Adopted by the Town of Charleston Selectboard on:

_____, ____ 2026

TOWN of CHARLESTON, Vermont

All-Hazards Mitigation Plan Update

FEMA ID#: 019-13150-00

5063 VT Route 105

Charleston, VT 05872

802-895-2814

Prepared by:

The Town of Charleston, Vermont

CERTIFICATE OF LOCAL ADOPTION

Town of Charleston, Vermont

A Resolution Adopting the All-Hazards Mitigation Plan Update

WHEREAS, the Town of Charleston has worked with its residents and stakeholders to identify its hazards and vulnerabilities, analyze past and potential future losses due to natural and human-caused hazards, and identify strategies for mitigating future losses; and

WHEREAS, the Town of Charleston All-Hazards Mitigation Plan contains recommendations, potential actions and future projects to mitigate damage from disasters in the Town of Charleston; and

WHEREAS, the Town of Charleston and the respective officials will pursue implementation of the strategy and follow the maintenance process described in this plan to assure that the plan stays up to date and compliant; and…

WHEREAS, a meeting was held by the Town of Charleston to formally approve and adopt the Multijurisdictional All Hazards Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED that the Town of Charleston adopts this Hazard Mitigation Plan Update.

_____

Date

_____

Selectman

_____

Selectman

_____

Selectman

_____

Attested to by Town Clerk

[EXECUTIVE SUMMARY]

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SECTION 1: INTRODUCTION AND PURPOSE

1.1 Purpose and Scope of this Plan

The purpose of this 2026 update of the Charleston All-Hazards Mitigation Plan is to identify all natural and human-caused hazards facing the town and to recommend practical, cost-effective actions that reduce risks and impacts from future disasters before they occur.

The goal is to protect lives, property, and critical infrastructure while addressing community-identified priorities from the 2025 resident survey: recurring flooding, protection of vulnerable residents, emergency service access, communication improvements, and highway/road resilience.

This update builds on the 2021 adopted plan and, where appropriate for a small rural community, integrates guidance from the 2023 Vermont State Hazard Mitigation Plan (SHMP), the 2025 revisions to the State Emergency Management Plan (SEMP), and the 2025 Vermont Municipal and Regional Hazard Mitigation Policy Guide. These state resources align Charleston's local priorities with current state hazard profiles, risk assessment tools, and best practices while keeping actions realistic and affordable.

This plan remains consistent with the Charleston Town Plan and was prepared with assistance from the Northeastern Vermont Development Association (NVDA) and the Orleans-Essex Regional Emergency Management Committee (REMC). It meets the requirements of 44 CFR §201.6 and maintains the town's eligibility for FEMA hazard mitigation grant funding.

1.2 Hazard Mitigation

The 2023 Vermont State Hazard Mitigation Plan (SHMP) emphasizes that proactive mitigation is less costly than repeated repairs, protecting the economy, environment, residents, and visitors. It integrates mitigation across all phases of emergency management (preparedness, mitigation, response, and recovery) to comprehensively address risks by improving understanding of hazards and their impacts. This update focuses on people, compounded hazards, and vulnerabilities to the natural and built environments, economy, and residents, while addressing observed and projected hazards amid climate change, population shifts, and development patterns.

Hazard mitigation strategies and measures can reduce or eliminate the frequency of a specific hazard, lessen the impact of a hazard, modify standards and structures to adapt to a hazard, or limit development in identified hazardous areas. This plan aligns with and benefits from the 2023 SHMP, the 2025 revisions to the State Emergency Management Plan (SEMP)—including annexes for functions like mass care, though the applicability of such elements to a small rural town like Charleston remains under evaluation—and the 2025 Vermont Municipal and Regional Hazard Mitigation Plan Policy Guide, as part of Emergency Relief Assistance Funding (ERAF) requirements. Community input from the 2025 resident surveys highlights priorities such as improving communications during emergencies and enhancing support for vulnerable populations, including the elderly and disabled. The plan also explores regional mutual aid agreements that towns looked to during the COVID-19 pandemic, as well as tools and resources identified through the Orleans-Essex Regional Emergency Management Committee (REMC) and

Vermont Emergency Management, such as VT-Alert, the Municipal Vulnerability Index (MVI) and the National Weather Service Flood Inundation Mapping (NWS FIM) for better flood forecasting and response.

With enhanced emphasis on community resiliency, many state agencies and local organizations have an increased awareness of the importance of mitigation planning and have produced plans and resources that towns can use to support their efforts. This plan will reference, when relevant, pertinent tools and resources that can be used to enhance mitigation strategies.

1.3 Hazard Mitigation Planning Required by the Disaster Mitigation Act of 2000

Hazard mitigation planning is the process that analyzes a community's risk from natural hazards, coordinates available resources, and implements actions to reduce risks. According to 44 CFR Part 201, Hazard Mitigation Planning, this planning process establishes criteria for State and local hazard mitigation planning authorized by Section 322 of the Stafford Act as amended by Section 104 of the Disaster Mitigation Act of 2000. Effective November 1, 2003, local governments now must have an approved local mitigation plan prior to the approval of a local mitigation project funded through federal Pre-Disaster Mitigation funds. Furthermore, the State of Vermont is required to adopt a State Pre-Disaster Mitigation Plan for Pre-Disaster Mitigation funds or grants to be released for either a state or local mitigation project after November 1, 2004.

There are several implications if the plan is not adopted:

- After November 1, 2004, Flood Mitigation Assistance Grant Program (FMA) funds will be available only to communities that have adopted a local Plan.
- For disasters declared after November 1, 2004, a community without a plan is not eligible for HMGP project grants but may apply for planning grants under the 7% of HMGP available for planning.
- For the Pre-Disaster Mitigation (PDM) program, a community may apply for PDM funding but must have an approved plan to receive a PDM project grant. (Note: PDM has been replaced by BRIC, which was terminated in 2025, limiting pre-disaster mitigation funding options.)
- For disasters declared after October 14th, 2014, a community without a plan will be required to meet a greater state match when public assistance is awarded under the ERAF requirements (Emergency Relief Assistance Funding). Charleston currently benefits from the enhanced 7.5% local match rate. As seen after the 2024 floods, towns without an approved plan face significantly higher local cost share.

The recent termination of the federal Building Resilient Infrastructure and Communities (BRIC) program has eliminated a major source of non-disaster mitigation funding, making an up-to-date local plan even more essential to remain competitive for remaining federal and state mitigation dollars.

1.4 Benefits

Adoption and maintenance of this updated 2026 Hazard Mitigation Plan will:

1. Make certain funding sources available to complete the identified mitigation initiatives that would not otherwise be available if the plan was not in place (including continued eligibility for remaining FEMA Hazard Mitigation Assistance programs).
2. Ease the receipt of post-disaster state and federal funding because the list of mitigation initiatives is already identified and because Charleston maintains its enhanced 7.5% ERAF match rate.
3. Support effective pre- and post-disaster decision making efforts, including access to real-time tools such as National Weather Service Flood Inundation Mapping (NWS FIM) and monitoring FEMA Special Flood Hazard Area (SFHA) updates for better flood risk awareness.
4. Lessen the town's vulnerability to disasters by focusing limited financial resources on specifically identified, community-prioritized initiatives.
5. Connect hazard mitigation planning to community planning where possible, including consistency with the Charleston Town Plan and regional efforts through NVDA and the Orleans-Essex REMC.

1.5 All-Hazards Mitigation Plan Goals

This 2026 All-Hazards Mitigation Plan update establishes the following general goals for the town and its residents. These goals continue to guide the plan while incorporating new emphasis on climate resiliency, community input from the 2025 resident survey, and guidance from the 2025 Vermont Municipal and Regional Hazard Mitigation Policy Guide:

1. Reduce at a minimum, and prevent to the maximum extent possible, the loss of life and injury resulting from all hazards.
2. Mitigate financial losses and environmental degradation incurred by municipal, educational, residential, commercial, industrial, and agricultural establishments due to various hazards.
3. Maintain and increase awareness amongst residents and businesses of the damages caused by previous and potential future hazard events as identified specifically in this Local All-Hazards Mitigation Plan.
4. Recognize the linkages between the relative frequency and severity of disaster events—exacerbated by climate change—and the design, development, use, and maintenance of infrastructure such as roads, utilities, and stormwater management, as well as the planning and development of various land uses.
5. Maintain existing municipal plans, programs, and ordinances that directly or indirectly support hazard mitigation and climate resiliency.
6. Develop a mechanism for formal incorporation of this Local All-Hazards Mitigation Plan into the multi-jurisdictional municipal comprehensive plan as described in 24 V.S.A. § 4403(5). This mechanism will be developed by the Selectboard, Planning Commission, NVDA, and Orleans-Essex REMC.
7. Develop a mechanism for formal incorporation of this Local All-Hazards Mitigation Plan, particularly the recommended mitigation actions, into municipal operating and capital plans and programs as they relate to public facilities and infrastructure within political and budgetary feasibility. The Planning Commission will review the plan annually and use language/actions from it to inform the integration and update process. Town

Meeting Day will serve as the formal time that mitigation strategy budgetary considerations will be approved and incorporated into town budgets.

8. Ensure strong integration of hazard mitigation and climate resiliency strategies into the comprehensive 2026 Charleston Town Plan update, including a dedicated mitigation/resiliency chapter or annex, using this 2026 All-Hazards Mitigation Plan as the primary resource document.

1.6 Town of Charleston: Population and Characteristics

Population:

The Town of Charleston covers 24,662 contiguous acres. The 2020 U.S. Census reports a total population of 1,021 residents (51% male, 49% female), indicating a population density of about 1 person per 24 acres. Population grew slowly over the past 50 years, with a modest increase from 2010 to 2020. The median age is 53 years; 34% of residents are aged 60 or older. This aging demographic, combined with 2025 resident survey feedback, underscores the need for hazard mitigation measures that support elderly, disabled, and vulnerable family households.

Table 1-1 Town of Charleston, selected population characteristics, 2020 Census

Category	Number	%
Total Population	1021	100
Median Age	53	--
Population age 60 years and over	347	34
Population under 20 years old	174	17
Population 20–39	184	18
Population 40–59	316	31

Housing:

The entire population of Charleston is housed, with more than half living in traditional nuclear families, a third living in non-family households, and about one-quarter living alone. The average family size is 2.7 and the average household size is 2.2. In 2022 the average annual household income was approximately $53,000 with per capita income around $30,500, both lower than state averages. About one-third of the Town's housing stock was built before 1950. Almost half was built between 1960 and 1990. About 12% has been built since 2000. Median house value in 2022 was $210,000. More than 80% of the housing is owner-occupied, with about 20% rented. Rental costs range from $700 to $1,600 per month.

Table 1-2 Town of Charleston, selected housing unit data, 2020 Census Block Group 2

Category	Number	%
Total Housing Units	670	--
Occupied housing units	419	62.5
Vacant housing units	251	37.5
Owner-Occupied	336	80.2
Renter Occupied	83	19.8

Population in Renter-occupied	179	
Households with individuals under 18	98	

Town Districts

West Charleston Village is described by the area on both sides of Vermont Route 105 from the junction of Routes 105 and 5A on the east to the Derby-Charleston border on the west. The Clyde River forms the northern boundary. The southern boundary is 1,000 feet in distance on a line perpendicular to the center line of Vermont Route 105. The eastern boundary is the Clyde River, north of Vermont 105 and Vermont 5A, south to a point 1,000 feet from the centerline of Vermont 105.

East Charleston Village is described by an area on both sides of Vermont Route 105 from Route 105/Ten Mile Square Road to a point approximately .9 of a mile west of the centerline of Church Hill Road. The northern boundary is 1,000 feet in distance measured on a line perpendicular to the center line of Vermont Route 105. The southern boundary is the Clyde River.

Pensioner Pond is described by the area lying within Route 105 to the north, Route 5A to the south, and to the south and east along Stumpf Brook to where it meets the Clyde River, and from that point to the intersection of Parlin Meadow Road and Vermont Route 5A.

Echo Lake is described by the area circumscribed by East and West Echo Lake Roads.

Rural: All other land within the Town is part of a Town-wide Rural District, which contains approximately 22,050 acres.

Commercial:
Small scale enterprises flourish in Charleston, employing many Town residents. Many of these are directly tied to the Town's land and natural resources and depend on the preservation and stewardship of these features to thrive. The rise in remote work since 2020 has heightened resident concerns (noted in the 2025 survey) about gaps in cell service and high-speed internet—critical during hazard events for both remote workers and vulnerable households.

[Population, age, housing unit, and income data in this section are from the U.S. Census Bureau 2020 Decennial Census and the American Community Survey 2018–2022 5-Year Estimates.]

1.7 Summary of Planning Process

The work to update this plan was led by the planning team made up of municipal officials, school officials, local businesses, service agencies, and the regional planning organization (NVDA) with support from key state agencies. The update project followed a work plan which provided the public and other stakeholders with the opportunity for two-way communication. Existing documents were also researched and incorporated into the plan update. Planning team members, for the most part, fulfill multiple roles in the community and represent a broad array of stakeholders. The following table presents the Planning Team members and their title:

- Patrick Austin, Charleston Selectboard Chair
- Timothy Jenness, Charleston Selectboard
- Terry Rollins, Charleston Selectboard

- John Kellogg, Charleston Planning Commission Chair
- Patrick McLaughlin, HAZMAT Chief, State of Vermont
- Samantha Slayton, HAZMAT Compliance Officer, Vermont State HAZMAT Team
- Kevin Lacoss, Interim Chief, Newport City Fire Department
- Lt. Andrew Jensen, Vermont State Police Derby Barracks Station Commander
- Jeff Johansen, Newport Ambulance Service
- Mary Esposito, School Board Chair, Charleston Elementary School District
- Christopher Lawson, Charleston Elementary School Principal
- Tom Wagner, Charleston Planning Commission/Echo Lake Protective Association
- Maria Young, Director, NorthWoods Stewardship Center
- Phil Brooks, Chair, Orleans-Essex REMC
- Duane Moulton, Charleston Fire Chief & Town EMD
- Teri Gray, Town Clerk
- Colleen Kellogg, Asst. Town Clerk
- Molly Dockter, Emergency Planner, NVDA
- Wendell Hastings, Road Foreman

There is a current understanding of the need to integrate the content of this update and its goals, actions and reporting into the daily operational structure and awareness of all town officials so that mitigation planning establishes itself as a consistent topic of concern and discussion. The community survey was distributed through the town Facebook group Charleston Coffee (with 587 members) and mailed with tax bills in July 2025 with a tax deadline of October 24th. Charleston has about 740 parcels. 13 responses were received and focused on flooding, power outages, lack of cell service, road access, emergency notification and communication, and mobility of vulnerable elderly and disabled residents. All neighboring towns were sent notification via the town clerk of the plan's development and the subsequent draft and were given an opportunity to provide input through email and/or phone call to the town clerk. [XX] responses were obtained from this solicitation. Following FEMA guidance in Local Mitigation Plan Review Tool Regulation Checklist, the plan was written using data sources that included:

- Surveys and warned, public meetings collecting public comment (issues raised were addressed in plan and the public meeting)
- 2019 Town Plan (provided current goals and regulations supporting mitigation, recent capital expenditures and infrastructure value helped to drive vulnerability assessment)
- 2023 Vermont State Hazard Mitigation Plan and the 2025 revisions to the SHMP (provided key guidance language and definitions throughout the plan).
- Vermont Agency of Natural Resources (ANR) and Transportation (VTrans) (Provided key policy recommendations on environmental conservation, high accident locations, climate change and fluvial erosion data).
- Vermont Departments of Health (VDH) and Environmental Conservation (DEC) (provided information related with public health services that could be impacted during a disaster and state support functions designated to both VDH and DEC. DEC also provided river corridor data for mapping purposes.

- FEMA Open Source (data.gov) Data for Disaster History and PA funding (provided comprehensive declared disaster by year and type as well as project descriptions and cost per event).
- FEMA NFIP "Bureau.Net" database (provided detailed information on repetitive loss properties and associated flood insurance claims).
- EPA's Incident Action Checklist for cold weather resilience of water systems (provides a guidance tool for public works to cross-reference actions on the system).
- 2013 ACCD Mobile Home Resilience Plan (served as resource for future mitigation actions)

Based on the information obtained, input from town and state officials, the planning team, state and federal databases, local associations and NVDA, the plan was created. While many small communities in Vermont face similar circumstances (e.g. flooding, winter storms and remote residents), each one has unique considerations and opportunities. There was a point made to capture the subtle characteristics of the town and its distinct villages. From this, the specific risks, vulnerabilities, and mitigation strategies were developed and applicable, broken down to the specific entity impacted. NVDA's role in assisting the entire region with all facets of planning provided crucial information and NVDA's Emergency Management Planning representative provided guidance. While the REMC provides the best platform to engage representatives from various towns and agencies, all bordering towns were contacted with planning objectives and asked to provide input through a formal email invitation. Vermont Emergency Management (VEM) also provided information during the development of the plan. VEM also has representation at the REMC meetings and will continue to provide input and guidance as the town moves forward with their mitigation strategies. The following summary represents the timeline for the planning process:

- 7/31/25: Community Input Surveys mailed with tax bills to owners/residents of Town (and posted 9/11/25 in the 'Charleston Coffee' Facebook gSroup).
- 10/13/25: Workplan meeting with Charleston Planning Commission Chair and Town Clerk
- 10/21/25: Planning Team Kick-off meeting. Planning team was approved by selectboard and updated hazards to be profiled were discussed. The public was notified and in attendance at this meeting, however, no comments were received.
- 10/29/25: All returned Community Input Surveys collected and reviewed by planning team lead
- 12/09/25: Warned Community Meeting to review updated profiled hazards and draft sections I and II of the update. The public was notified and in attendance at this meeting, and _____ comments were received.
- __/__/25: Meeting with Town Road Foreman to discuss mitigation projects and progress on 2021 mitigation action items related to infrastructure.
- __/__/25: Mitigation Action Status Report sent to Town for required updates. Results captured and included as Appendix B.
- __/__/25: Updated Mitigation Actions for next planning cycle sent to planning team for review. Note any corrections made based on feedback.

- __/__/25: Proposed mitigation actions were discussed at warned community meeting. The public was notified and in attendance at this meeting, and _____ comments were received.
- __/__/25: Draft Sections III and IV sent to planning team for review and comment. Inclusion of Climate Change was brought up and addressed.
- __/__/2__: All neighboring towns received notice of availability of draft plan for review and comment via the town clerk. No comments were received.
- __/__/2__: Draft plan submitted to VEM for review and approval.
- __/__/2__: VEM review and request for edits obtained
- __/__/2__: Plan revision made and resubmitted to VEM

The draft plan was then revised based on input from planning team. The revised draft was made available for review at the town office and residents were informed via meeting minutes and the town bulletin board of the ability to review the draft and additional opportunity for formal comment and suggestions. [Insert any additional public comment was received.] Edits were made to the plan following State recommendations and the final draft was resubmitted to VEM for formal review and approval pending municipal adoption. A resolution of adoption will occur following VEM review and "approval pending adoption" status. [Revise as needed]

SECTION 2: HAZARD IDENTIFICATION

For this 2026 update, the planning team considered the continued inclusion or deletion of the 2021 profiled hazards by developing and researching the natural hazard categories outlined in the 2023 Vermont State Hazard Mitigation Plan (SHMP) and, for each, evaluating prior history, current trends (including climate projections), and available data to estimate risk. Based on occurrence frequency, risk, and/or vulnerability, previously profiled hazards remain a significant risk for the town, and Severe Drought was added as a profiled hazard. The definitions of each hazard, along with historical occurrence and impact, are described below.

Types of Natural Hazards: weather/climate hazards (drought, hurricane/tornado, high winds, severe winter storm, extreme temperatures, climate change, lightning, hail), flooding, geological hazards (landslide/erosion, earthquake, naturally-occurring radiation), and fire hazards.

2026 Updated Profiled Natural Hazards:

- Flooding (including fluvial erosion and severe storms)
- Severe Winter Storms (including ice storms and ice jams)
- Extreme Cold Events
- Pandemic Planning
- Severe Drought

2.1 Natural Hazards Overview

There have been 28 disasters and 5 emergencies declared in Orleans County from 1964 through 2025 (it is noted that "Hurricane Irene" was listed as an Emergency, and then "Tropical Storm Irene" was listed as a Disaster a few days later). The following discussion on natural hazards is

based upon information from several sources. Often, extent data specific to Charleston is not available but when appropriate and available, nearby Newport City data can be used to capture the extent of natural hazard events for the town and villages. General descriptions are based upon the 2023 Vermont State Hazard Mitigation Plan (SHMP). According to NOAA Storm data, there were over 500 severe weather events from 1995-2025 in Orleans County. Climate change is exacerbating these trends, with Vermont experiencing a 21% increase in annual precipitation since 1900 and projections for an additional 15% increase in precipitation intensity by 2050, leading to more severe flooding and stormwater challenges (Vermont Climate Assessment, 2021, incorporated in 2023 SHMP). Additionally, 2025 resident survey responses highlighted cell service gaps in rural areas, which can delay emergency notifications and response during hazard events.

The highest risk hazards (severe winter/ice storm, flooding, extreme cold and pandemic) have been profiled to provide the basis of future mitigation strategies. Severe drought, although historically a lower risk hazard, is also included among profiled hazards for mitigation action due to increasing incidence and devastating impacts in 2025. Other lower risk natural hazards (tornado, high winds, extreme heat, hail, landslide, earthquake, naturally-occurring radiation, hurricanes and fire hazards) are omitted from full profiling because they do not pose enough risk to substantiate mitigation efforts at this time. And while the risk of a hazardous materials incident as outlined remain moderate due to border crossings and the associated vulnerabilities that result, the town will focus on natural hazards and pandemic response for this update. Additionally, impacts from hurricanes are addressed under flooding hazard.

Table 2-1: Summary of Vermont Emergency Declarations

Number	Year	Type
EM-3532	2024	Pandemic (COVID-19 extension)
EM-3437	2020	Pandemic (COVID-19) national 3/13/20
EM-3338	2011	Hurricane Irene
EM-3167	2001	Snowstorm
EM-3053	1977	Drought

Source: FEMA

Table 2-2: Summary of Orleans County Disasters (Green rows indicate town PA received)

DN	Date	Disaster Type	Incident Type	Title
397	1973	DR	Flood	SEVERE STORMS, FLOODING, & LANDSLIDES
518	1976	DR	Flood	SEVERE STORMS, HIGH WINDS & FLOODING
1063	1995	DR	Severe Storm(s)	EXCESSIVE RAINFALL, FLOODING
1307	2000	DR	Severe Storm(s)	TROPICAL STORM FLOYD
1559	2004	DR	Severe Storm(s)	SEVERE STORMS AND FLOODING
1428	2002	DR	Severe Storm(s)	SEVERE STORMS AND FLOODING
1184	1997	DR	Flood	EXCESSIVE RAINFALL, HIGH WINDS, FLOODING
1101	1996	DR	Flood	ICE JAMS AND FLOODING
1228	1998	DR	Severe Storm(s)	SEVERE STORMS AND FLOODING

1715	2007	DR	Severe Storm(s)	SEVERE STORMS AND FLOODING
3167	2001	EM	Snow	SNOW
1995	2011	DR	Severe Storm(s)	SEVERE STORMS AND FLOODING
3338	2011	EM	Hurricane	HURRICANE IRENE
4178	2014	DR	Flood	SEVERE STORMS AND FLOODING
4207	2015	DR	Severe Storm(s)	SEVERE WINTER STORM
4163	2014	DR	Severe Ice Storm	SEVERE WINTER STORMS
4380	2018	DR	Severe Storm(s)	SEVERE STORM AND FLOODING
4022	2011	DR	Hurricane	TROPICAL STORM IRENE
4066	2012	DR	Severe Storm(s)	SEVERE STORM, TORNADO, AND FLOODING
4356	2018	DR	Severe Storm(s)	SEVERE STORM AND FLOODING
4140	2013	DR	Flood	SEVERE STORMS AND FLOODING
4474	2020	DR	Severe Storm(s)	SEVERE STORM AND FLOODING
160	1964	DR	Drought	DROUGHT & IMPENDING FREEZE
164	1964	DR	Flood	FLOODING
4474	2020	DR	Severe Storm(s)	SEVERE STORM AND FLOODING (Oct 2019)
4532	2020	ED	Pandemic	COVID-19
4695	2023	DR	Severe Storm(s)	SEVERE STORM AND FLOODING (July 2023)
4720	2023	DR	Severe Storm(s)	SEVERE STORM AND FLOODING (July 2023)
4770	2024	DR	Severe Storm(s)	SEVERE WINTER STORM (April 2024)
4810	2014	DR	Severe Storm(s)	SEVERE STORM AND FLOODING (July 2024)
4816	2024	DR	Severe Storm(s)	SEVERE STORM AND FLOODING (July 2024)
4826	2024	DR	Severe Storm(s)	SEVERE STORM AND FLOODING (July 2024)

2.1.1. Profiled Hazards

Climate Change Overview:

"Over the past several decades, there has been a marked increase in the frequency and severity of weather-related disasters, both globally and nationally. Most notably, the Earth has experienced a 1°F rise in temperature, which has far-reaching impacts on weather patterns and ecosystems. This statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer), is known as climate change. The Intergovernmental Panel on Climate Change (IPCC) forecasts a temperature rise of 2.5°F to 10°F over the next century, which will affect different regions in various ways over time. Impacts will also directly relate to the ability of different societal and environmental systems to mitigate or adapt to change. Increasing temperatures are forecasted to have significant impacts on weather-related disasters, which will also increase risk to life, economy and quality of life, critical infrastructure and natural ecosystems. The IPCC notes that the range of published evidence indicates that the costs associated with net damages of climate change are likely to be significant and will increase over time. It is therefore imperative that recognition of a changing climate be incorporated into all planning processes when preparing for and responding to weather-related emergencies and disasters. Most of the natural hazards identified in this plan are likely to be exacerbated by changes in climate, either directly or indirectly. The National

Aeronautics & Space Administration (NASA) reports that global climate change has already had observable effects on the environment: glaciers are shrinking, sea ice is disappearing, sea level rise is accelerating, heat waves are occurring more frequently and intensely, river and lake ice is breaking up earlier, plant and animal ranges have shifted, and trees are flowering sooner. Though climate change is expected to have global reach, the impacts differ by region. While the southwestern United States is expected to experience increased heat, wildfire, drought and insect outbreaks, the northeastern region is predicted to experience increases in heat waves, downpours and flooding. Accordingly, consideration of climate change was identified as a key guiding principle of the 2023 SHMP, addressed in each of the pertinent hazard profiles and incorporated into all relevant mitigation actions." 2023 SHMP

From 1962 to 2006, each five-year period resulted in 0–6 Major Disaster Declarations in Vermont. From 2007–2025, there have been 40. It is commonly accepted that weather extremes are becoming more commonplace in Vermont. Since 2011, record-setting snow, rain, and cold have been experienced in the state. In recent years, it has become evident that human activities, mostly associated with the combustion of fuel, have added to the natural concentration of greenhouse gases in the atmosphere and are contributing to rapid climate change on a global scale. While projections of the effects of climate change vary, it is generally predicted that Vermont will have warmer temperatures year-round—rising over 2°F by 2050—with wetter winters and drier summers. An increase in the size and frequency of storms is also predicted. Thus, climate change in the next century will likely increase the chance of weather-related hazards occurring. An increase in precipitation—nearly 6 inches annually since the 1960s, with an additional 15% rise in intensity projected by mid-century—may also result in increased flooding and fluvial erosion. Drier summers may increase the chance of drought and wildfire. A warmer climate may also result in the influx of diseases and pests that cold winters previously prevented. The severity of climate change is difficult to predict, though the effects may be mitigated somewhat if greenhouse gas emissions are reduced soon. In 2011, Governor Shumlin formed the Vermont Climate Cabinet. The Cabinet, chaired by the Secretary of Natural Resources, is a multidisciplinary approach to enhance collaboration between various state Agencies. Its primary objectives include providing the Governor with advisory information and facilitating climate change policy adoption and implementation. In 2013, the Vermont Agency of Natural Resources (ANR) released the Climate Change Adaptation Framework which addresses climate change exposures, vulnerability-specific elements within each of the natural resource sectors, and ongoing and proposed actions that can be or have been taken to prepare for the expected changes; this framework continues to inform ANR's resilience priorities, including post-2024 flood adaptations and municipal support tools. In line and in conjunction with the ANR report, the primary goal of a VTrans climate change adaptation policy is to minimize long-term societal and economic costs stemming from climate change impacts on transportation infrastructure, with ongoing updates integrated into the 2025 Climate Action Plan and Carbon Reduction Strategy.

In Charleston, these statewide trends are directly reflected in resident concerns documented in the 2025 community survey—particularly more intense flooding, unreliable cell service that delays emergency response, and the need for greater support for elderly and disabled residents during extreme weather events. The profiled hazards that follow—Flooding (including fluvial

erosion and severe storms), Severe Winter Storms (including ice storms and ice jams), Extreme Cold Events, Pandemic Planning, and Severe Drought—have therefore been evaluated and updated with climate projections, post-2024 flood lessons learned, and local vulnerabilities in mind.

Severe Winter Storm

Winter storms impact the entire planning area and can include snowstorm, cold, blizzard and ice. According to the 2023 Vermont State All-Hazards Mitigation Plan:

"Severe winter storms bring the threat of heavy accumulations of snow, cold/wind chills, strong winds, and power outages that result in high rates of damage and even higher rates of expenditures. A heavy accumulation of snow, especially when accompanied by high winds, causes drifting snow and very low visibility. Sidewalks, streets, and highways can become extremely hazardous to pedestrians and motorists. Severe winter storms develop through the combination of multiple meteorological factors. In Vermont and the northeastern United States, these factors include the moisture content of the air, direction of airflow, collision of warm air masses coming up from the Gulf Coast, and cold air moving southward from the Arctic. Significant accumulations of ice can cause hazardous conditions for travel, weigh down trees and power lines, and cause power outages. Freezing rain can also be combined with snowfall, hiding ice accumulation and further hindering travel, or with mixed precipitation and potentially ice jams or flooding.

Climate change is expected to alter the frequency and intensity of winter storms in Vermont. While total annual snowfall may decrease due to warmer temperatures, extreme snow events could become more intense in the short term, with increased variability leading to more frequent ice storms and mixed precipitation. Projections indicate a 15% increase in precipitation intensity by mid-century, exacerbating ice buildup and related hazards (Vermont Climate Assessment, 2021). These changes will heighten vulnerabilities to power outages and transportation disruptions, particularly for rural communities and aging populations reliant on reliable infrastructure."

Winter storm frequency and distribution vary from year to year depending on the climatological patterns but snowfall in the town is significantly higher than the national average.

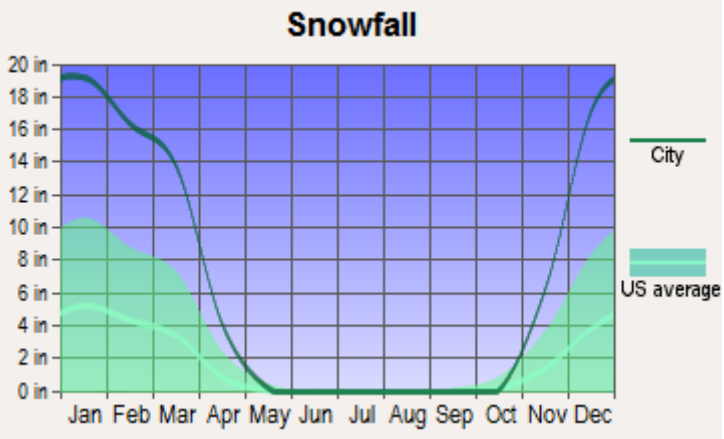
County-wide, the winter of 2010–2011 remains the third snowiest on record for Orleans County with a total of approximately 124 inches, behind the record of 145 inches set in 1970–1971 and 131 inches in 2007–2008. The potential for a major snowstorm that exceeds the capabilities of the town exists every year, but with the recent increase in snowfall totals, storm intensity, and durations of extreme cold, the town recognizes the need for enhanced consideration in mitigation planning. NOAA's National Centers for Environmental Information (NCEI) continues to produce the Regional Snowfall Index (RSI) for significant snowstorms impacting the eastern two-thirds of the U.S. The RSI ranks snowstorm impacts on a scale from 1 to 5 (similar to the Fujita scale for tornadoes or the Saffir-Simpson scale for hurricanes), factoring in snowfall amounts, areal extent, and population affected to quantify societal disruptions. NCEI has analyzed and assigned RSI values to over 600 storms dating back to 1900, providing a century-scale historical perspective useful for emergency managers, media, and the public. The RSI and Societal Impacts

section details regional RSI values, along with cumulative area and population affected above region-specific thresholds—for the Northeast, these are 4 inches, 10 inches, 20 inches, and 30 inches of snowfall. Notable storms in the Northeast region affecting Charleston include 2010, 2012, and 2015, with high RSI rankings based on severity. Since 2000, the Northeast has seen one Category 4 event (January 2016 winter storm Jonas, RSI 18.89), six Category 3 events (including the February 2021 nor'easter, RSI 11.23), ten "significant" (Category 2) storms (e.g., December 2020 nor'easter, RSI 6.89; January 2022 nor'easter, RSI 7.45), and numerous "notable" (Category 1) events through 2025. Recent winters (2020–2025) have featured four RSI-ranked storms impacting Vermont, including two Category 3 events in 2021 and 2022, underscoring the trend toward more frequent high-impact winter weather.

Table 2-3: NOAA's Regional Snowfall Index (RSI)

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

Table 2-4: Charleston Snowfall vs. U.S. Average



The Town has seen damage from declared snow disasters in the past, primarily dealing with debris removal from downed trees. In any Vermont community, this potential exists every winter. While there is no consistent long-term record of snowfall specifically for Charleston, nearby Newport City data continues to serve as a reliable proxy for the extent to which snow can impact the area. Recent notable events include the January 2019 nor'easter (28–32 inches across Orleans County) and the December 2020 storm that contributed to an RSI Category 2 ranking for the region.

Historic January snowfall totals in Newport remain led by 1987 (47.5 inches), followed by 1978 and 1979 (46.5 inches and 45.8 inches). Average monthly snowfall (1981–2010 normals, updated in NOAA/NCEI) is approximately December 26.2 inches, January 22.6 inches, February 16.9 inches, and March 18.3 inches. The greatest 24-hour maximum remains February 14–15, 2007 with 23.5 inches. From 2011 to 2025, Orleans County recorded at least seven additional significant winter weather events in the NOAA Storm Events Database, including multiple heavy snow and ice storm episodes in 2015, 2019, 2021, 2022, and 2024.

Specific past events affecting Charleston include:

- February 5, 2001 – a winter storm with 10–14 inches across Orleans County caused barn roof collapses in neighboring towns and minor damage in Charleston.
- March 5–7, 2001 (EM-3167) – a declared snow emergency brought 12–30 inches region-wide; Charleston received FEMA Public Assistance funds for debris removal and emergency protective measures, with approximately $75,000 in documented regional property damage.

There are no standard loss estimation models or methodologies for winter storm hazards. Potential losses from winter storms are, in most cases, indirect (power outages, transportation disruptions, roof collapses, and health impacts on vulnerable residents) and therefore difficult to quantify precisely. The 2023 Vermont State Hazard Mitigation Plan notes that, while total seasonal snowfall is projected to decrease over the coming decades due to warming temperatures, short-term variability will continue to produce intense individual storms and ice events, with precipitation intensity increasing and more winter precipitation falling as rain rather than snow. This shift heightens risks of ice jams, flash flooding during mid-winter thaws, and prolonged power outages—concerns echoed in Charleston's 2025 resident survey regarding communications gaps and support for elderly/disabled households during extended outages.

Ice Storm

Major Ice Storms occurred in January 1998 and again in December 2014. While both Morgan and Brownington received heavy damage to forest stands, Charleston did not record any significant damage in the 1998 event. Known as the North American Ice Storm of 1998, a series of surface low pressure systems passed in this atmospheric circulation between January 5 and January 10, 1998. For more than 80 hours, steady freezing rain and drizzle fell over an area of several thousand square miles of the Northeast, causing ice accumulation upwards of 2'' in some areas. Charleston and the surrounding area received .5 to 1 inch of ice. The ice storm that hit Vermont on Thursday, January 8, 1998 was one of the worst weather calamities in Vermont history. It took Green Mountain Power seven days, one hour, and 29 minutes to restore power to all its customers. The power company supplying Charleston during the 1998 Storm is no longer operating and the Vermont Electric Cooperative has been supplying the town for about 15 years. With a generator grant application in 2014, the town captured a recent history of outages with the greatest duration lasting four days but not due to an ice event. While there is evidence that supports an increase in weather and precipitation severity, the incidence of ice storms remains fairly spaced out. The town expects to have another ice storm but unlike rain and snow events, the occurrence of a major ice storm is not expected every year. There has

been no major ice event in northern Vermont since the last approved plan, though a significant statewide ice storm on March 30–31, 2025 impacted central and southern counties with up to 0.75 inches of ice accumulation, causing widespread power outages for over 14,000 customers and tree damage; Orleans County, including Charleston, experienced only minor sleet and freezing drizzle with no reported significant impacts (www.weather.gov/btv).

Extreme Cold

"Extreme cold temperatures can have significant effects on human health and commercial and agricultural businesses, as well as primary and secondary effects on infrastructure (e.g., burst pipes from ice expansion and power failure). What constitutes 'extreme cold' can vary across different areas of the country based on what the population is accustomed to in their respective climates. Exposure to cold temperatures can cause frostbite or hypothermia and even lead to heart attacks during physically demanding outdoor activities like snow shoveling or winter hiking. When temperatures dip below freezing, incidents of icy conditions increase, which can lead to dangerous driving conditions and pedestrian-related slipping hazards. A large area of low pressure and cold air surrounding the poles, known as a polar vortex, is strengthened in the winter. When these polar vortex winds are distorted, due to cyclical strengthening and weakening or interaction with high-amplitude jet stream patterns, they have the potential to split into two or more patterns, allowing Arctic air to flow southward along a jet stream. As this Arctic air is able to access more southerly regions, extreme cold conditions can be observed in Vermont, which also have the potential to remain over the region for extended periods.

Climate change is altering the frequency and intensity of extreme cold events in Vermont. While overall winter temperatures are projected to rise by 2–6°F by mid-century, leading to fewer prolonged cold snaps, the polar vortex disruptions may become more erratic, resulting in occasional intense outbreaks of Arctic air with rapid onset and higher wind chills. These events will compound vulnerabilities for aging populations, rural communities with limited heating access, and infrastructure like highways and power grids, as noted in the 2021 Vermont Climate Assessment. Increased precipitation intensity (up to 15% by 2050) during cold periods could also exacerbate ice formation on roads and utilities, heightening slip-and-fall risks and outage durations (2023 SHMP, Section 4-8)."

While there is no historical evidence to support a concern over the consequences of extremely hot temperatures on human health and safety in Charleston, high temperatures can contribute to severe storms, as evidenced by the September 11, 2013, event where record heat fueled damaging hail and winds across the NEK and parts of Vermont and New York. Recent heat waves, such as the June 23–24, 2025, outbreak with highs exceeding 90°F statewide and dew points in the upper 70s°F, have similarly increased thunderstorm risks, though direct health impacts remain limited due to the region's cooler climate and low population density (NWS Burlington, 2025). Recent extremes in cold temperatures remain a concern and impact the entire planning area and region. The winter of 2015 (January–March) tied the coldest on record (1923) for Vermont, with a mean temperature of 7.8°F, according to NOAA's National Centers for Environmental Information (NCEI) dataset dating to 1895. The National Weather Service maintains the following recent temperature records for nearby Newport City:

- Highest: 95°F, August 2001

- Lowest: -38°F, February 1933

Cold temperatures are expected in the Northeast, but they can pose a serious threat to health and safety, especially as the severity and duration increases in conjunction with other technological (e.g., power outages, fuel oil delivery disruptions) and societal (ability to purchase heating fuel) factors. January 1994 had the coldest mean temperature on record since 1930 at 2.7°F, and January remains the statistically coldest month in all of Vermont. Since 1930, January has produced temperatures in the negative 20s and 30s consistently for Orleans County, with record cold temperatures occurring in 1957 and 1933 (-38°F). While temperatures for the town remain within averages seen in the last 90 years, and the intensity of extreme winter cold is projected to decrease overall due to a 3°F rise in average temperatures since 1900 (NOAA NCEI State Climate Summary, 2021), dangerously cold temperatures—compounded by recent events like the February 2021 nor'easter (RSI Category 3) and January 2022 cold snap—are expected every winter, with survey-noted vulnerabilities for elderly and disabled residents during outages.2.6sFast

The NOAA Wind Chill Chart identifies those temperatures and associated wind speeds that may cause frostbite if skin is exposed to the air over a certain period of time:

Table 2-5: NOAA Wind Chill Chart

Temperature (°F)

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

Frostbite Times: 30 minutes | 10 minutes | 5 minutes

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

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

In anticipation of extreme cold temperatures, the National Weather Service may issue watches, warnings or advisories, which are aimed at informing the general public as well as the agricultural industry. While the NOAA wind chill chart remains relevant and actively in use as of 2025 for calculating apparent temperature and assessing frostbite risk from combined wind and cold, the NWS has updated its cold weather alerts for extreme cold temperatures.

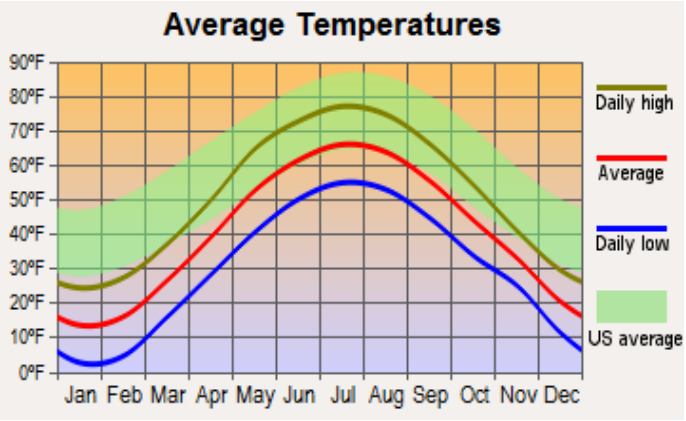
As of October 1, 2024, the National Weather Service (NWS) implemented a nationwide Hazard Simplification initiative to consolidate and streamline cold weather products for better public communication. This change retires separate Wind Chill Warnings, Watches, and Advisories, replacing them with broader Cold Weather Advisories, Extreme Cold Watches, and Extreme Cold Warnings. These new products use wind chill values internally for thresholds but emphasize that "cold is cold" regardless of wind, addressing misconceptions. Freeze-related products (for agricultural and plant impacts) remain unchanged. The updated alerts, aimed at

informing the general public as well as the agricultural industry, are as follows (criteria may vary slightly by NWS office/location, e.g., Northeast thresholds like -20°F for advisories):

- **Extreme Cold Warning**: Dangerously cold wind chill values or temperatures (typically -20°F or lower in the Northeast) are expected or occurring, posing high risk of frostbite or hypothermia within minutes; take immediate action to limit outdoor exposure.
- **Extreme Cold Watch**: Dangerously cold wind chill values or temperatures (typically -20°F or lower) are possible within the next 24–36 hours; prepare by checking heating systems and emergency supplies.
- **Cold Weather Advisory**: Seasonably or moderately cold wind chill values or temperatures (typically -10°F to -19°F in the Northeast) are expected or occurring, creating hazardous conditions but not at extreme levels; dress in layers and limit time outdoors.
- **Hard Freeze Warning**: Temperatures are expected to drop below 28°F for an extended period of time (several hours), killing most types of commercial crops and residential plants; protect sensitive vegetation.
- **Freeze Warning**: Temperatures are forecasted to go below 32°F for a long period of time (several hours), killing some types of commercial crops and residential plants; cover or bring in tender plants.
- **Freeze Watch**: Potential for significant, widespread freezing temperatures (below 32°F) within the next 24–36 hours; monitor forecasts and prepare protective measures.

These updates align with NWS priorities for clearer messaging, especially for vulnerable populations like the elderly and those without reliable heating. For Charleston, VT (Northeast region), thresholds are generally set at wind chill ≤ -20°F for Extreme Cold products and ≤ -10°F for Cold Weather Advisories, per NWS Burlington criteria. Always check local NWS forecasts for precise details.

Table 2-6: Charleston Temperature Ranges vs. National Average



Flooding

There are three main types of flooding that occur in Vermont: flooding from rain or snow melt, flash flooding and urban flooding. Flooding has also been known to occur as a result of ice jams in rivers adjoining developed towns and cities. These events may result in widespread damage in major river floodplains or localized flash flooding caused by unusually large rainstorms over a small area.

The effects of all types of events can be worsened by ice or debris dams and the failure of infrastructure (especially culverts), private and/or beaver dams. Rain storms are the cause of most flooding in town. Winter and spring thaws, occasionally exacerbated by ice jams, are another significant source of flooding, especially when coupled with high rain levels. Much of this flooding is flash flooding, occurring within hours of a rainstorm or other event. Flash flooding, as opposed to flooding with a gradual onset, causes the largest amount of damage to property and infrastructure. Floods cause two major types of damage: water damage from inundation and erosion damage to property and infrastructure. The 2023 Vermont State All-Hazards Mitigation Plan discusses flooding extensively:

"Flooding is the most common recurring hazard event in Vermont. In recent years, flood intensity and severity appear to be increasing, as evidenced by the catastrophic events of July 2023 and July 2024, which caused over $1.2 billion in statewide damages and highlighted vulnerabilities in river corridors and undersized infrastructure. Flood damages are associated with inundation flooding and fluvial erosion. Data indicate that greater than 75% of flood damages in Vermont, measured in dollars, are associated with fluvial erosion, not inundation. These events may result in widespread damage in major rivers' floodplains or localized flash flooding caused by unusually large rainstorms over a small area. The effects of both inundation flooding and fluvial erosion can be exacerbated by ice or debris dams, the failure of infrastructure (often as a result of undersized culverts), the failure of dams, continued encroachments in floodplains and river corridors, and the stream channelization required to protect those encroachments. Climate change projections, including a 15% increase in precipitation intensity by mid-century, will further amplify these risks, underscoring the need for nature-based solutions and resilient land use planning (2023 SHMP, Section 4-1: Inundation Flooding & Fluvial Erosion)."

Vermont experienced major floods long before Federal disaster assistance became available. But in November of 1927, Vermont experienced catastrophic flooding. In the month before the flood, rains more than 150% of normal precipitation fell after the ground had frozen. The flood itself was precipitated by 10 inches of rain falling over the course of a few days. The flood inundated parts of many towns and damaged or destroyed numerous bridges in the county. As the history of the flooding cited above bears out, the geography and topography are right for a significant localized storm with extreme damage at almost any location in Vermont. Numerous floods have resulted in Presidentially declared disasters and an influx of federal disaster assistance. Of these disasters, the 1973 flood inflicted the most widespread damage, and the residual rains of Hurricane Belle in 1976 resulted in the second highest amount of federal disaster assistance in Vermont.

Widespread, steady rainfall from frontal systems, tropical cyclones, or "northeasters" can result in flooding of large areas. Extensive and disastrous floods are rare but can result from intense

spring rains combined with warm, humid winds that rapidly release water from the snowpack. Such was true for the devastating flood of March 11-12, 1936. During this flood, total rainfall and snowmelt ranged from 10 to 16 inches over the southeastern one-half of the State. Rainfall alone can cause disastrous flooding like that in November 1927. During that flood, rainfall totals of 5-9 inches were common, and much more occurred at higher altitudes. Intense rainfall caused extensive flooding on September 21, 1938, when the "great hurricane" reached landfall in the southern area of the State. Severe thundershowers more commonly cause localized street and cellar flooding.

The Clyde River and associated brooks did rise during both the May, 2011 storms (which is the time for record high levels for Lake Champlain at 103.27 feet on May 6th, 2011) and due to the extent of these storms, the town is confident that Irene produced the greatest rise and discharge rates in the river in recent history. The discharge rate for the Clyde River during Irene was close to 1200 cubic feet per second compared to the average for that time of year at 100 cubic feet per second. While the data is for the portion of the Clyde River at Newport, it does indicate the magnitude of water resulting from the rains Irene produced. June 2015 broke records across the state for the wettest on record. Montpelier had the wettest June on record with 9.05 inches of precipitation, beating the old record of 8.36 inches set in 2013, according the National Weather Service. Mount Mansfield also had record rain with 15.54 inches, topping the 15.28 inches that fell in 1998. During May of 2011, Charleston saw 7’’ of rain which is the most the town has seen in many years. Recent history, including the flooding events of 2011 and the records set in 2015 suggest that increases in total rainfall and severity in terms of rainfall per given unit of time are to be expected along the lines seen with the records seen across the state recently.

Recent history has intensified these trends, with Vermont enduring catastrophic 'anniversary floods' on July 10 in 2023, 2024, and 2025—each dumping 3–9 inches across the NEK and Orleans County, causing Clyde River peaks of 1,200–1,500 cfs (cubic feet per second) and over $1.8 billion in cumulative statewide damages (FEMA DR-4720, DR-4816). The 2023 event alone inflicted $100 million in NEK fluvial erosion and road washouts, including impacts to Charleston's Town Highways, while 2024 and 2025 repeats stranded area residents. These recurring events, amplified by climate-driven precipitation intensity (up 21% since 1900 per 2023 SHMP), affirm the geography's vulnerability to localized extremes and the urgency of adaptive measures like culvert upgrades and mutual aid.

Tropical cyclones (storms) are officially ranked on one of five tropical cyclone scales, according to their maximum sustained winds and which tropical cyclone basin are located. Only a few scales of classifications are used officially by the meteorological agencies monitoring the tropical cyclones, but some alternative scales also exist, such as Accumulated cyclone energy, the Power Dissipation Index, the Integrated Kinetic Energy Index, and Hurricane Severity Index. Of most recent importance for Vermont was Tropical Storm Irene in 2011. Irene first struck the U.S. as a Category 1 hurricane in eastern North Carolina, then moved northward along the Mid-Atlantic Coast. Wind damage in coastal North Carolina, Virginia, and Maryland was moderate, with considerable damage resulting from falling trees and power lines. Irene made its final landfall as a tropical storm in the New York City area and dropped torrential rainfall in the Northeast that caused widespread flooding. Irene resulted in the worst Vermont flooding in 83 years but

Charleston, along with much of the surrounding towns were not of the hardest hit. During Irene (August 20th-29th, 2011) Charleston received 3'' of rain (NOAA). By comparison, the following chart shows the three highest recorded rain and wind events for Vermont towns during Irene.

Tropical Storm Irene Rain and Wind Extremes	
Rainfall	Wind
Mendon, 11.23 inches	Burlington, 51 mph
Walden, 7.60 inches	Morrisville, 40 mph
Randolph Center, 7.15 inches	Springfield, 40 mph

Source: http://www.accuweather.com/en/weather-news/irenes-infamous-top-ten-1/54348

The state road to Island Pond from East Charleston (VT105) was closed due to damage from Tropical Storm Irene. While not classified as a Tropical Storm, the April 2011 rain totals for the NEK reached nearly 7'' compared to the normal precipitation for the month at 3''. The heaviest rainfall event was associated with thunderstorms during the late afternoon of April 26th into the early morning hours of April 27th, 2011. These storms resulted in record and near record rainfall and flooding across portions of northern Vermont. Specific records for the town of Charleston regarding rainfall totals were not available but in using nearby Newport City (where the 7'' of rain was recorded), the town feels that this event can be used as a benchmark regarding extent.

Table 2-5: 2011 "Irene" Discharge Rates for Clyde River

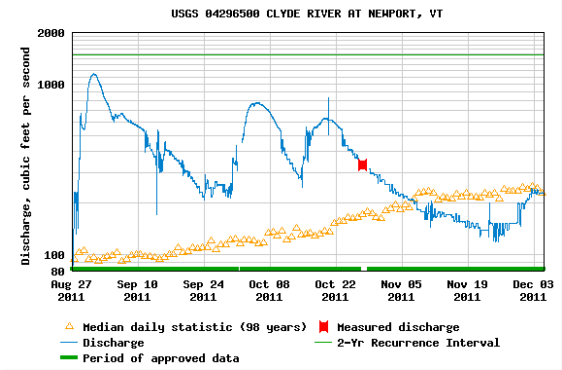
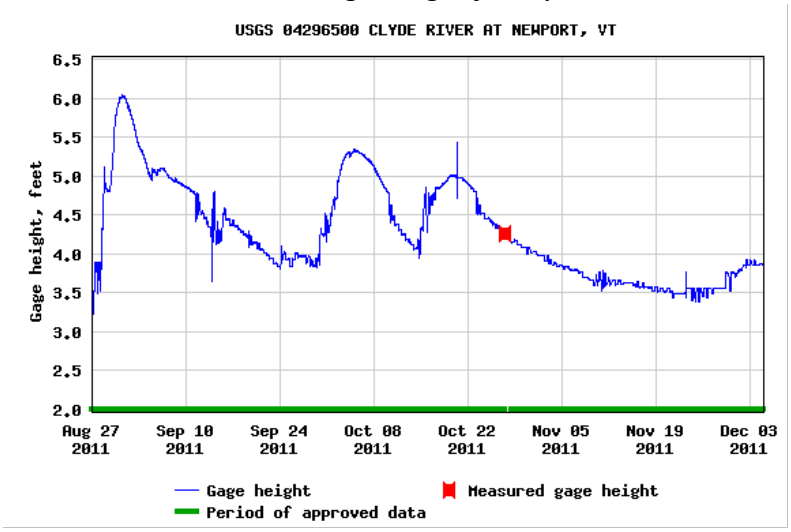
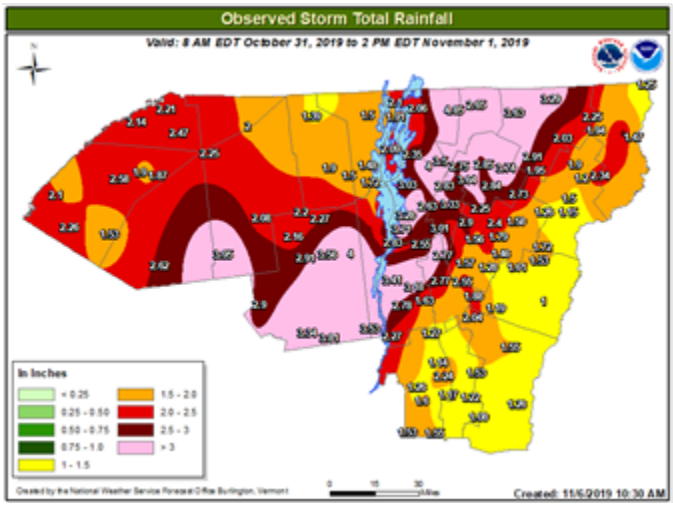


Table 2-6: 2011 "Irene" Gage Height for Clyde River



The "Halloween" storm of 2019 (DR-4474) proved to be a most damaging flood event for many areas of the County in recent memory. While later events in 2023 and 2024 surpassed it in scale (see below), this powerful storm system tracked across the eastern Great Lakes late on October 31st, 2019 and produced an axis of 3 to 5 inches of rain, which caused significant flooding across our region. Record rainfall occurred at Burlington, Vermont with 3.30 inches on October 31st, along with a record high temperature of 71 degrees. In addition, very gusty southwest winds developed behind this potent storm, which generated scattered to widespread power outages. Surface wind gusts measured up to 65 mph across northern New York and parts of Vermont, with gusts over 100 mph at the summits. The heavy rainfall washed out numerous roads and culverts from Essex County, New York into parts of central and northern Vermont, while 10 rivers reached flood stage with 8 reaching moderate to major levels. A new record high level of 14.72 feet was attained at North Troy on the Missisquoi River. Extensive flooding was observed in the following river basins: Missisquoi, Lamoille, Winooski, and Ausable, while flash flooding with very sharp rises of smaller streams and rivers occurred across the higher terrain of the eastern Adirondacks into central and northern Green Mountains of Vermont, including the Champlain Valley. Observed total rainfall recordings were 5.26 inches in East Berkshire, 4.85 inches in Enosburg Falls, 4.80 in Fletcher, 4.32 Westford, and 4.0 inches in Elizabethtown, New York. Table 2-7 below shows the storm total precipitation from 31 October at 8 AM to 1 November 2019 at 2 PM.

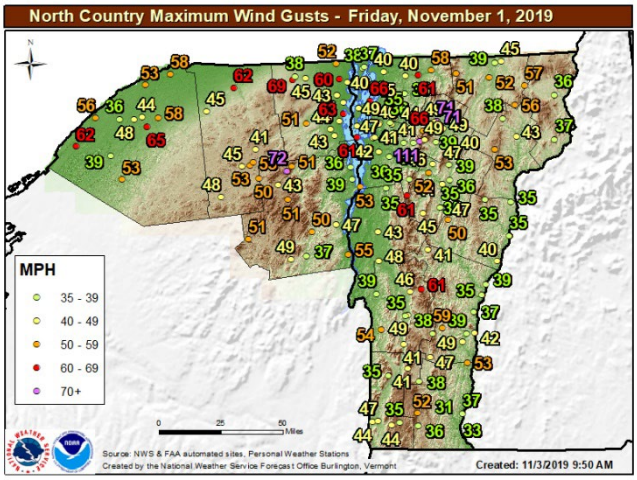
Table 2-7: Observed storm total rainfall from 8 AM EDT on 31 October to 2 PM EDT on 1 November 2019



The second significant impact from this powerful storm was the high winds, which caused scattered to widespread power outages across northern New York into Vermont. The core of the strongest winds occurred early morning on November 1st across New York and spread into Vermont during the daytime hours. At the peak, over 120,000 customers were without power across the region. Given how saturated the soils were from the recent heavy rainfall, shallow rooted trees were easily uprooted, exacerbating power outages. A few peak wind gusts included 69 mph at Ellenburg, 65 mph in Potsdam and 62 mph in Malone, New York, while a gust to 71 mph was measured in Johnson, 66 mph at Burton Island and 111 mph at Mount Mansfield in Vermont. Figure 2 below shows a map of observed peak wind gusts across the North County on 1 November 2019. Charleston did sustain wind damage that was addressed by electric and telephone service providers.

Subsequent floods in 2023 (DR-4720) and 2024 (DR-4816/DR-4810) have since eclipsed the 2019 event as the most damaging in the region, with cumulative statewide damages exceeding $1.5 billion—far surpassing the ~$3 million initial estimate for 2019 public infrastructure alone. The July 10–11, 2023, "Great Flood" brought 4–6 inches to Orleans County, peaking the Clyde River at ~1,500 cfs (higher than Irene's 1,200 cfs) and causing $100+ million in NEK damages, including washouts on Charleston's Town Highways that required FEMA PA funding for repairs. Anecdotes from area residents described it as "worse than Irene," with 150+ swift-water rescues and days-long road closures stranding vulnerable households. The 2024 repeat (July 9–11, DR-4810) added 4–7 inches, ~1,400 cfs peaks, and $500+ million statewide, focusing on fluvial erosion (75% of costs per SHMP) in rural areas; Charleston received $472,557.91 in FEMA assistance with no structure loss but repairs needed to highways and bridges, including replaced and/or upsized culverts townwide. These "anniversary" events, amplified by 21% higher precipitation since 1900 (2023 SHMP), affirm increasing flood risks and the need for culvert upgrades and resilient communications.

Table 2-8: Maximum Wind Gust Map for 11/1/2020



Inundation and Floodplains

The land area where inundation flooding occurs is known as the floodplain. During high water events, water flows out of the riverbank and spreads out across its floodplain. FEMA defines the portion of the floodplain inundated by the 1% annual chance flood as the Special Flood Hazard Area (SFHA); the area where the National Flood Insurance Program (NFIP) floodplain management regulations must be enforced and where the mandatory purchase of flood insurance applies for federally-secured loans.

Inundation flooding on larger rivers and streams typically occurs slowly, over an extended period of time but can spread out over a large area of land. Due to the slower onset of inundation flooding on larger rivers, there is time for emergency management planning (e.g. evacuations, electricity shut-off considerations, etc.) to take place. Though the inundation floodwaters are slower to hit, they often take time to recede as well, and exposure to water for an extended period of time can result in significant property damage. U.S. Geological Survey's (USGS) National Water Information System monitors real-time streamflow gaging stations in Vermont.

Inundation and fluvial erosion may both increase in rate and intensity as a result of human alterations to a river, floodplain, or watershed. For instance, when a dam fails there may be significant, rapid inundation which can occur without warning. Public and private structures and infrastructure become vulnerable when they are located on lands susceptible to inundation and fluvial erosion. The 2023 Vermont State Hazard Mitigation Plan contains the following on inundation:

"Recent studies have shown that most flooding in Vermont occurs in upland streams and road drainage systems that fail to handle the amount of water they receive. Due to steep gradients, flooding may inundate these areas severely, but only briefly. Flooding in these areas generally has enough force to cause erosion capable of destroying roads and collapsing buildings. These areas are often not mapped as being flood prone and property owners in these areas typically do not have flood insurance. Furthermore, precipitation trend analysis suggests that intense

local storms are occurring more frequently, with annual precipitation increasing by 21% since 1900 and heavy rain events intensifying by 2% per decade (Vermont Climate Assessment, 2021). Additionally, irresponsible land use and development will exacerbate the preexisting vulnerability. Urban flooding usually occurs when drainage systems are overwhelmed and damages homes and businesses. This flooding happens in all urban areas, but specifically in Burlington where the area is located at the bottom of a gradient, which adds to the intensity of this localized flooding…

…Over the past two decades, flood damage costs have risen dramatically in Vermont due to increasing occurrences of flooding and increases in vulnerability associated with unwise land use development in floodplains or within stream corridors, as evidenced by over $2 billion in damages from the 2023 and 2024 floods alone. The geography and topography are right for a significant localized storm with extreme damage at almost any location in Vermont. Heavy rains with previous ground saturation, which causes runoff, are a significant part of the flooding formula in Vermont. Steep topography and narrow, inhabited, stream and river valleys further increase the dangerous nature of this hazard. Furthermore, precipitation trend analysis suggests that intense, localized storms that can cause flash flooding are occurring with greater frequency, projected to increase by an additional 15% in precipitation intensity by mid-century. While flooding will continue, planning and other mitigation measures—such as nature-based solutions and updated floodplain mapping—can help minimize damages.

All of Vermont's major rivers have inhabited floodplains. While residents in mountain valleys are at risk, they may not be aware of the danger or may choose to ignore it. There are many reasons property owners are reluctant to relocate to less flood-prone ground, not the least of which is the lack of personal experience of flooding. In addition, many communities originated beside rivers and streams, some of the most attractive property is located in vulnerable areas. Lakeshore property in Vermont is vulnerable to flooding from high water levels, either by surface water erosion or flooding. Occasionally, water-saturated ground and high-water tables cause flooding to basements and other low-lying areas. Lakeshore property is highly desirable and valuable, making the development of lakeshore areas very likely, even with the high potential for flooding. Restrictions on lakeshore property development have significant negative economic and tax revenue impacts that must be carefully weighed against the gains in personal safety and protection of property (2023 SHMP, Section 4-1: Inundation Flooding)."

All of the planning area has the potential to be affected by flooding. Although the town experienced relatively limited damage during Tropical Storm Irene in 2011, Charleston has not remained insulated from flood impacts in recent years. The catastrophic July 2023 (DR-4720) and July 2024 (DR-4810/DR-4816) floods caused road washouts, culvert failures, and fluvial erosion along the Clyde River and tributaries, requiring FEMA Public Assistance for emergency repairs and highlighting vulnerabilities noted in the 2025 resident survey (e.g., highway access disruptions and communication gaps for vulnerable residents).

FEMA's current Flood Hazard Boundary Map of Charleston, published in 1974, delineates areas of concern along the Clyde River, Mad Brook, Pensioner Pond, Toad Pond, and Echo Lake. These maps are now over 50 years old and are currently under revision through FEMA's Risk MAP program. During this multi-year update process, the Northeastern Vermont Development

Association (NVDA) has provided the Town with provisional river corridor and updated floodplain maps to better reflect current conditions and climate-adjusted risks. There is limited development in mapped flood hazard areas, including a few residences and hay barns. There are no repetitive loss structures in the Town. Portions of Mad Brook continue to show fluvial erosion potential, with minor increases observed since the 2023 and 2024 events. With very little floodplain development in Charleston, the greatest danger during flood events remains to Town highway infrastructure. All 41 culverts on Hudson Road and Twin Bridge Road are located within mapped floodplains.

During 2017–2018, the Town completed two FEMA 404 Hazard Mitigation Grant Program projects on highways that had seen repeated washout and closure during Tropical Storm Irene and other storms. The first replaced double culverts with a precast box culvert and natural stream bed over Mad Brook on Cole Road, a town-to-town connector. The second rebuilt the road surface and upgraded the ditch and culvert network on Hudson Road, a Class 2 highway and major state highway connector adjacent to the Clyde River floodplain. Both projects prevent or reduce damages from future disasters, lower long-term highway repair costs, and mitigate stormwater and pollutant discharge into the watershed. These projects were made possible because the Town adopted a Local Hazard Mitigation Plan in 2016.

Following the 2023 (DR-4720) and 2024 (DR-4810/DR-4816) floods, the Town received FEMA Public Assistance (PA) funding totaling $472,557.91 under DR-4810, with no major structure loss but extensive repairs needed to highways, bridges, and culverts. These PA-funded repairs incorporated mitigation measures to prevent future damage, including the upsizing of numerous culverts throughout town to better handle increased flow and reduce erosion risks, as well as stabilization of steep Hinton Hill Road with sta-mat surfacing to improve drainage and prevent washouts. As well, the Better Roads Program continues to provide grants and technical assistance to help the Town avoid erosion and flash floods resulting from road design and construction (2019 Town Plan, as referenced in 2026 Town Plan update).

Fluvial Erosion

Erosion occurs on a consistent, but small-scale, basis within the riparian corridor of the town's streams and rivers. This is a part of normal natural processes and as such is necessary for the proper functioning of the ecosystem of these waterways. However, fluvial erosion on a large scale can damage stream banks and undercut infrastructure such as roads, bridges and culverts as well as agricultural land and structures, causing severe damage. Most flood damage is associated with fluvial erosion rather than inundation. The 2023 Vermont State Hazard Mitigation Plan contains the following on fluvial erosion:

"In Vermont, most flood-related damage is due to fluvial erosion. Erosion occurs when the power of the flood (i.e., the depth and slope of the flow) exceeds the natural resistance of the river's bed and banks. Rivers that have been overly straightened or deepened may become highly erosive during floods, especially when the banks lack woody vegetation, or when the coarser river bed sediments have been removed. In areas where rivers are confined due to human activity and development, they have become steeper, straighter, and disconnected from their floodplains. The more trapped the river is, the greater power it will gain, which eventually

results in a greater degree of damage to critical public infrastructure such as roads and stream crossings, as well as homes, businesses, community buildings, and other man-made structures built near rivers. Fluvial erosion is also increased downstream when all the eroded materials (i.e., sediment and debris) come to rest in a lower gradient reach, clog the channel, and cause the river to flow outside its banks. When severe enough, fluvial erosion can also be the cause of landslides (see: Landslides). The land area that a river accesses to meander and overtop its banks to release flood energy without excessive erosion is known as the River Corridor. A river corridor includes the meander belt of a stream or river and a buffer of 50'. The River Corridor, as defined in Vermont statute, is: the land area adjacent to a river that is required to accommodate the dimensions, slope, planform, and buffer of the naturally stable channel and that is necessary for the natural maintenance or natural restoration of a dynamic equilibrium condition, as that term is defined in section 1422 of this title, and for minimization of fluvial erosion hazards, as delineated by the Agency of Natural Resources in accordance with river corridor protection procedures (2023 SHMP, Section 4-1: Inundation Flooding & Fluvial Erosion)."

Vermont's River Corridor maps delineate river corridors for larger streams and rivers, and standard setbacks for smaller, upland streams. The setbacks were determined by factoring in the same stable stream slope requirements used when delineating a river corridor using a meander centerline setback. These maps are located on the FloodReady Vermont and Vermont Natural Resources Atlas websites in addition to recent NVDA work for mapping river corridors for towns in the NEK.

The Vermont Agency of Transportation (VTrans) applies the term "scour critical" to stream crossing structures especially vulnerable to streambed scour—the undermining of bridge supports by water action and erosion. A spreadsheet database is maintained by VTrans and continually updated by the Bridge Inspection Program. Structures inspected are only those of 20 feet or longer owned by a municipality or the state. The scour critical rating is based on the structure itself, and does not consider debris jams, outflanking, channel change, or other issues commonly associated with fluvial erosion. However, since 2023, VTrans has begun integrating DEC river corridor data into inspections to better account for climate-amplified erosion risks (2023 SHMP). Water supply source and distribution systems are also endangered by fluvial erosion. Many water distribution systems involve buried pipes that cross streams, which are vulnerable to fluvial erosion.

The 2023 and 2024 floods (DR-4720/4810) highlighted these risks statewide, with recommendations for geomorphic assessments of high-risk crossings (2023 SHMP). In December 2014, the Vermont Department of Environmental Conservation (DEC) released the "Flood Hazard Area and River Corridor Protection Procedures" guide, outlining specific actions and considerations. The underlying Rule was amended in 2021 to strengthen "no adverse impact" standards, including compensatory storage in flood fringes. Erosion of stream banks was a concern but is less-so now. A FEMA study has shown limited but increasing increase in velocities resulting from over-bank events which are more frequent and have subsequently caused minor channel migration in NEK streams like the Clyde River (USGS SIR 2025-5016).

Charleston remains committed to enhancing awareness and incorporating recommendations in future planning and mitigation work. The Clyde River Stream Geomorphic Assessment is part of

an ongoing partnership between the NorthWoods Stewardship Center and the State of Vermont to identify sources of nonpoint source pollution in the four main Vermont tributaries draining into Lake Memphremagog, a lake receiving high nutrient and sediment loads. Located in northeastern Vermont, the Clyde River Watershed encompasses 144 square miles of land noted for its remoteness and wildness. Although recognized for their natural beauty, relatively intact wetlands, and abundant recreational and fishing opportunities, the Clyde River, its tributaries, and associated lakes also face a number of water quality threats resulting from a variety of sources within the watershed. While it is important to address these threats, it is equally important to identify and prevent degradation of areas with excellent water quality. In streams, water quality is influenced by inputs from the watershed as well as the health of the stream itself.

Assessments on 83 miles of the Clyde River and its tributaries were completed; from these, 17.5 miles were chosen for more detailed Phase 2 Stream Geomorphic Assessments. The results of these assessments indicate that many streams in the Clyde River Watershed are in good or reference condition. However, there are areas in the watershed which have lost their protective riparian buffers, are receiving inputs of sediment and nutrients from urban and agricultural development and are eroding and sending nutrients downstream. The Phase 2 reaches most profoundly affected by these stressors were rated in fair or poor condition and totaled 1.6 stream-miles. The Phase 2 assessments highlighted several potential stream restoration sites, including reaches in Newport (reach M01), West Charleston (reach M08), East Charleston (reaches M15, M16 and an unnamed tributary to M15), and the lower reach of Cold Brook in Brighton (reach T4.01). These reaches contain areas of actively eroding streambanks and significant areas without riparian buffers. These reaches would benefit from buffer enhancement projects such as tree or shrub plantings. Dropping only 40 feet in elevation from its beginning at Island Pond (Reach M21) to Pensioner Pond (Reach M12), the Clyde River is a slow, low gradient river snaking its way through broad valleys, vast wetlands, and floodplain forests. The river receives inputs from numerous cold-water mountain tributaries during this 11.8 mile (16.5 river miles) stretch, most notably the Pherrins River (Reach T6), Oswegatchie Brook (T5), Cold Brook (T4), Webster Brook (not assessed), Mad Brook (T2), and outflows from Seymour and Echo Lakes (T1). Below Pensioner Pond and the Great Falls Dam above West Charleston, the river changes dramatically, cascading over several bedrock ledges before entering Charleston Pond. Below Charleston Dam, the Clyde becomes a whitewater river, encountering more small bedrock ledges, flowing over cobble and boulder stream beds, and finally leveling off downstream of West Charleston village. The river elevation drops 140 feet from Pensioner Pond (Reach M12) to West Charleston (Reach M09), a distance of only 0.68 river miles, excluding the pond lengths. After West Charleston village, the Clyde River transitions again to a low-gradient river, meandering through fields and forests before entering Little Salem Pond and Lake Salem (Reach M06). The river elevation drops 40 feet in these 1.7 miles (2.3 river miles). After exiting these lakes, the Clyde again changes to a fast-flowing and high-gradient river, traveling through a confined valley within the town of Derby and dropping 80 feet in 3.6 miles (3.9 river miles) between Lake Salem and Clyde Pond (Reach M03). Upon leaving Clyde Pond, the river passes over the Clyde Pond Hydroelectric Dam and becomes a fast and cascading stream, dropping 190 feet in only 1.1 miles before leveling off in Newport and

entering Lake Memphremagog. The Clyde River flows through five lakes along its course. Its flows are affected by three man-made grade controls: Great Falls Dam below Pensioner Pond, Charleston Dam at Charleston Pond, and the Clyde Pond Dam in Newport. Salem Lake and Little Salem Pond are undammed, but all of these ponds and lakes capture sediment originating from upstream sources. Based on the intensity of channel and floodplain modifications, as well as the overall stream condition observed during the field assessments, reaches conditions were defined as reference, good, fair, and poor. Vermont ANR Stream Geomorphic Assessment Protocols describe these conditions below (State of Vermont 2007b):

In Regime: A stream reach in reference and good condition that is in dynamic equilibrium which may involve localized, insignificant to minimal change to its shape or location while maintaining the fluvial processes and functions of its watershed over time and within the range of natural variability.

In Adjustment: A stream reach in fair condition that has experienced major change in channel form and fluvial processes outside the expected range of natural variability; and may be poised for additional adjustment with future flooding or changes in watershed inputs that could change the stream type.

Active Adjustment and Stream Type Departure: A stream reach in poor condition that is experiencing extreme adjustment outside the expected range of natural variability for the reference stream type; likely exhibiting a new stream type; and is expected to continue to adjust, either evolving back to the historic reference stream type or to a new stream type consistent with watershed inputs and boundary conditions. There are five stages in channel evolution. Streams in stable condition that are not out of balance due to in-stream or upstream stressors are in Stage I. These streams are in good to reference condition and have the ability to regularly flood in order to disperse sediment and energy. Reaches in fair or poor condition are currently evolving to regain balance; these streams will be in various stages of channel evolution. Streams in Stage II have eroded their beds and may have lost the ability to access their floodplains. These reaches have increased power, increased ability to erode, and decreased ability to store sediment within the reach. Instead, much of the sediment may be sent downstream to affect downstream reaches or lakes. In Stages III and IV, the stream is widening and migrating as it re-establishes meanders and a new floodplain at a lower elevation. Erosion may be severe at these stages as the stream attempts to establish its equilibrium. Finally, Stage V represents a new equilibrium and a reestablished floodplain at a lower elevation. Most assessed reaches in the Clyde River watershed were stable and in good to reference condition. Although some reaches rated in good condition contained areas of erosion and unstable banks, they lacked the widespread instability resulting from extensive modifications to the channel and watershed. Four reaches were in fair condition, and one reach was in poor condition. These reaches were unstable, have lost floodplain function, and may be responsible for sending large amounts of sediment and nutrients downstream. While this information provides a foundation for the town to understand erosion characteristics, continued analysis in conjunction with ANR and the NorthWoods Stewardship Center is needed. (Source: Restoring Water Quality in the Lake Memphremagog Basin: Clyde River Phase I and II Stream Geomorphic Assessments, 2016). The 2011 flooding events did result in enhanced erosion, and post-2023/2024 floods (DR-4720/4810) have caused minor additional channel shifts in reaches

like M08 and M15, per ANR/NVDA provisional maps and USGS data (2023 SHMP; USGS SIR 2025-5016). Further monitoring is ongoing to quantify these changes.

Building on the Geomorphic Assessment, recent local efforts include the Jan 30, 2025 completion of three conservation easements in East Charleston (e.g., Whitcomb-Bedell parcel at Churchill Brook/Clyde confluence) for flood resilience and habitat, funded by VHCB/GLFC. Ongoing Clyde Salmon Restoration (VTFWCG, 2024: 136 adults processed) enhances spawning above dams, while NorthWoods' 2023 Phragmites control in Echo Lake reduces erosion loads, and MWA's 2024 VHCB grants ($105K) target riparian buffers on lower Clyde tributaries. These align with 2023 SHMP priorities and inform Charleston's culvert upgrades post-DR-4720/4810.

In summary, flooding is a significant hazard in Charleston, a fact that is unlikely to change. Protecting river systems as a preventative measure, protecting property and human health and safety from flooding and flood-related damage remains important facets of mitigation planning for most Vermont communities including Charleston.

Pandemic

Pandemic planning in Vermont has continued to evolve in the wake of the COVID-19 experience, with renewed emphasis on integrating public health resilience into all-hazards frameworks. The H1N1 outbreak in 2009–2010 initially spurred statewide preparedness, but focus waned from 2010 to 2019 amid the absence of major U.S. events. The COVID-19 pandemic in 2020 dramatically reversed this trend, exposing rural vulnerabilities like Charleston's dispersed population and limited healthcare access, while delivering severe economic shocks—statewide unemployment peaked at 20% in April 2020, with NEK tourism and small businesses hit hardest by border closures and supply chain disruptions.

COVID-19, caused by the SARS-CoV-2 virus, is highly contagious and can spread asymptomatically. On March 13, 2020, President Trump declared a nationwide emergency under Section 501(b) of the Stafford Act, enabling streamlined federal support. Vermont received a major disaster declaration (FEMA-4532-DR-VT) on April 8, 2020, covering the period from January 20, 2020, to May 11, 2023. This authorized Public Assistance (PA) Category B funding at a 75% federal cost share for emergency protective measures, including direct federal assistance to state, local governments, and eligible nonprofits. The declaration supported over 1,000 PA projects statewide, with Vermont allocating $400 million in economic relief (e.g., Operational Relief Grants for childcare and small businesses) from federal CARES Act funds.

Early 2020 saw a rapid pivot to core pandemic tenets: hospital surge planning, PPE stockpiling, and public guidance on isolation, masking, and quarantine. Economic mitigation—workforce reductions, school closures, and business shutdowns—required balancing infection control with livelihoods, including out-of-state travel restrictions to curb resource strain. The 2025 revisions to the State Emergency Management Plan (SEMP) now embed these lessons across five mission areas (Prevention, Protection, Mitigation, Response, Recovery), with enhanced annexes for human-caused and technological hazards like supply chain failures and misinformation, informed by COVID-19 after-action reviews.

While the Northeast Kingdom, including Orleans County, experienced lower per capita infection rates than urban areas like Burlington (due to rural isolation and compliance with measures), every community faced border enforcement, protocol implementation, and economic fallout. Charleston received PA funding under DR-4532 for emergency protective measures, including emergency meals for homebound and high-risk residents, cleaning and personal protective equipment, supplies and digital resources for remote and distanced public meetings. Statewide, COVID-19 tallied ~170,000 cases, ~1,300 deaths, and high recovery rates (>99%) by mid-2025, with Orleans County reporting ~5,000 cases and ~50 deaths cumulatively—Charleston itself saw fewer than 50 confirmed cases, reflecting its small population but underscoring vulnerabilities for elderly residents (per 2025 survey). As of December 2025, cases remain low (e.g., 0 new deaths weekly), with wastewater monitoring and vaccination (24% uptake in 2024–2025) guiding ongoing vigilance.

The 2023 State Hazard Mitigation Plan (SHMP) and 2025 SEMP revisions elevate pandemics as a priority hazard, advocating equity-focused strategies like regional mutual aid (e.g., Orleans-Essex REMC protocols refined post-COVID) and tools for vulnerable populations. Charleston integrates these into local planning, emphasizing communications enhancements to address survey-noted gaps during isolation events.

Severe Drought

The 2023 Vermont State Hazard Mitigation Plan (SHMP) addresses drought as a moderate but increasing hazard, particularly in the context of climate change:

"Drought is a prolonged period of abnormally low precipitation that leads to a deficiency of surface and subsurface water supplies, resulting in water shortages that stress ecosystems, agriculture, water resources, and human health. In Vermont, droughts typically occur every 5–10 years and are classified using the U.S. Drought Monitor (USDM) scales from D0 (abnormally dry) to D4 (exceptional drought). Historical events like the 1964 and 1977 droughts caused widespread agricultural losses, low streamflows, and water restrictions. Climate projections indicate warmer temperatures (2–6°F rise by mid-century) will exacerbate evaporation and soil moisture deficits, potentially reducing summer precipitation by 15% and increasing drought frequency and duration. This heightens risks to rural communities, where private wells and small farms are vulnerable, and underscores the need for proactive monitoring and resilience strategies (2023 SHMP, Section 4-6: Drought)."

Vermont has a long history of droughts, with records dating to 1895 showing cycles every 5–10 years. The driest water years (October–September) include 1923–24 (statewide precipitation 70% of normal), 1976–77 (second driest at 75% normal), and 1964 (third at 78% normal). More recently, moderate droughts (D1–D2) struck in 2020 (summer D2 in NEK), 2023 (D1–D2 affecting 60% of VT), and 2025 (ongoing D2–D3 as of November 25, 2025, with 41% of the state in drought and 49% abnormally dry—the driest August on record since 1895, 1.82 inches below normal). In Orleans County, including the NEK, these events have been recurrent, with 2025 marking the third consecutive severe weather year (floods in 2023/2024 followed by drought). Locally, Charleston lacks dedicated gauges, but proxy data from Newport City shows 2025

summer precipitation at ~60% of normal (4.5 inches vs. 7.5-inch average), leading to low levels in Pensioner Pond and Echo Lake. Frequency has increased: 3 moderate droughts in Orleans County since 2020, up from 2 in the prior decade, aligning with SHMP projections of heightened variability.

Likelihood in Charleston remains moderate (10–20% annual probability of D1+), but climate trends suggest rising odds (up 20–30% by 2050 per SHMP), driven by warmer, drier summers reducing soil moisture and streamflows in low-gradient rivers like the Clyde.

Drought poses cascading risks to Charleston's rural economy and vulnerable residents. Primary impacts include water shortages for private wells and springs (with no municipal water system in town), straining emergency services and daily needs. 2025 saw voluntary restrictions in NEK towns, with some Charleston wells dropping 10–15 feet. Agriculture, vital to small farms (e.g., dairy/hay in rural districts), faces crop failures and livestock stress; statewide, 2025 losses exceed $14 million (projected from survey responses to date), with NEK hay yields down 30% or more. Secondary effects include heightened wildfire risk in forested areas (2025 fire bans issued), ecosystem degradation (e.g., wetland drying), and health concerns for elderly/disabled such as dehydration and heat. Economic ripple: Reduced tourism (fishing/recreation) and remote work disruptions from power fluctuations. Infrastructure like highways sees dust/erosion issues, compounding flood vulnerabilities.

The 2023 SHMP prioritizes drought mitigation through a statewide drought plan (Year 1 goal: water monitoring predictors for early alerts), agricultural resilience (e.g., irrigation grants via MVI tool), and equity for rural/low-income areas—aligning with Charleston's goals for vulnerable support and communications. Local integration includes NVDA's provisional maps for water resource planning and REMC mutual aid for supply sharing, emphasizing low-cost measures like rainwater harvesting to build long-term equity and sustainability.

The 2025 drought, classified as severe (D2) across 94% of Vermont by September (with Orleans County at D2–D3), has amplified water supply anxieties, particularly in rural Orleans County where over 400 statewide reports of dry wells and shortages were logged by late September. Many of these were from the NEK, including Glover where residents reported complete well failures and business closures like the Busy Bee Diner due to no water. In Charleston, town office inquiries about where to fill up water jugs and anecdotal reports from residents with dry wells highlight fears of well depletion affecting elderly and low-income households, with sediment in taps signaling contamination risks from dropping levels. Statewide, the Vermont Agency of Agriculture's 2025 Drought Impact Survey (open through December 15) captured $14 million in agricultural losses (projected from 174 responses to date), with 59% of NEK farmers calling it "the worst ever", echoing survey calls for better emergency water distribution and communications to vulnerable families during shortages.

[END SECTION 2]