look for opportunities for collaboration and support)	Description: The Village should continue its engagement and collaboration with local organizations and Dutchess County departments and programs such as those given in Appendix E. Furthermore, the Village should launch new efforts to collaborate with these organizations and deliver information and resources to residents related to public and environmental health. These collaborations will not only be highly effective but will help distribute costs. Cost: Low; the costs associated with this effort will vary on a case-by-case basis, but the overall effect should be cost-lower as collaboration splits costs among multiple groups.		
Co-Benefits: 	Mayor/ Village Board / Partner Organizations	\$	2025-2026 (ongoing)

Strategy 5: Damage Assessment	Owner	Cost Estimate	Timeframe
Develop/implement post-event damage assessment program	Description: The Village should design and implement a highly organized post-event damage assessment program. With this program, the Village can have a clearer understanding of what resources are needed for cleanup and what assets should be prioritized for repair and replacement. This strategy has potential to utilize funds strategically, efficiently restore key resources, and incorporate equity into the repair process by prioritizing vulnerable communities. The process should also include provisions to restore damaged historical assets back to their original state to the extent possible. Cost: Low; while the Village will have to spend money as part of the repair process, the act of creating a damage assessment program will be low-cost.		
Co-Benefits: 	Mayor/Village Board/Emergency Management	\$	2025-2026

Process, Implementation and Monitoring

Planning Process for a Shared Vision

Beginning in 2023, The CAPI team solicited input from a variety of sources to draft the vision statement. The draft vision was included in the Village's 2024 Government Operations Climate Action Plan posted on the Village website for public comment. The vision was updated accordingly based on resident and staff feedback. In July of 2024, the CAPI Team worked to revise this statement to fit the context of adaptation using resident survey responses.

Planning Process for Assessing and Prioritizing Climate Adaptation

Our planning process considered diversity, equity, inclusion, and justice. We attempted to include frontline communities by consulting Census data, EPA mapping tools, and previous plans to understand the demographics and unique needs of the Village and residents of different vulnerability levels. Furthermore, the team worked to create an inclusive resident survey to gauge residents' different health concerns and resource needs. This survey was provided in both English and Spanish and was sent to a diverse group of community groups and organizations to aid in distribution to residents. The team also created separate surveys for these organizations, Wappingers Falls Government leaders/emergency managers, and Dutchess County departments/programs to learn about their concerns and needs in the face of climate impacts. Note that this is a moderate-scope planning effort which centers on the impacts of extreme heat/temperature rise, severe storms/changing precipitation patterns, rising sea levels, and flooding.

Table 10: Public Engagement/Outreach Process

Action	Individuals Involved	Description of Action / Activities
Public survey to residents	Sent to municipal residents, 25 responses tallied / analyzed	Survey addressed municipal vulnerabilities and adaptation measures, posted Spanish and English online and paper copies on Village website, reached out to community organizations and Facebook groups for distribution.
CVA overview on Village website	Village website visitors (residents)	Description of CVA goals and process shared on Village website climate page along with link to fill out online resident survey or PDF paper versions.
Survey to community groups/organizations	Emailed 27 groups (few responses)	Survey addressed vulnerabilities and adaptation measures as they relate to the concerns and needs of community organizations.
Survey to Wappingers Falls Government leaders	Emailed 13 Village leaders/emergency managers (no responses)	Survey addressed vulnerabilities and adaptation measures as they relate to the concerns and needs of different Village departments/boards/emergency management.
Survey to Dutchess County Government departments/programs	Distributed to several Dutchess County departments/programs (few responses)	Survey addressed vulnerabilities and adaptation measures as they relate to the concerns and needs of Dutchess's departments/programs which residents and the Village rely upon

Implementation

Below in the Timeline is a summary of proposed implementation planning priorities through 2030.

Timeline for Action	2025	2026	2027	2028	2029	2030
INFRASTRUCTURE						
Purchase and install back-up generators for Village Hall, Highway Department, Police Department, and Grinnell Library	X	X				
Work with utilities and upstream communities to update/replace aging sewer system and septic tanks		X	X	X	X	X
Update/replace aging water distribution system		X	X	X	X	X
Work with utility companies/developers to bury utility lines underground wherever possible, and consider requiring underground utilities for any new development		X	X	X	X	X
Energy resiliency and efficiency improvements: develop plan for islanded microgrid powered with solar, hydropower, and natural gas generators		X	X	X	X	X
ENVIRONMENTAL						
Seek funding for a biological study of Wappinger Lake to inform best practices for restoration	X	X				
Amend zoning law to establish a buffer zone along Wappinger Lake	X	X				
Launch an effort to plant new trees along sidewalks, formalize a tree replacement policy, and protect trees along roads and Village properties	X	X				
Protect existing natural assets: stream corridor overlay districts or protection ordinances	X	X	X	X	X	X
Encourage use of green infrastructure techniques in all development, and require “zero runoff” for all areas of the Village	X	X	X	X	X	X
SOCIAL						



Update Village's communications systems: utilize social media, encourage residents to sign up for alerts, and provide information in multiple formats and languages	X	X				
Organize neighborhood networks for emergency preparedness, planning, and training ("buddy system")	X	X				
Assess need for additional cooling centers and emergency shelters and determine best locations	X	X				
Develop/implement post-event damage assessment program	X	X				
Continue engagement with local organizations and Dutchess County departments/programs which provide social support	X	X	X	X	X	X

Monitoring

While some of the actions in this Climate Vulnerability and Adaptation Plan are underway, the Village of Wappingers Falls will continue to engage with stakeholders in further refining and implementing the actions that have not been completed. Once the Plan is adopted, next steps include:

- Disseminate the Plan to the relevant departments to review each of the strategies, assign organizational responsibility to relevant department owners and initiate a process for implementation with key stakeholders.
- Generate and post to the Village Website a summary tracking sheet based on the above Recommendations for Adaption.
- Ongoing outreach efforts to key stakeholders and community members.
- Identify staff and key sources of funding, where not already mentioned.
- Gather bids for contracted services and equipment where necessary.

The Village Climate Lead will oversee the implementation of this plan and will post periodic updates to the Village website Climate page. <https://wappingersfallsny.gov/climate/>

Establishing an implementation and monitoring process enables the Village to track the impacts of the recommended strategies included in this Plan. Assessing the implementation status of the actions will allow for the determination of whether the action is performing well or to identify corrective measures. This process is also an opportunity to understand the barriers to implementation and identify best practices or new opportunities for moving forward.

With the approval of this Climate Vulnerability and Adaptation Plan, the Village of Wappingers Falls agrees to revisit this Plan at least every 7 years, or following a major climate event, or when other relevant circumstances change, such as the release of new climate change projections or an



evaluation of how those projections may impact assets, systems, and vulnerable populations in the community.

Conclusion

This Climate Vulnerability and Adaptation Plan integrates scientific data and the perspectives of residents and key groups regarding climate hazards in our community, county, and region. The Assessment outlines, analyzes, and prioritizes the impacts of priority climate hazards on key assets in the Village of Wappingers Falls. Throughout the assessment, diverse and thoughtful feedback was received at each stage of the process. The assessment and recommended adaptation strategies reflect the dedication of municipal officials, staff, the Village Council, commissions, and numerous residents to safeguard identified unique and irreplaceable assets. Although the number of responses from the public was not where we would have liked, we were able to gain some insight. Future updates will increase the focus on residential input.

Acknowledging that perceptions and priorities evolve, the CAPI Adapt Team is dedicated to continuing the dialogue, as well as climate vulnerability, adaptation, and resilience planning. The next steps include Plan adoption and dissemination, and additional research pre- and post-implement. The authors are confident that this Plan will inform and contribute to future municipal plans and development projects, aiding the Village of Wappingers Falls in cost-effective and efficient climate adaptation efforts.

The Village of Wappingers Falls commits to reviewing this Plan at least once every seven years. A periodic review of the Plan can help inform other municipal planning initiatives. Through ongoing dialogue, research, prioritization, reassessment, and planning, the authors envision this Climate Vulnerability and Adaptation Plan as a living document, the cornerstone for a comprehensive Climate Action Plan, and a key component of our resilient vision guiding the Village's long-term sustainability efforts.

Appendix A: References

1 NOAA National Centers for Environmental Information, Monthly Global Climate Report for Annual 2023, published online January 2024, retrieved on February 7, 2024
from <https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202313>.

2 NOAA National Centers for Environmental Information, Monthly National Climate Report for Annual 2023, published online January 2024, retrieved on Jan 31, 2024
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3 Stevens, A., & Lamie, C., Eds. (2024). New York State Climate Impacts Assessment: Understanding and preparing for our changing climate. <https://nysclimateimpacts.org>.

4 Horton, R., D. Bader, C. Rosenzweig, A. DeGaetano, and W. Solecki. 2014. Climate Change in New York State: Updating the 2011 ClimAID Climate Risk Information. New York State Energy Research and Development Authority (NYSERDA), Albany, New York. <https://www.nyserda.ny.gov/climaid>.

5 Recommendations to Improve the Strength and Resilience of the Empire State's Infrastructure NYS 2100 COMMISSION <https://www.cakex.org/sites/default/files/documents/NYS2100.pdf>.

6 Hudson, Scenic. "Sea Level Rise Mapper." Scenichudson.Maps.Arcgis.Com, Scenic Hudson, scenichudson.maps.arcgis.com/apps/MapJournal/index.html?appid=3a3d0dc3884c4637ad0a51f4aa912189. Accessed 31 Jan. 2024.

7 U.S. EPA. "EJScreen: EPA's Environmental Justice Screening and mapping Tool (Version 2.2)." <https://ejscreen.epa.gov/mapper/>. Accessed 26 June 2024.

8 Rebuild by Design. "New York Atlas of Disaster." https://rebuildbydesign.org/wp-content/uploads/2023/02/NEW-YORK_Web.pdf. Accessed 26 June 2024.

Appendix B: Key Terms

Key climate adaptation terms from the [NY State Template for Local Climate Change Adaptation Plan](#), p. 13, are provided below for informational purposes. Not all are used in this document but are commonly used in climate adaptation work.

Adaptation (climate change): Actions that reduce the level of physical, social, or economic impact of climate change and variability, or take advantage of new opportunities emerging from climate change (Rosenzweig et al., 2011). It includes reducing the vulnerability of people, places, and ecosystems to the impacts of climate change.

Adaptive capacity: The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences (IPCC, 2014).

Climate change: A statistically significant variation in either the mean state of the climate, most often surface variables such as temperature, precipitation, and wind, or in its variability, persisting for an extended period (typically decades or longer) (Wuebbles et al., 2017).

Climate change effects: The physical effects of anthropogenic climate change, including changes in average temperatures, precipitation rates, sea level rise and ocean temperatures.

Climate change impacts: The impacts experienced by a human, natural system, or man-made system as a result of climate variation including physical changes in average conditions or extreme weather. Examples of climate change impacts include flooding of homes or ecosystem changes (Vogel et al., 2016).

Drought: A period of unusually persistent dry weather that persists long enough to cause a water supply shortage (NOAA, 2015).

Ecosystem-based Adaptation (EbA): The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change (IPCC, 2014).

Ecosystem services: Ecological processes or functions having monetary or non-monetary value to individuals or society at large. These are frequently classified as (1) supporting services such as productivity or biodiversity maintenance, (2) provisioning services such as food or fiber, (3) regulating services such as climate regulation or carbon sequestration, and (4) cultural services such as tourism or spiritual and aesthetic appreciation (IPCC, 2014).

Exposure: The degree to which elements of a system are in direct contact with climate variables, may be affected by long-term changes in climate conditions or by changes in climate variability, including the frequency and magnitude of extreme weather (Rosenzweig et al., 2011).

Extreme heat: Individual days with a maximum temperature at or above 90°F or above 95°F; threshold used depends on the region within the state (Rosenzweig et al., 2011).

Extreme cold: Individual days with a maximum temperature at or below 32°F or below 0°F; threshold used depends on the region within the state (Rosenzweig et al., 2011).

Extreme precipitation: Event with more than 1, 2, or 4 inches of precipitation over a 24-hour period; threshold used depends on the region within the state (Rosenzweig et al., 2011).

Extreme weather: A period of abnormal weather conditions that can negatively affect humans, natural and man-made resources. Extreme weather is often used as an umbrella term referring to a

combination of extreme heat, extreme cold, extreme precipitation, or extreme wind.

Extreme wind: Period with sustained or gusting wind speeds high enough to cause damage to trees, power lines, and other types of natural or man-made resources (NOAA, n.d.).

Flood or flooding: A temporary inundation of normally dry land area caused by an increase in water levels in nearby water bodies including lakes, rivers, estuaries, and oceans or by localized accumulation of precipitation (FEMA, 2017).

Greenhouse gas (GHG): Any gas that absorbs infrared radiation in the atmosphere; examples include carbon dioxide, methane, nitrous oxide, ozone, and water vapor.

Heat wave: Three consecutive days with maximum temperatures above 90°F (Rosenzweig et al., 2011).

Maladaptation: Adaptive actions that may lead to increased risk of adverse climate-related outcomes, increased vulnerability to climate change, or diminished welfare, now or in the future (IPCC 2014).

Mitigation (climate change): Actions that reduce the levels of greenhouse gases in the atmosphere; includes reducing emissions of greenhouse gases and enhancing sinks (things that absorb more greenhouse gases than they emit). Examples include switching to renewable energy sources and implementing energy efficiency measures.

Nature-based solutions (NbS): Actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits (IUCN, 2016).

Resilience: The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation (IPCC, 2014).

Sensitivity: How much a system is directly or indirectly affected by changes in climate conditions (e.g., temperature and precipitation) or specific climate change impacts (e.g., sea level rise and increased water temperature). If a system is likely to be affected as a result of projected climate change, it should be considered sensitive to climate change.

Vulnerability: The degree to which systems are susceptible to, and unable to cope with, adverse impacts of climate change (Rosenzweig et al., 2011). Generally, systems that are sensitive to climate and less able to adapt to changes are considered to be vulnerable to climate change impacts.

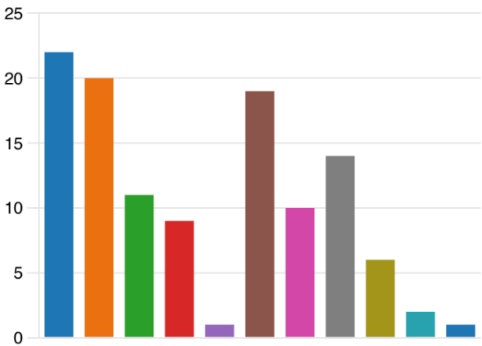
Appendix C: Resident Survey Key Results

Hazard Concerns

1. Over the past 10 years, which of the following natural hazard events have you experienced in Wappingers Falls? *Check all that apply.*

[More Details](#)

Extremely hot days (maximum t...	22
Heat wave (5+ days of 95°F or h...	20
Flooding - Roads, land/yard, sto...	11
Flooding - Basement	9
Flooding - First floor or above	1
Severe storms (tornado, thunder...	19
Severe winter weather (blizzard, ...	10
Poor air quality	14
Drought	6
Wildfire	2
None	1

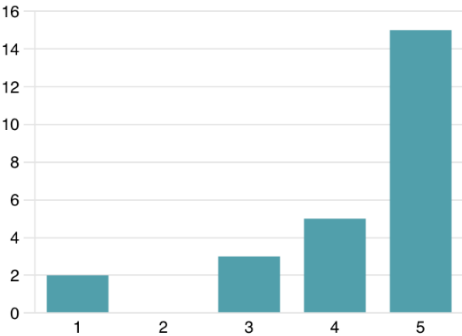


5. Higher energy bills?

[More Details](#)

[Insights](#)

4.24
Average Rating

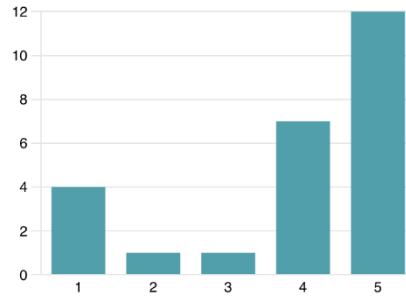


16. Damage to water and sewer infrastructure?

[More Details](#)

[Insights](#)

3.88
Average Rating

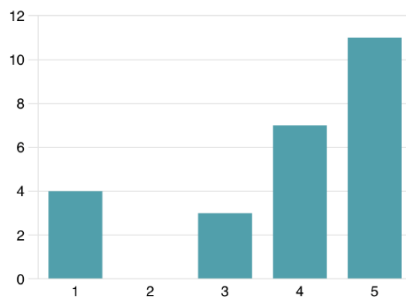


9. Poor air quality, particularly in combination with wildfire smoke?

[More Details](#)

[Insights](#)

3.84
Average Rating

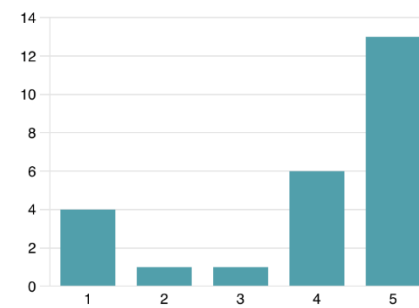


15. Reduced water quality due to polluted runoff and sediment?

[More Details](#)

[Insights](#)

3.92
Average Rating

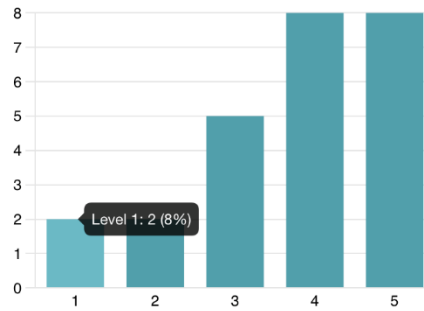


4. Loss of electricity due to overloading of the electrical grid?

[More Details](#)

[Insights](#)

3.72
Average Rating

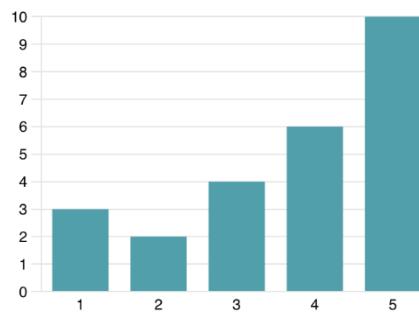


26. Downed trees/power lines/traffic lights/streetlights?

[More Details](#)

[Insights](#)

3.72
Average Rating

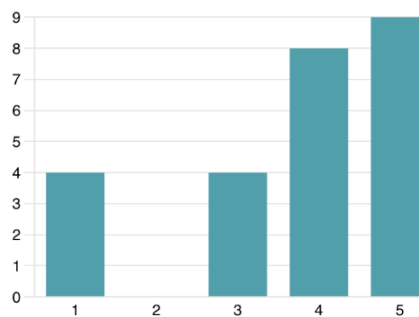


6. Threats to the health and survival of trees, wildlife, and natural areas?

[More Details](#)

[Insights](#)

3.72
Average Rating



Adaptation Guiding Principles

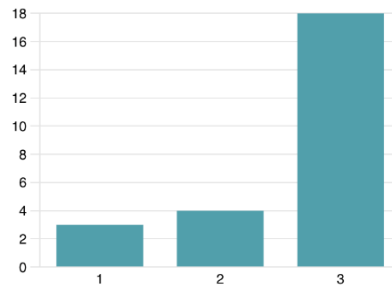


51. to address social, economic, and health disparities across diverse communities to promote equity?

[More Details](#)

[Insights](#)

2.60
Average Rating

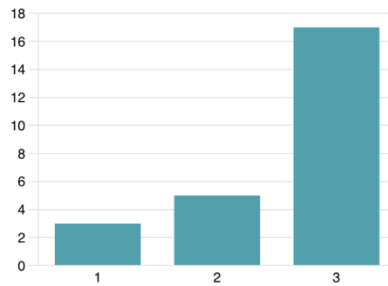


55. to preserve/enhance the enduring historical character of the Village and its buildings?

[More Details](#)

[Insights](#)

2.56
Average Rating

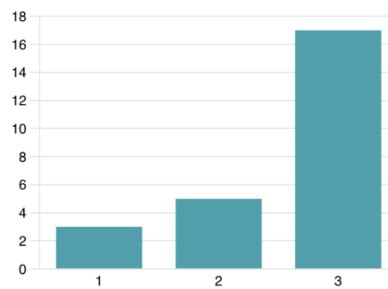


54. to protect natural resources and enhance outdoor recreation areas such as Wappinger Lake?

[More Details](#)

[Insights](#)

2.56
Average Rating

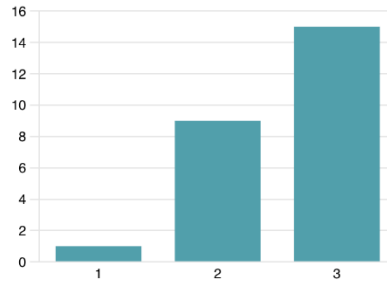


52. to strengthen regional collaboration/partnerships with other local governments and stakeholders from different municipalities?

[More Details](#)

[Insights](#)

2.56
Average Rating



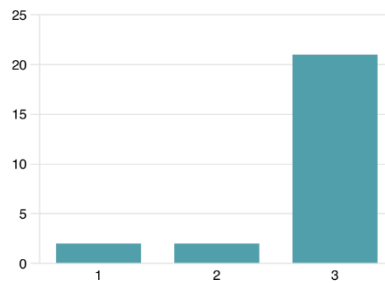
Adaptation Strategies

39. Replacing or updating aging water distribution system and/or sewer systems and consolidating wastewater treatment (example: switching residents with septic tanks to the municipal system)?

[More Details](#)

[Insights](#)

2.76
Average Rating

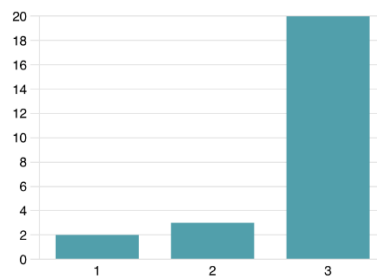


38. Measures directed at better understanding and strengthening the protection of Wappingers' drinking water through groundwater studies and potential additional protections?

[More Details](#)

[Insights](#)

2.72
Average Rating

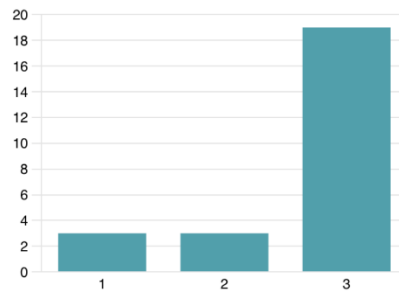


40. Measures to improve energy resiliency (example: constructing an “islanded microgrid” that utilizes a variety of energy sources and is less vulnerable to storm damage), constructing backup generators at emergency centers/shelters, and/or transitioning to buried power lines?

[More Details](#)

 Insights

2.64
Average Rating

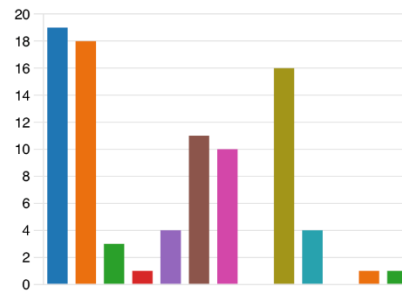


Hazard Communication Sources

35. How do you receive information about natural disasters (e.g. heat wave, winter storm, flooding)? *Check all that apply.*

[More Details](#)

Internet	19
Social media	18
Village website	3
Village newsletter	1
Village notification system- http...	4
TV news	11
Radio news	10
Print newspaper	0
Friends/family/neighbors	16
Dutchess County Emergency No...	4
Dutchess County e-bulletins	0
Dutchess County Department of...	1
Other	1



Appendix D: Relevant Plans

1. Dutchess County Hazard Mitigation Plan (HMP) (2016)
 - a. Link: <https://www.dutchessny.gov/Departments/Emergency-Response/Hazard-Mitigation-Plan.htm>
2. Village of Wappinger Falls Hazard Mitigation Plan Annex (2016)
 - a. Link: <https://www.dutchessny.gov/Departments/Emergency-Response/Docs/Section-9-31-Wappingers-Falls-V.pdf>
3. Village of Wappinger Falls Community Resilience Building Workshop Summary of Findings (2019)
 - a. Link: https://hudsonwatershed.org/wp-content/uploads/2020/02/Lower-Wappinger-CRB_FINAL-with-Funding_09132019.pdf
4. Village of Wappinger Falls Comprehensive Plan (2022)
 - a. Link: https://wappingersfallsny.gov/wp-content/uploads/2022/07/2022CompPlan_5_31_2022.pdf
5. Village of Wappinger Falls Local Government Operations Climate Action Plan (2024)
 - a. Link: https://wappingersfallsny.gov/wp-content/uploads/2024/05/CAP-2023_LGO-GOCAP-VoWF-20240312-V2.pdf
 - b. Purpose: “Transform the Village of Wappingers Falls facilities into high-performing and energy efficient buildings and facilities resilient to climate change. The Village also plans to migrate the Village fleet toward clean, carbon-free technologies across all departments.”

Appendix E: Dutchess County Resources

Environment

- [Dutchess County Soil & Water Conservation District](#)
- [Water and Wastewater Authority](#)
- [Dutchess County Parks](#)
- [Cornell Cooperative Extension](#)
- [Naturalist Education Programs](#)
- [Dutchess County Environmental Management Council \(EMC\)](#)
- [Poughkeepsie Farm Project](#)
- [Dutchess Land Conservancy](#)
- [Hudson Highlands Fjord Trail, Inc.](#)
- [The Fresh Air Fund](#)
- [Winnakee Land Trust](#)
- [Stony Kill Foundation](#)

Public Services/Utilities/Planning/Transportation

- [Transportation Council](#)
- [Public Transit](#)
- [Traffic Safety Board](#)
- [Hudson Valley Regional Airport](#)
- [Solid Waste Management](#)
- [Resource Recovery Agency](#)
- [Department of Public Works](#)
- [Planning & Development](#)
- [Dutchess County-Poughkeepsie Land Bank](#)

Social/Economic/Food Assistance

- [United Way, Dutchess County](#)
- [The Food Bank of the Hudson Valley](#)
- [Dutchess Outreach](#)
- [Veterans Services](#)
- [Home Energy Assistance Program \(HEAP\)](#)
- [Community Action Partnership for Dutchess County](#)
- [Meals on Wheels](#)
- [Salvation Army, Poughkeepsie](#)
- [Sparrow's Nest](#)

Housing/Shelter



- [Dutchess County Emergency Housing](#)
- [Hudson River Housing](#)
- [Grace Smith House for victims of domestic violence](#)
- [Children's Home of Poughkeepsie](#)
- [Ronald McDonald House Greater Hudson Valley](#)
- [Habitat for Humanity of Dutchess County](#)
- [Rebuilding Together Hudson Valley](#)
- [Migrant Farmworker Housing](#)

Physical Health/Safety

- [American Red Cross, Dutchess County Chapter](#)
- [Emergency Response](#)
- [American Cancer Society of the Hudson Valley](#)

Mental Health

- [Dutchess County Stabilization Center](#)
- [National Alliance on Mental Illness \(Mid-Hudson\)](#)
- [Behavioral & Community Health](#)
- [Mental Health America of Dutchess County, Inc.](#)
- [Mental Health Services](#)
- [People USA](#)
- [Council on Addiction Prevention and Education of Dutchess County, Inc.](#)
- [Hudson Valley Clubhouse](#)

Residents with Disabilities

- [ThinkDIFFERENTLY.](#)
- [Abilities First, Inc.](#)
- [The Arc Greater Hudson Valley](#)
- [In Flight, Inc.](#)
- [Mid-Hudson Works](#)
- [Keli House Community Services, Inc.](#)
- [Greystone Programs, Inc.](#)
- [Access: Supports for Living](#)

Elderly Residents

- [Dutchess County Office for the Aging](#)
- [Adult Care Facilities](#)
- [Transportation for Older Adults](#)

Youth Residents/Families



- [Dutchess County Youth Council](#)
- [Child Care Council of Dutchess and Putnam Counties](#)
- [Department of Community and Family Services](#)
- [Catharine Street Community Center](#)
- [Community Matters 2, Inc.](#)
- [Youth Mission Outreach, Inc.](#)
- [Angels of Light](#)
- [Girl Scouts Heart of the Hudson](#)
- [Youth Advocate Programs, Inc. of Dutchess County](#)
- [Family Services](#)

Residents of Color and Residents with Limited English Proficiency

- [Forge Project, Native-led non-profit](#)
- [Latinos Unidos of the Hudson Valley](#)
- [Esperanza Dutchess County Hispanic Organization](#)
- [La Voz \(Hudson Valley news in Spanish\)](#)
- [The Mid-Hudson Chinese Language Center](#)
- [NAACP Northern Dutchess Branch](#)

Equity/Justice/Opportunity

- [Commission on Human Rights](#)
- [Dutchess County Pride Center](#)
- [Yusuf House of the Hudson Valley, Inc.](#)
- [Exodus Transitional Community, Inc.](#)
- [The Revolving Door](#)

Religious

- [Dutchess County Interfaith Council](#)

Animals

- [Dutchess County SPCA](#)
- [Hudson Valley Animal Rescue and Sanctuary](#)
- [Horses for a Change](#)
- [13 Hands Equine Rescue, Inc.](#)
- [Animal Farm Foundation, Inc.](#)

Economic Development/Business Support

- [Think Dutchess Alliance for Business](#)
- [Business Groups & Chambers of Commerce](#)
- [Agriculture](#)
- [Centennial Farms Foundation](#)



Grants/Funding/Nonprofit support

- [Dyson Foundation](#)
- [New York Council of Nonprofits, Inc.](#)
- [Dutchess County Municipal Consolidation & Shared Services Grant Program](#)

Tourism/Recreation/Arts

- [Arts and Culture](#)
- [Dutchess Tourism](#)
- [Dutchess County Historical Society](#)
- [Hudson River Valley National Heritage Area](#)
- [Tours and Trails](#)
- [Travel Hudson Valley](#)
- [Arts Mid-Hudson, Inc.](#)
- [Mid-Hudson Discovery Museum](#)
- [The Art Effect](#)

