

Westfield Local Hazard Mitigation Plan

CERTIFICATE OF LOCAL ADOPTION

Town of Westfield, Vermont

A Resolution Adopting the Local Hazard Mitigation Plan

WHEREAS, the Town of Westfield 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 Westfield Local Hazard Mitigation Plan contains recommendations, potential actions and future projects to mitigate damage from disasters in Westfield; and


WHEREAS, the Town of Westfield 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...

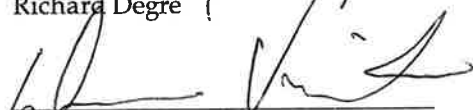
WHEREAS, a meeting was held by the Town of Westfield Selectboard to formally approve and adopt the Westfield Local Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED that the Town of Westfield Selectboard adopts this Local Hazard Mitigation Plan for the town.

Date : 4/21/25


Jacques Couture, Chair


Richard Degre


Dennis Vincent

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1. INTRODUCTION

A. Purpose

The purpose of this plan is to assist the Town of Westfield to identify potential hazards and mitigation strategies to begin reducing their risks. It is less costly to reduce vulnerability to disasters than to repeatedly repair damage.

Hazard Mitigation: Any sustained action that reduces or eliminates long-term risk to people and property from natural hazards and their effects.
-- Vermont 2018 State Hazard Mitigation Plan

Hazard mitigation strategies alter the hazard by eliminating or reducing the frequency of occurrence, avert the hazard by redirecting the impact by means of a structure or land treatment, adapt to the hazard by modifying structures or standards, avoid the hazard by stopping or limiting development, or reducing the potential impact through education and outreach. Specific hazard mitigation projects include:

- Flood-proofing structures
- Securing propane/fuel tanks in flood-prone areas
- Elevating furnaces and water heaters in flood-prone areas
- Identifying and modifying high traffic incident locations and routes
- Ensuring adequate water supply
- Elevating structures or utilities above flood levels
- Identifying and upgrading undersized culverts
- Proactive land use planning for floodplains and other flood-prone areas
- Proper road maintenance and construction
- Ensuring critical facilities are safely located
- Providing public information

With enhanced emphasis on community resilience, 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 planning efforts. This plan will reference, when relevant, pertinent tools and resources that can be used to enhance mitigation strategies.

[*The Code of Federal Regulations \(44 CFR Part 201\)*](#), 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 must have an approved local hazard 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 and approved by FEMA:

- After November 1, 2004, [Flood Mitigation Assistance Grant Program \(FMAGP\)](#) funds will be available only to communities that have adopted a local plan;
- Communities without a plan are not eligible to receive funding from [FEMA's Hazard Mitigation Grant Program \(HMGP\)](#) to pay for hazard mitigation projects. (Communities, however, may apply for planning grants under the 7% of HMGP available for planning;

- Communities with a local plan are not eligible to funding from [FEMA’s Pre-Disaster Mitigation \(PDM\)](#) program, and
- 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 Emergency Relief Assistance Fund (ERAF) requirements.

Adoption and maintenance of this Hazard Mitigation Plan will:

- Make certain funding sources available to complete the identified mitigation initiatives that would not otherwise be available if the plan were not in place;
- Support effective pre- and post-disaster decision making efforts;
- Lessen each local government’s vulnerability to disasters by focusing limited financial resources to specifically identified initiatives whose importance have been ranked; and
- Connect hazard mitigation planning to community planning where possible.

B. Planning Process

This plan was developed over the course of two significant natural disasters. The 2020 Pandemic forced the planning process to pivot to a virtual engagement process. In the summer of 2023, Orleans County experienced flooding from excessive July rains. Each core planning team member serves the communities in a number of capacities, creating a balanced perspective:

**This section satisfies Requirement 44
CFR § 201.6(c)(1): Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction?{**

- Pat Saqui, Westfield Planning Commission Chair, also serves as the Town Moderator. She has been heavily involved in amending the town’s zoning regulations, as well as the Town’s flood hazard regulations.
- Anne Lazor, formerly on the Westfield Selectboard and founder of Butterworks farm, Anne provided critical insights on impacts of natural hazards, especially agricultural enterprises.
- LaDonna Dunn, Town Clerk and also member of the Westfield Emergency Preparedness Committee
- Dennis Neumann, Emergency Management Coordinator
- Dan Backus, also an Emergency Management Coordinator

They were assisted by Alison Low, Senior Planner at Northeastern Vermont Development Association, the regional planning commission serving Westfield.

Table 1B.1: Details of the Planning Process

Plan Development Element	Description and timeframe
Project kickoff	February 24, 2020: At 5:00 p.m the core planning team assembled in the Westfield Town offices, along with Alison Low. This process identified the priority hazards to be included in this plan update. The team opted to focus only on natural hazards, since FEMA does not review man-made hazards. The project team also reviewed questions to be distributed in a community questionnaire.
Stakeholder and public involvement	Immediately following this meeting, at 6:30, Sacha Pealer from the Department of Environmental Conservation led a presentation as a publicly warned presented on flood risks in Westfield and river corridor protection

	measures. The presentation, which included the Selectboard, Planning commission and members of the general public included LIDAR data showing lateral movement of stream channels over time. Plan development continued remotely, and in April 2022, Alison Low met with members of the core team to share data and complete a hazard ranking of natural hazards, using the same methodology that is used in the Statewide Hazard Mitigation Plan. This ranking determined the hazards to be profiled.
General public involvement	The Westfield Community Survey was distributed online, and paper copies were available through the Town Clerk’s office through the spring of 2020. However, COVID made paper distribution of the surveys extremely difficult. Surveys were promoted through Front Porch Forum and social media. There were 21 responses. On September 18, 2023, a public presentation was made at a regularly warned meeting of the Westfield Selectboard. The public presentation included a high level overview of the hazards to be profiled and the mitigation actions to be considered.
Businesses, academia, and other private and non-profit interests	Copies of the plan were distributed to members of the school board, and to Rural Edge, who operate an affordable housing development in the Town of Westfield, as well as Northeast Kingdom Community Action. A copy of the draft plan was made available on the Town Web site.
Neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development	The NVDA consultant emailed an initial draft plan to the Town clerks of the neighboring communities of Richford, Jay, Troy, Lowell, and Montgomery, as well as the Agency of Natural Resources Department of Environmental Conservation, the Vermont Department of Health and the basin planners. The plan was also sent to VEM for initial review, so the comments and input from all of the above-mentioned contacts and outreach strategies continued to be incorporated into the plan.

Table 1B.2: Information Sources Reviewed

The table below details the documents that were reviewed in the preparation of this plan, as well as how they were used.

This section of the plan satisfies requirement §201.6(b)(3): Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information?

Source	Description (and links, if available)	How they were incorporated into the plan
OPEN FEMA Datasets	Disaster Declaration summaries Orleans County. Records go back to 1964. Public Assistance summaries details FEMA assistance to the Town of Westfield for the repair of public infrastructure following disaster declarations. https://www.fema.gov/about/reports-and-data/openfema	Both datasets are used to analyze climate change and weather patterns in Table 1C.4. Public assistance datasets are also referenced as relevant in the hazard profiles.
FEMA FIRM, Town of Westfield	Accessed from FEMA Flood Map Service Center with an effective date of 4/1/1998, Westfield’s maps lack significant detail. Additionally, The Town of Westfield does not currently have an effective Flood Insurance Study (FIS) Report within the jurisdiction.	Depicts Special Flood Hazard Areas that are subject to regulation under Westfield’s Flood Hazard Regulations.

National Oceanic and Atmospheric Administration (NOAA)	NOAA’s mission is to understand and predict changes in climate, weather, ocean, and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources. https://www.noaa.gov/	Datasets and databases were used to analyze climate change and weather patterns in Orleans County and provide historical data on hazardous weather events.
Missisquoi Bay Tactical Plan	A strategic guide protecting watershed health. Last updated in 2021. https://dec.vermont.gov/water-investment/watershed-planning/tactical-basin-planning/basin6	Provides context to streamflows and flood risks in Westfield.
Vermont Agency of Natural Resources Natural Resource Atlas	A robust online mapping tool https://anrmaps.vermont.gov/websites/anra5/	Used to identify water supplies, Emerald Ash Borer area, and dams in the Vermont Dam Inventory
University of Vermont Climate Change Assessment	Published in 2021, this is Vermont’s first state climate assessment since 2014. https://site.uvm.edu/vtclimateassessment/#	Provides perspective to climate change and weather patterns, as well as potential vulnerabilities from future hazards impacts.
Upper Missisquoi River Corridor Plan	A geomorphic assessment of the Upper Missisquoi watershed prepared by Arrowwood Associates, September 30, 2011.	Provide a description of flows in the Upper Missisquoi watershed, as well as flood levels.
Vermont State Hazard Mitigation Plan (2018) and update (2023)	Presents the hazard impacts most likely to affect Vermont and a mitigation strategy to reduce or eliminate most significant vulnerabilities. https://vem.vermont.gov/plans/SHMP	Used as a basis for identification and ranking of hazards in Westfield. See Section 2A.
Westfield Community Survey	The URL from online survey was publicized in early 2020, just as the pandemic was unfolding. There were 26 responses.	Where relevant, provides local perspective on natural hazard events.
Westfield All-Hazard Mitigation Plan	Approved on May 27, 2005 and expired on May 26, 2010, the Westfield AHMP was adopted as an annex to a regional all-hazard mitigation plan.	Provides historical data on losses and vulnerabilities, such as Table 1C.4.
Westfield Town Plan (2019)	Adopted January 7, 2019.	Provided information about land use, development patterns, flood resilience, environmental concerns, town assets and facilities. Information incorporated into Community Profile and Hazard Profile on Flooding.
Westfield Zoning Bylaw	Updated January 2020 and March 2024	Provided information on existing and desired development patterns, as well as existing strategies to protect water resources and improve the functionality of floodplains.
US Drought Monitor	U.S. Drought Monitor, National Drought Mitigation Center, University of Nebraska-Lincoln	
Vermont Electric Coop	Outage data	Provided insight into the frequency and extent of power outages, especially

	related to wind, downed trees, and severe winter weather.
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C. Community Profile

Town Background

The Town of Westfield is a small rural community in north-central Vermont. This Orleans county community is in the northwestern corner of the tri-county area known as “the Northeast Kingdom,” which covers roughly one-fifth of the state’s land mass, yet only accounts for one-tenth of the state’s population.

The 2020 U.S. Census reports a total population of 534 residents, representing virtually no change from the 2010 Census. Westfield is considered a rural area, with a very low population density of only 13.39 persons per square mile. By contrast, Orleans County has a population density of just under 40 persons per square mile. Historical Census data shows that the town’s population peaked in 1890 with 763 persons. In recent years, the town’s most significant growth period was from 1990 to 2000 when the town population saw a 19.2% jump from 422 to 503.

Prevailing Development Trends

According to the Grand List, land uses have not changed significantly since the previous hazard mitigation plan. For all intents and purposes, Westfield continues to be a rural community with a prevailing long-term trend of scattered low-density residential development. Non-residential development remains on a rural scale as well. The predominant land use pattern – typical of many rural communities in the Northeast Kingdom – is a compact settlement area (Westfield Village) surrounded by large tracts of working lands (farming and forestry), as well as some dispersed rural residential development that runs along roadways. The town is primarily residential: there are about 230 residential parcels, more than half of which are on lots larger than six acres; about 100 seasonal (vacation) properties; 15 parcels with mobile homes, and about a dozen commercial properties.

This section of the plan satisfies requirement §201.6(d)(3): Was the plan revised to reflect changes in development?

The town’s zoning has had four districts to manage patterns of land use and development:

Village: Westfield Village is in the Village District, which requires a minimum half-acre for development. The area is served by a community water system (Fire District #1), but there is no off-site sewage disposal. Westfield is the commercial, civic, and residential center of the Town. The main street (Route 100) passes by the general store, Community Center, hardware store, antiques dealer, two storage rental facilities, a campground, the Hitchcock Museum and Library, and the Congregational Church. The village center is anchored by an organic vegetable farm on the south end, and on the north end by an organic dairy farm with retail maple shop and B&B; the Town Garage and Recycling Center, the Town Offices, as well as the Post Office (which is located in a private residence). The village has some multi-unit rental housing, as well as an 11-unit senior housing facility operated by RuralEdge, the region’s affordable housing service provider. This housing facility is the former location of the Scenic View Community Care Home, a residential home for seniors, which closed since the previous hazard mitigation plan was adopted.

Recreational Residential: The district running along Route 242 contains an island of concentrated development in the otherwise undeveloped western portion of town. Alpine Haven is separated from

the rest of Westfield by topography, the spine of the Green Mountains with limited roadway connections. The land is mountain sidehill, and its proximity to Jay Peak makes it desirable for vacation home development. Some homeowners in the Alpine Haven development are year-round residents with children who must be picked up by school bus. The roads and water system within the development are privately owned and maintained. A wellhead protection area has been established for the Alpine Haven water system. Condominiums, nearly completed in 2013, burned in 2017 and have not been rebuilt.

Rural Agricultural: The balance of lands in Westfield is contained in this district. The use in this area is mostly large-lot rural residential (ranging from five to 25 acres) but there are some working farms as well, located along Route 100, north and south of the Village, as well as Kennison and Loop Roads. Six of the farms have sold their development rights, which will limit future development.

Mountain District (created in March 2024 bylaw amendment: All land at or above 1600 feet in elevation excluding areas designated as the Recreational-Residential District. The purpose of the Mountain District is to ensure the Town’s forestland and wildlife resources remain productive, intact, and healthy. Protecting forest function, particularly upland forests in this District, provides species adaptation and wildlife corridors, stormwater management and flood control through water infiltration and retention capacity that also recharges ground water. This district places restrictions on most development to protect these functions on steep slopes and shallow soils.

Working lands (farming and forestry) are a major contributor to Westfield’s landscape, and more than 13,000 of the town’s 25,728 acres are enrolled in the Vermont’s Use Value Appraisal Program (aka “Current Use”), which helps to disincentivize development. Most of the enrolled lands are forested. In fact, forested lands cover more than 85% of the town. Limited year-round road access largely restricts residential development in the western side of the town, which contains the largest concentration forested blocks. The highest elevation forest lands contain two state forests, Jay State Forest to the northwest and Hazen’s Notch to the southwest. The latter can be accessed by Route 58, but the road is closed in the winter. The two state forests are connected by a six-mile stretch of the Long Trail. Development on privately-held lands in the western portion of town primarily consists of seasonal camps.

In general, maintenance of large tracts of working lands through enrollment in the Current Use Program and through direct conservation helps to reduce risk from natural hazards in limiting future dispersed low-density rural residential development and fragmentation of forest cover. The primary benefits include the ecological function of wildlife passage from one interior forest block to the next, allowing species to adapt to climate change. Preservation of large forested blocks in higher elevation areas may help to protect the ecological function of sensitive headwaters and attenuate downslope flood flows in heavy precipitation events. Finally, restricting low-density residential development in areas not easily reached by first responders may help to limit future vulnerable populations. The creation of the Mountain District, which limits new development in upland forested areas, is likely to have a similar effect. As appropriate, the benefits of conservation and zoning efforts are documented in each risk profile.

Table 1C.1: Town Statistics

Datum		Source
Population per square mile	13.39	2020 Decennial Census
Total housing units	411	American Community Survey 2021 5-Year Estimates
Occupied	252	
Vacant (including seasonal)	159	
Median age	42.7	

Median home value	\$187,900	
Homestead tax rate (per \$100)	1.3257	Westfield lists, Town of Westfield 2023-24 Report https://tax.vermont.gov/property/education-property-tax-rates
Non-residential tax rate	1.5649	

Electric Utility

Westfield’s utility services are managed solely by Vermont Electric Cooperative.

Solid Waste

Currently, solid waste collected locally for disposal goes to the Waste USA, Inc. located on the Airport Road in Coventry. Westfield has a solid waste transfer station and recycling center. This facility is located at the town garage. Dumpsters are available for residents to get rid of waste on a fee per bag basis. The town covers the cost to operate the recycling center from the per bag fees. Recycling is also provided at the Waste USA, Inc. facility. Some residents opt to have trash pickup by a privately contracted hauler. Hazardous waste disposal days are offered five times a year at different locations in Orleans County, and at no cost to residents. In 2017 the Town began offering organics collection for food scraps. This material is hauled to a farm-based composting facility in Lyndonville.

Emergency Response

Fire Protection: Westfield contracts the Troy Volunteer Fire Department through an annual appropriation for fire protection services, except for the area of Alpine Haven, which is served by Montgomery’s Volunteer Fire Department. The State Police provides E-911 dispatch services out of Williston. The Town pays for fire and rescue services through an annual appropriation.

Emergency Medical Services: Patients are typically taken to North Country Hospital, 15 miles away in Newport. Until recently, the Town contracted with Missisquoi Valley Ambulance Service (MVAS) based in Jay. The Town now contracts with Newport Ambulance Service, which is licensed at the paramedic level.

Police Protection: The Orleans County Sheriff’s Department and the Vermont State Police in Derby provide law enforcement services for the Town. The Town contracts yearly with the Orleans County Sheriff’s Department to patrol the roads.

Medical Facilities

Locally, the Westfield Community Center provides services and local care on a neighborhood scale for older adults. However, for medical treatment, residents must travel to Primary Care Barton Orleans in Orleans (19 miles) and North Country Hospital in Newport (14.5 miles). There is also Northern Care Express and North Country Primary Care in Newport. North Country Hospital has the state’s first heated helipad. North Country Hospital has 25 beds and is considered a “critical access” hospitals that give limited outpatient and inpatient hospital services to people in rural areas. With 562 beds, University of Vermont Medical Center in Burlington (70 miles away) serves all of Vermont and contains a Level 1 Trauma Center.

Water and Sewer

Forty-eight homes, businesses and town properties in the village are provided with water from a spring and a well on North Hill Road. It is owned and operated by the Westfield Fire District. The system was renovated in 1999, and a new drilled well became operational in August, 2016. With an estimated flow rate of 100 gal/minute, the new well has expansion capability to meet the needs of future residential and light industry development in the village center. Alpine Haven has a well-fed water supply that serves

approximately fifty homes. Water quality of private wells and springs is acceptable without further treatment. Reports of high sulfur and iron content are common.

Town officials believe the more important needs are to ensure residents live in safe, energy efficient housing provided with water supply and sewage treatment systems that function properly. To this end the Town created a fire district to upgrade a water supply system that serves the Village. This system was at one time privately owned and has been donated to the Fire District. With regard to sewage treatment, Westfield does not have a public sewer system nor does it regulate private, on-site systems. Therefore, it is critical that residents comply with the applicable State regulations. Septic systems in the Village are on very shallow soils, and it's possible that some systems have failed in periods with heavy rain, as evidenced by the unpleasant odors. The Town is currently working with the Clean Water State Revolving Fund to explore a sewer connection from Jay to the Village.

Town Governance and Town Properties

The three member Selectboard is responsible for general supervision and control over town; enacts ordinances, regulations, and policies for town; oversees town property and personnel; prepares, presents and manages budget; and oversees roads, including laying out, discontinuing, and reclassifying roads.

Buildings owned and operated by the Town of Westfield include the Town Office, the Hitchcock Museum and Library, the Town Garage, the Community Center, the town playground, ¼ acre of land on Route 242 that was gifted to the town, half of the Jay-Westfield School, the Village Common, and Westfield and North Hill Cemeteries.

Roads

Road maintenance in Westfield comes from private sources and contracts from a long-standing local excavation company. The Town owns a grader and sander with a reserve fund for equipment maintenance.

Research and water quality monitoring has indicated that roads are responsible for 6-10% of phosphorus loads to Lake Champlain and other waterways, and roads contribute over 10% of sediment loads. Since 2015, Act 64, aka the Clean Water Act, requires municipalities to develop and implement a customized, multi-year plan to stabilize their road drainage system, bring road drainage systems up to basic maintenance standards, and implement additional corrective measures to reduce erosion. The plan is based on a comprehensive inventory of the road network that identifies priority road segments connected to surface waters through ditches, culverts or other drainage structures (i.e. "hydrologically connected"). Westfield, like all municipalities in Vermont, has had to prioritize road segments through a Road Erosion Inventory and develop remediation plans that can be carried out over time.

Westfield's efforts to keep pace with requirements for hydrologically connected segments are supplemented by grants from VTrans, and the road crew's current focus is on "hydraulically connected road segments" near or adjacent to streams and ponds.

Table 1C.2 Westfield Road Mileage

Class	Description	Mileage
State Highways		8.594
Class 1	State highways that run typically run through downtowns and village centers and are maintained by the municipality.	0.0
Class 2	Major connectors between high activity centers in a town. Town is required by statute to keep in "good and sufficient repair" all year.	6.57

Class 3	All other town highways that remain negotiable by a car throughout the year. Town is required by statute to keep in “good and sufficient repair” all year.	16.16
Class 4	Roads that the Selectboard may apply some discretion for maintenance. The Town has an adopted policy on Class 4 roads.	2.16

Source: VTrans Town Highway 2020 (most current)

Westfield also has 7.67 miles of legal trails which can be used as an ATV and walking trails. The town has identified roads open to ATV Travel [here](#).

Critical Facilities

FEMA defines a critical facility as buildings or structures that provide services and functions essential to a community, especially during and after a disaster. Examples include – but are certainly not limited to – fire stations; emergency shelters; medical facilities; schools; nursing homes, day cares, and other facilities serving vulnerable populations; public utility infrastructure; drinking water supplies; and structures or facilities that store hazardous materials.

Climate Change and Severe Weather Patterns

An analysis of FEMA disaster declarations indicates weather extremes are becoming more commonplace in Vermont.

There are two types of disaster declarations provided for in the Stafford Act: Emergency Declarations and Major Disaster Declarations. Both declaration types authorize the President to provide supplemental federal disaster assistance.

- **Emergency Declarations:** An Emergency Declaration can be declared for any occasion or instance when the President determines federal assistance is needed. Emergency Declarations supplement State and local efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe in any part of the United States. The total amount of assistance provided for a single emergency may not exceed \$5 million. If this amount is exceeded, the President shall report to Congress. Sometimes an Emergency Declaration is followed by a Major Declaration.
- **Major Declaration:** The President can declare a Major Disaster Declaration for any natural event that the President believes has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work.

From 1964 to 2007 there were 12 major declarations in Orleans County (two of which were statewide), and one emergency declaration for heavy snowfall. From 2011 to the present, Orleans County has already had 12 major declarations and one emergency declaration. The majority of these declarations have involved flooding.

Table 1C.4: FEMA Disaster Declarations in Orleans County, FY1964-present

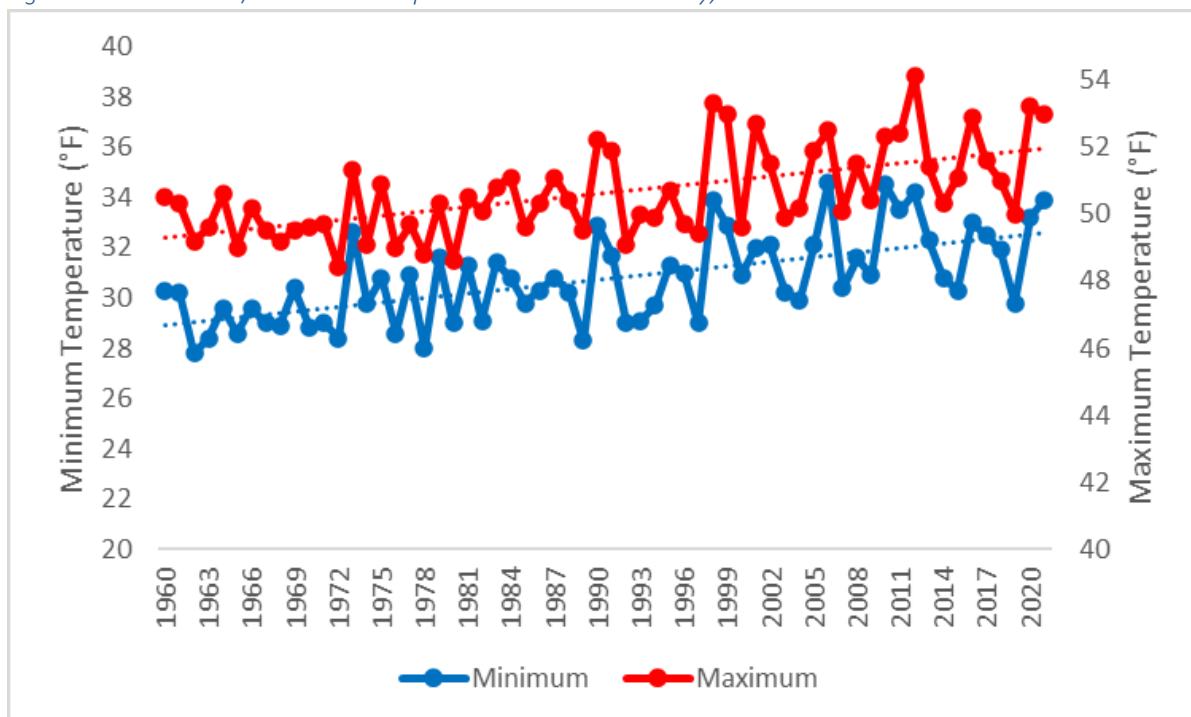
Declaration Number	Declaration Date	Incident Description
DR-160-VT	11.02.1963	Drought and impending freeze (this was a statewide declaration)
DR-164-VT	03.17.1964	Flooding (this was a statewide declaration)
DR-397-VT	07.06.1973	Severe storms, flooding and landslides
DR-518-VT	08.05.1976	Severe storms, high wind, and flooding
DR-1063-VT	08.16.1995	Excessive rainfall, flooding
DR-1101-VT	02.13.1996	Ice jams and flooding

DR-1184-VT	07.25.1997	Excessive rainfall, high winds, and flooding
DR-1228-VT	06.30.1998	Severe storms and flooding
DR-1307-VT	11.10.1999	Tropical Storm Floyd
EM-3167-VT	04.10.2001	Snow
DR-1428-VT	07.12.2002	Severe storms and flooding
DR-1559-VT	09.23.2004	Severe storms and flooding
DR-1715-VT	08.03.2007	Severe storms and flooding
DR-1995-VT	06.15.20011	Severe storms and flooding
DR-4022-VT	09.01.2011	Tropical Storm Irene; earlier declaration was EM-3338 on 8.29.2011
DR-4066-VT	06.22.2012	Severe storm, tornado, and flooding
DR-4140-VT	08.02.2013	Severe storms and flooding
DR-4163-VT	01.29.214	Severe winter storms
DR-4178-VT	06.11.2014	Severe storms and flooding
DR-4207-VT	02.03.2015	Severe winter storm
DR-4356-VT	01.02.2018	Severe storm and flooding
DR-4380-VT	07.30.2018	Severe storm and flooding
DR-4474-VT	01.17.2020	Severe storms and flooding
DR-4532-VT	04.08.2020	Biological – COVID 19 Pandemic; earlier declaration was EM-3437 on 03.13.2020
EM-3567-VT	08.22.2021	Hurricane – Tropical Storm Henri
DR-4720-VT*	07.14.23	Severe Storms, Flooding, Landslides, and Mudslides

Bolded text denotes public assistance FEMA funding for damage to public infrastructure in Westfield Town.
Note: Open FEMA only has public assistance records going back to 1999. Pre-1999 public assistance data comes from the 2005 Westfield All-Hazards Mitigation Plan. *Public assistance for DR-4720 is highly likely.

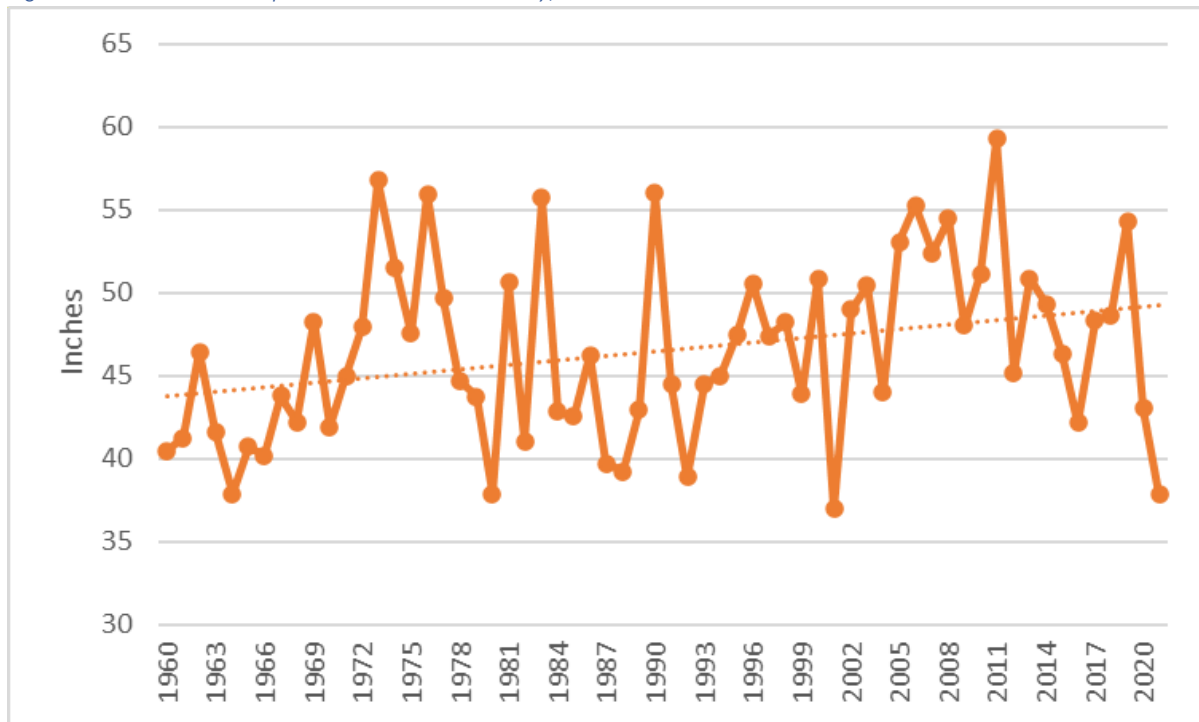
In recent years, it has become evident that human activities, mostly associated with the combustion of fossil fuel, have added to the natural concentration of greenhouse gases in the atmosphere and are contributing to rapid climate change on a global scale. An analysis of annual minimum and maximum temperatures in Orleans County shows that minimum temperatures are generally rising faster (.6°F per decade) than maximum temperatures, (.4°F per decade). (See Figure 1C.2).

Figure 1C.2: Minimum/Maximum Temperatures in Orleans County, 1960-2020



Annual precipitation is rising at a rate of about .89" per decade (See Figure 1C.3). While projections of the effects of climate change vary, it is generally predicted that the region can expect to have warmer temperatures year-round, with warmer, wetter winters, and increasingly erratic patterns of precipitation.

Figure 1C.3: Annual Precipitation in Orleans County, 1960-2020



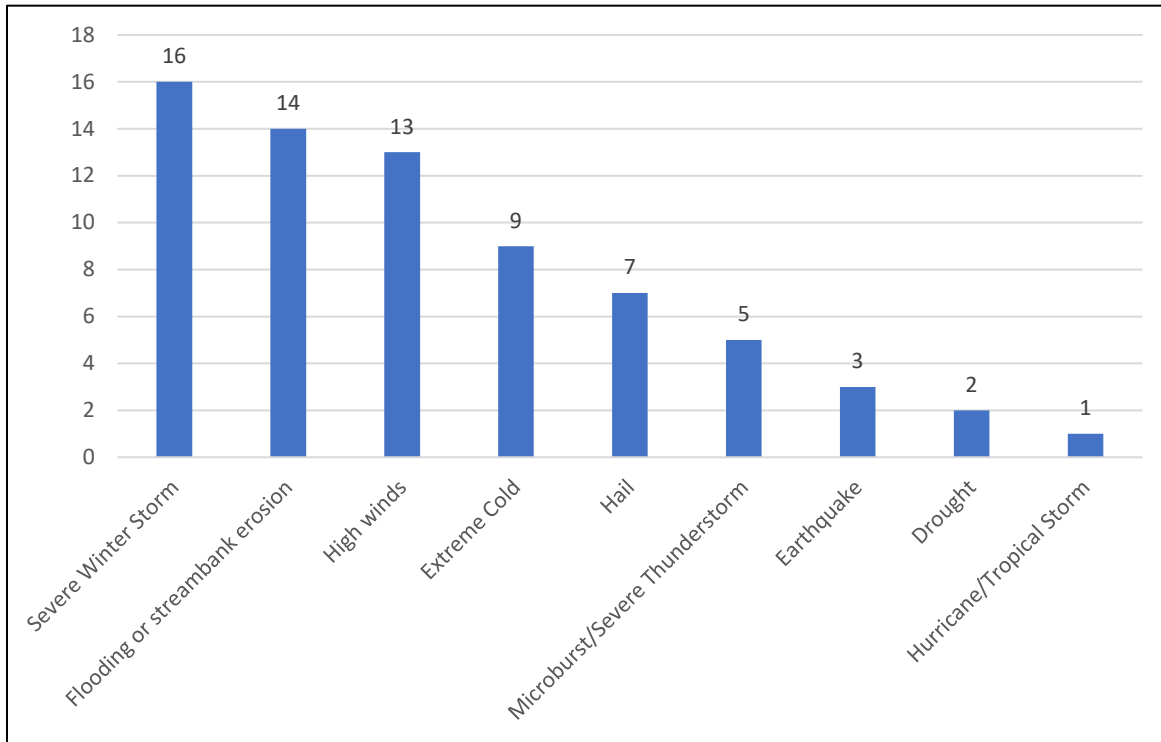
Sources: NOAA Climate at a Glance

USDA’s recent drought disaster declaration in Orleans County (and all other counties in Vermont) is not an aberration from the warming trend: According to the University of 2021 Vermont Climate Assessment, increasing variability of rain patterns and water tables makes both flooding and drought likely possibilities. We are moving to extremes: either too much rain or not enough. An increase in precipitation may 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 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. Increasing temperatures are expected to significantly exacerbate the impacts of natural hazards and net economic damages will continue to rise¹.

Westfield residents who responded to the Community Survey indicated that they have primarily experienced flooding (mainly road washouts), severe winter storms, and high winds. (Figure 1C.4) Fourteen respondents (64%) indicated that they had been unable to travel due to impassable roads in severe weather.

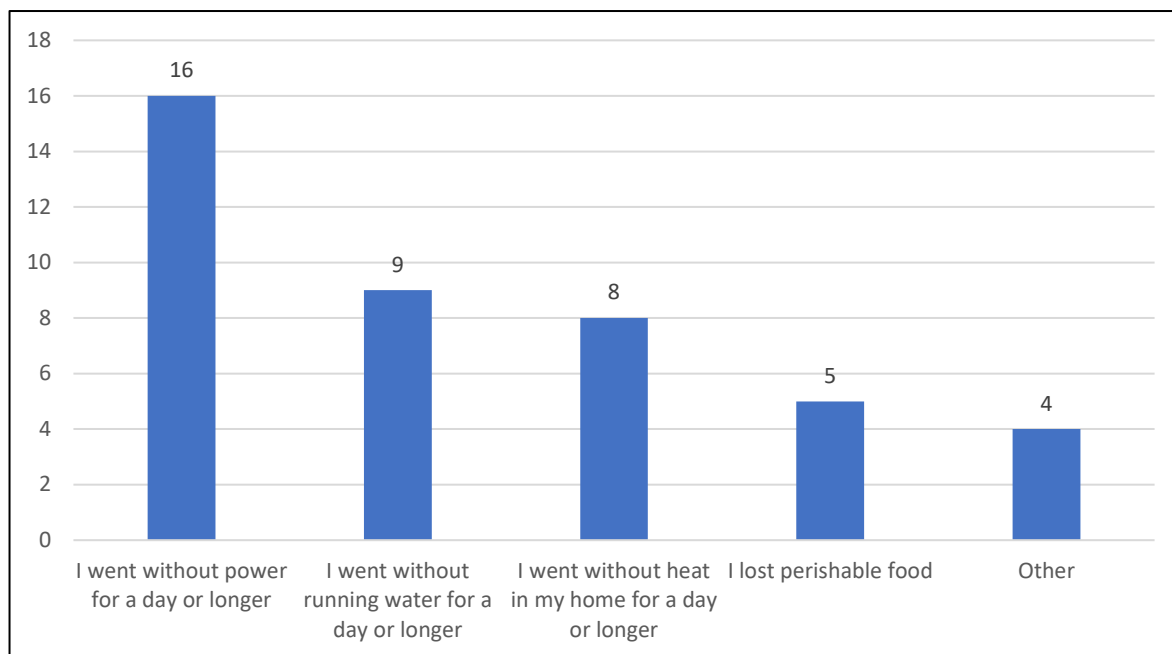
¹ World Economic Forum: Climate Change is Making Disasters More Expensive. <https://www.weforum.org/agenda/2018/10/climate-disasters-cause-global-economic-losses-un/>

Figure 1C.4: What Hazards Have You Experienced in Westfield? (20 respondents)



Power outages were a frequent result of natural hazards, although no respondent to the Community Survey indicated being displaced from their home. (Figure 1C.5) One respondent indicated that power outage interfered with home dialysis. Another indicated that water in the basement caused issues with the furnace and water heater.

Figure 1C.5: Regarding extreme weather events or natural disasters in Westfield, which of the following statements are true for you? (18 respondents)



While flooding, erosion, extreme winter storms, and winds account for hazards experienced to date, Westfield residents may be anticipating a wider array of natural hazards in the future, including hail, drought, and wildfire. (Figure 1C.6). They also anticipate a broad range of damages, but have greatest concern for damage to infrastructure and the local economy. (Figure 1C.7).

Figure 1C.6: How concerned are you about the following hazards? (20 respondents)

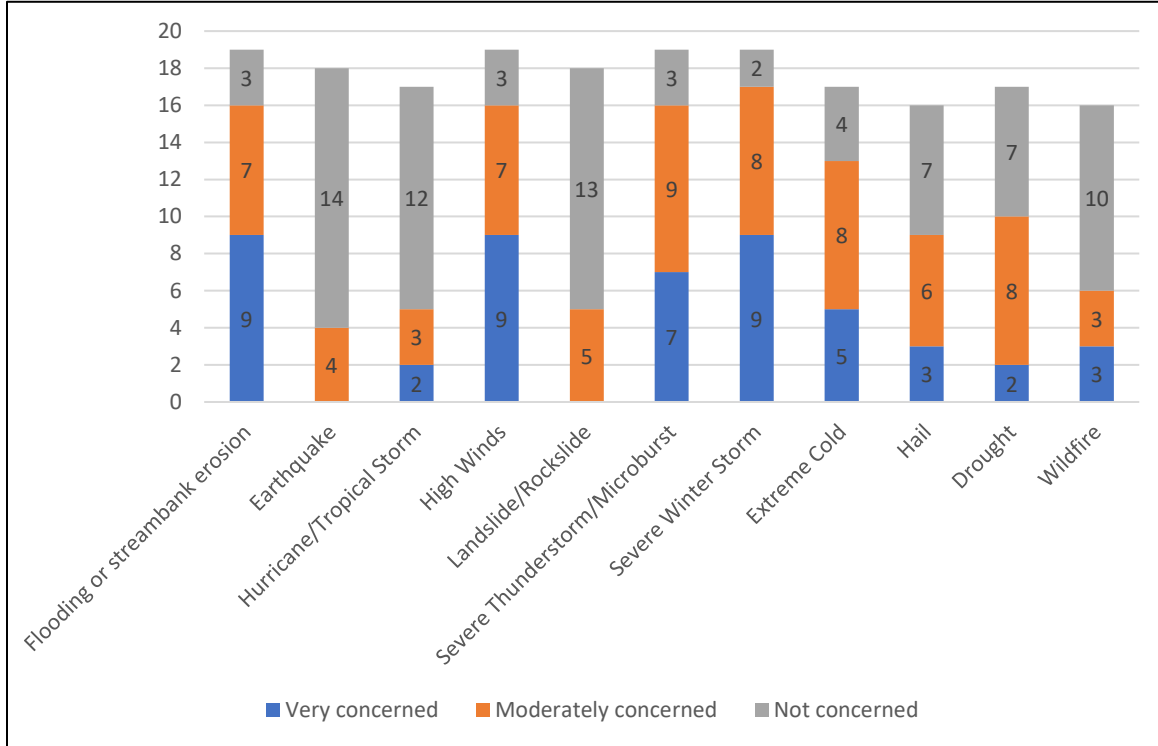
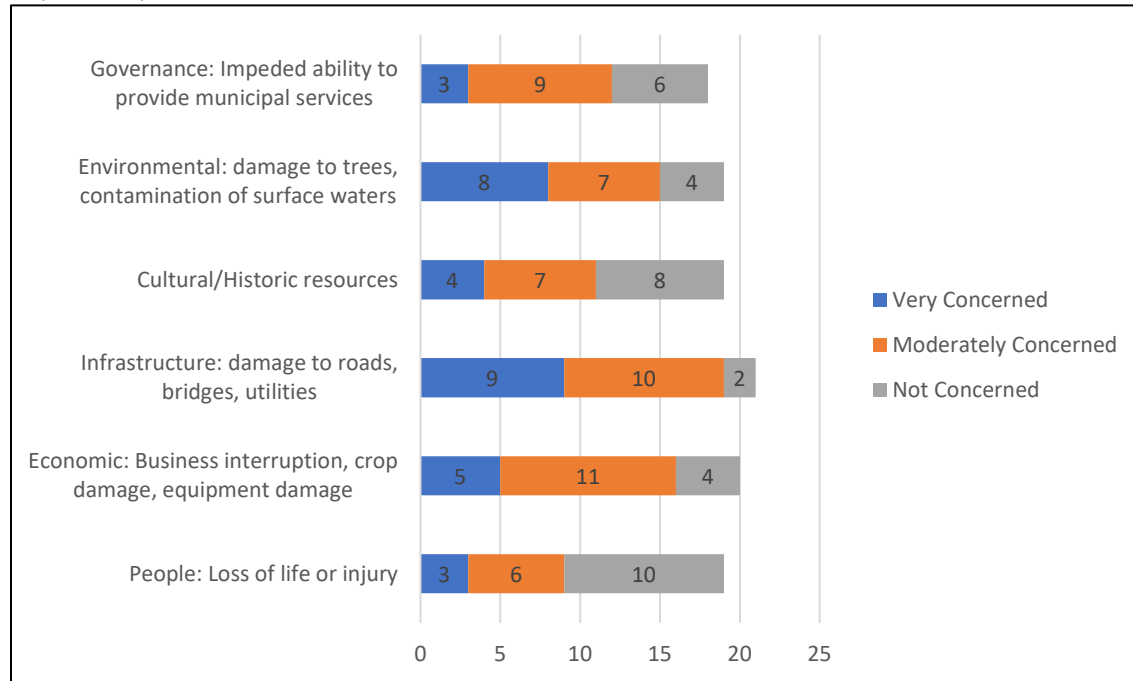


Figure 1C.7: How concerned are you about the potential damage from natural hazards in Westfield? (22 respondents)



2. WESTFIELD HAZARDS AND POTENTIAL IMPACTS

A. Hazard Identification Process

Effective mitigation efforts must be based on a rational evaluation method that answers three basic questions:

1. What bad things can happen, given the town’s vulnerabilities and loss history?
2. How likely are these hazards to occur?
3. How bad could they be?

The tables below represent Westfield’s inventory of known hazards, a determination of the likelihood of future occurrences, and assessment of the community’s vulnerability. By performing this analysis we can then prioritize actions to mitigate the impacts of each of these hazards and make Westfield a safer place.

To answer the above questions, we assembled as much data and insight on past events that we could find. Disasters that have occurred in the Town, the larger region, and the State of Vermont can give us good information about what types of disasters we can expect in the future and what kinds of damage they might cause. However, while historical data shapes our perspective, past losses are by no means a crystal ball for predicting future events. Climate change is already changing our weather patterns, which means we can expect a proliferation in storm events with severe impacts as well as new challenges, like drought in summer and long winters characterized by heavy ice accumulation. Armed with historical data and a healthy respect for climate change and the unknown, the plan represents the town’s best attempt to identify hazards and prepare for the future.

Westfield’s 2005 Local Hazard Mitigation Plan identified *flooding, hazardous materials, and terrorism* as the highest risks to the community. To update the plan, the Westfield Hazard Mitigation working group

considered the hazards profiled in the 2018 Vermont Hazard Mitigation Plan, as well as all the hazards originally assessed in the 2005 Westfield Plan. The group revised priorities from the 2005 plan along these guidelines:

- **Events vs. Impacts:** Instead of continuing to view hazards as events (such as hurricanes or tornadoes), the Vermont Hazard Mitigation Plan assesses the *impacts of events* (e.g. inundation flooding, fluvial erosion). This is a logical way to assess hazards since it is the impacts, not the events, that can be mitigated. For example, while tornadoes are not as common as microbursts in Vermont, both events can produce powerful winds that damage structures and bring down trees.
- **Natural vs. Man-made:** Man-made disasters in local plans, such as hazardous material spills and acts of terrorism, are not reviewed by FEMA or Vermont Emergency Management staff. In fact, FEMA does not provide mitigation funds for man-made hazards. While man-made hazards are certainly not insignificant concerns, the Westfield Hazard Mitigation working group felt it was prudent to prioritize its time and resources on natural hazards and address man-made hazards through other more appropriate channels, such as regional emergency preparedness exercise and the Local Emergency Managements Plans. Nevertheless, some “hazards” considered in Westfield’s previous plan should be considered as *vulnerabilities* to natural hazards. Water supplies, for example, are more prone to contamination during periods of drought. High and damaging winds can lead to power failures.

It is important to note that since the development of its 2005 plan, Westfield remains a rural community marked by low-density rural development. *Learned experiences*, rather than changes in development patterns, have reshaped hazard planning priorities. At the time the original plan was adopted, few could anticipate the myriad impacts of climate change, the introduction of invasive and non-native species, rising temperatures, and increasingly erratic weather patterns. Moreover, the likelihood of a global pandemic and its crippling impact on nearly every aspect of daily life was purely hypothetical.

Table 2A.1: Westfield Hazards, 2005 vs. 2022

Hazards originally considered in 2005	...are now considered
Tornado Power failures High winds Hurricane	Wind (<i>with power failures a vulnerability of winds and ice</i>)
Flood Flash Floods Hurricane Dam Failure	Fluvial inundation Fluvial erosion (<i>with dam failures a vulnerability of flooding or possibly earthquakes</i>)
Winter storm/Ice Structure fires	Snow Ice Cold (<i>with structure fires a vulnerability of a heating season</i>)
Drought Water Supply contamination	Drought, <i>with water supply contamination a vulnerability of drought</i>
Hazardous Materials, Radiological Incident, Air crash, Chemical or biological incident, Highway incidents, School Safety Issues, Terrorism	n/a These man-made risks are not evaluated by FEMA

Westfield’s Plan from 2005 also evaluated wildfires, earthquakes, and landslides, which are also evaluated in the 2018 Statewide Hazard Mitigation Plan. Additional hazards – heat, invasive species, infectious disease outbreak, and hail – were not included in Westfield’s 2005 plan but were evaluated in the Statewide Hazard Mitigation Plan. Finally, while lightning was not profiled in the State Hazard Mitigation Plan, the Westfield Hazard Mitigation working group felt that there were sufficient losses due to lightning to merit evaluation. The working group then ranked a list of hazards using the same methodology from the State Plan to determine their highest priority hazards:

Probability x Average impact score = Overall Score

Table 2A.2: Probability and Impact Scoring

Score	Probability
1	Unlikely: <1% probability in any year
2	Occasionally: 1-10% of occurrence in any year; at least 1 chance in 100 years
3	Likely: >10% but < 75% in any year; at least one chance in next 10 years
4	Highly likely: >75% in any given year

Score	Impact
1	Negligible: isolated occurrences of minor property and environmental damage, potential for minor injuries, no to minimal economic disruption
2	Minor: isolated occurrences of moderate to severe property and environmental damage, potential for injuries, minor economic disruption
3	Moderate: severe property and environmental damage on a community scale, injuries or fatalities, short-term economic impact
4	Major: severe property and environmental damage on a community or regional scale, multiple injuries or fatalities, significant economic impact

Table 2A.3 All Hazards Assessed

Hazard Impact	Probability	Potential Impact					Avg.	Score
		Infra-structure	Life	Economy	Environment			
Fluvial Erosion	4	2	1	3	3	2.25	9	
Inundation Flooding	4	1	1	3	2	1.75	7	
Ice	4	2	1	2	3	2	8	
Snow	4	2	2	3	1	2	8	
Wind	4	3	2	3	3	2.75	11	
Heat	4	2	3	4	3	3	12	
Cold	4	1	3	3	3	2.5	10	
Drought	4	4	2	4	4	3.5	14	
Landslide	1	1	1	1	1	1	1	
Wildfire/Forest Fire	1	1	1	3	3	2	2	
Earthquake	1	1	1	1	1	1	1	
Invasive Species	4	1	3	4	4	3	12	
Infectious Disease Outbreak	4	2	3	4	3	3	12	
Hail	4	1	1	4	3	2.25	9	
Lightning	3	2	2	2	4	2.5	7.5	

The highest risks to the town (risks to be profiled) were those with an overall score of two or higher. Each of the “priority” hazards will be profiled to identify the following factors in accordance with FEMA requirements. Landslide and earthquake have a low probability and will not be profiled.

- **Location:** General areas in community that may be vulnerable to the hazard.
- **Vulnerability:** Community structures, systems, populations, or other assets as defined by the community that are susceptible to damage and loss from hazard events.
- **Extent:** The strength or magnitude and details of the most notable event(s).
- **Observed impact:** Financial impact from an event, and/or the number of structures that are impacted.
- **Likelihood/Probability:** Occasionally: 1-10% of occurrence in any year; at least 1 chance in 100 years; Likely: >10% but < 75% in any year; at least one chance in next 10 years; Highly likely: >75% in any given year

B. Hazard-Specific Information for Profiled Risks

1. Flooding (Fluvial Erosion and Inundation Flooding)

Floods can damage or destroy public and private property, disable utilities, make roads and bridges impassable, destroy crops and agricultural lands, cause disruption to emergency services, and result in fatalities. People may be stranded in their homes for a time without power or heat, or they may be unable to reach their homes. Long-term collateral dangers include the outbreak of disease, loss of livestock, wash out of septic systems causing water supply pollution, downed power lines, loss of fuel storage tanks, fires and release of hazardous materials.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Flooding (Fluvial erosion and Inundation Flooding)

All of Westfield is contained in the Missisquoi Bay Basin, an area that extends over most of Franklin County, as well as part of Orleans and Lamoille Counties, and parts of Quebec. According to the 2021 Tactical Basin Plan, the prominent problem areas include land erosion, channel erosion, and nutrient loading. Physical alterations are also present throughout the watershed, ranging from habitat alteration, general stream channel instability and encroachment into the flood hazard zone.

Westfield has two sub watersheds in the Missisquoi Basin:

- The **Upper Missisquoi** sub watershed covers the eastern majority of the Town. The Upper Missisquoi – federally designated a Wild and Scenic River, based on unique cultural, scenic, and recreational qualities --has its origins in Lowell to the south. It flows north into Westfield very close to the Route 100 transportation corridor. After entering Westfield, the river heads east of Route 100, where it remains in a broad valley as it meanders about the Loop Road, picking up flows from Taft Brook and its tributaries. The river re-enters the Route 100 corridor, as it crosses the Westfield town line into Troy. The Upper Missisquoi has a Corridor Management Plan that was completed in 2011.
- The **Trout River** sub watershed on the eastern edge of Westfield contains headwaters for the Trout River– another designated Wild and Scenic River -- which flows successively from Montgomery to Enosburg, and East Berkshire in Franklin County.

Inundation Flooding

This is the type of flooding that occurs when heavy precipitation and ice jams cause streams to spill over into adjoining low-lying lands called floodplains. This risk is associated with moderate to severe community scale impact to life, economy and environment due to damage to personal property, businesses, and business disruption. Major community-scale environmental impacts may be due to sedimentation deposit, loss of crops and loss of water quality. There is also potential for moderate to severe, but isolated damage to infrastructure, particularly roads. Inundation may also leave roads impassable due to standing water. ‘

The Town has participated in FEMA’s National Flood Insurance Program since 1998. Participation in the NFIP allows all Westfield property owners and renters to purchase flood insurance at more affordable. To participate the Town must administer flood hazard regulations using a flood map provided by FEMA. This map depicts inundation hazards known as floodplain. All development in the mapped floodplains (areas with a 1% chance of flooding in any year) must meet minimum standards established by FEMA.

Westfield’s flood hazard map is based on a flood hazard boundary first identified in 1974. It is a paper map organized into 12 panels. Only four of the panels are published because the other eight panels contain no information. Westfield’s map includes Coburn Brook, where it runs near Kennison Road; portions of Mill Brook and Taft Brook; and the Missisquoi River. The Town of Westfield does not currently have an effective Flood Insurance Study (FIS) Report within the jurisdiction. FEMA did not conduct hydrologic or hydraulic studies, and the map lacks important detail such as:

- base flood elevations (how high the water can be expected to rise in the floodplains)
- delineation of floodways (where floodwaters run the deepest and fastest); or
- 500-year floodplains, (areas that could become inundated in a flooding event with a 0.2% chance of occurring in any given year).
- number of structures in the floodplain (although the regional planning commission estimates that there may be about 25 structures, which are most concentrated along Loop Road).

Fortunately, FEMA and the U.S. Geological Survey are remapping areas of the Missisquoi watershed, which will include digitized data, as well as some new studies along the Missisquoi up Loop Road. The draft maps will be available for review shortly. There are currently four flood insurance policies in force in Westfield, for a total insured value of \$1,062,000. Only one of these policies is for a property in the Special Flood Hazard Area. There are no repetitive loss structures, and no claims have been paid to date.

The USGS maintains a stream gage on the Missisquoi River near North Troy, Vermont. The National Weather Service has developed the following flood categories, based on this gauge data:

Table 2B.1.1: Flood Stages along the Missisquoi

Stage	Impact
Action (8 ft)	Water overflows onto farmlands.
Flood (9 ft)	Water floods farmlands along the Missisquoi River from Lowell to North Troy. Low lying portions of Loop Road near Troy and Westfield will flood as well as portions of River Road from Troy to North Troy.
Moderate Flood (11 ft)	Water will inundate River Road between Troy and North Troy, as well as portions of Loop Road in Westfield and Troy. Water will cover portions of Route 100 near Troy and well upstream near Lowell. There will be widespread flooding of lowlands, fields, and pastures long the Missisquoi River from Lowell to North Troy.
Major Flood (12-13 ft)	Large sections of Route 100 will be flooded, water will approach homes along River Road and Loop Road from Westfield to North Troy. Widespread flooding of farmlands. Substantial flooding occurs with water over Loop Road and 3ft of water on Route 100 between Westfield and Newport

Source: USGS Water Gauge Data #042930000

According to the available gauge data, levels have reached the flood stage or higher 12 times since 2011. The highest crest reported on this gauge is 14.72 ft on November 1, 2019, due to flooding from a Halloween storm. The storm resulted in FEMA disaster declaration 4474. The second highest crest was 13.93 ft on August 29, 2011 during Tropical Storm Irene, FEMA disaster declaration 4022. Provisional gauge data indicate a crest of 13.2 ft on July 11, 2023 at 6:30 a.m., FEMA disaster declaration 4720.

Dam failure can be another potential source of inundation flooding. The Coburn Brook Reservoir (Dam #1128) is in service and has a surface coverage of about .8 acre. It is a public water supply for the Town of Troy, but the ANR Natural Resource Atlas indicates that the dam is actually located in Westfield. It is considered a “minimal hazard” dam, which means that is not capable of impounding more than 500,000 cubic feet of water, and that that no direct loss of life can be expected from dam failure, although there may be isolated incidents of loss of agricultural lands, equipment, or non-residential buildings. There is no periodic inspection requirement for minimal hazard dams. The Olhoeft Dam (Dam#1263) is also on Coburn Brook. The dam was formerly owned by the Town of Troy as a water storage dam but was taken offline, is now privately owned, and is intended for restoration as a private hydroelectric facility. The dam was last inspected in July 2021. There are no homes or businesses in the dam’s downstream floodway. If it were to fail, the dam would likely discharge within minutes. It is considered a minimal hazard dam.

Fluvial Erosion

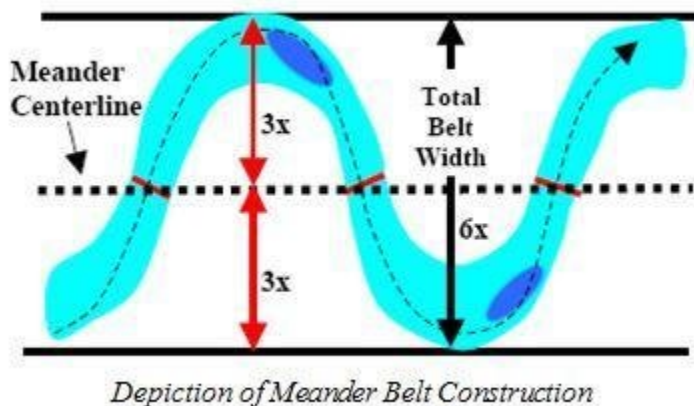
The Vermont Agency of Natural Resources estimates that inundation areas have only been mapped for about 20% of Vermont’s stream miles. The more common mode of damage is associated with the dynamic, and often catastrophic, physical adjustment of stream channel dimensions and location during storm events. These adjustments are often due to bed and bank erosion, debris and ice jams, or structural

failure of or flow diversion by man-made structures. Fluvial erosion can lead to moderate to severe community-scale damage to infrastructure, which includes washed out roadways. There also can be major community-scale impacts to environment, which includes collapse of streambanks, and severe disruption of riverine habitat. Increased sedimentation loads can damage water quality. There are moderate-to-severe threats to personal safety, private property, and businesses from structural damage, but these are likely to occur on an isolated scale.

The Vermont Rivers Program of the Agency of Natural Resources has released statewide data on areas subject to fluvial erosion for all streams and rivers. These risk areas are defined by Vermont Statute as “River Corridors,” 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.

Mapped river corridors along streams with a drainage area of two miles or more consist of two components: a *meander belt* and a *riparian buffer*. The meander belt is an area calculated to accommodate the amplitude of stream meanders that have or will form in response to the laws of physics which dictate that channel depth and slope evolve toward a state of minimal work (i.e., equilibrium or least erosive form). The width of the meander belt will vary depending on the amount of land draining to a given point on a stream, so the River Corridor width varies in part based on stream size. (See Figure 2B.1.1)

Figure 2B.1.1: River Corridor Meander Belt



Source: Vermont Agency of Natural Resources, <https://floodready.vermont.gov/>

The riparian buffer is an extension of the meander belt to provide additional protection. A naturally vegetated buffer helps to protect streambank stability if the meander moves to the edge of the meander belt. If this extension were not included and structures were planned at the very edge of the meander belt, a prospective home or business owner would need to armor the riverbank to protect the structure.

For streams with a drainage of less than two square miles, a riparian buffer of 50 feet on either side of the top of the streambank is deemed sufficient to accommodate lateral movement of the stream channel. Westfield’s Zoning Bylaw currently requires a 50 foot riparian buffer along all streams.

Analysis of the Flood Insurance Rate Map indicates there may be 27 structures in the Special Flood Hazard Area. Most of these are accessory structures, but there are also seven residential structures and four farms. An analysis of the Agency of Natural Resources River Corridor map indicates that may be 25 structures in the river corridor, 13 of which are probably not located in the Special Flood Hazard Area.

Six of these structures unique to the river corridor are residential properties (single-family homes and mobile homes).

Municipalities are strongly encouraged to regulate development in the river corridor as part of their flood hazard regulation. Given the amount of sediment load and stream instability in the watershed, there are significant advantages to adopting river corridor regulations. The Missisquoi Bay Basin plan also advocates for regulation of development in the river corridor, as well as conservation easements to increase flood resilience and allow rivers to reach equilibrium in the Upper Missisquoi, Trout and Tyler Branch.

Much of the flooding that Westfield experiences is flash flooding. Flash floods occur when severe storms drop high amounts of rainfall in short periods of time. Precipitation falls so quickly that the soil is unable to absorb the water, which results in surface runoff that collects in small, upstream tributaries, that then moves quickly downstream at a high velocity. Stream alteration from fluvial erosion will exacerbate the effects of flash flooding. Due to the town's topography, Westfield typically experiences some fluvial erosion with each major flooding event. However, extent data for fluvial erosion is unavailable due to a lack of a central repository for this information to be collected after flood and fluvial erosion events.

At the time of this writing, the entire state is still reeling from the impact of historic flooding from a powerful July storm that dumped as much as 9" of rain on soils already saturated by an unusually rainy summer. At least one person died, and hundreds of Vermonters were forced to evacuate their homes. Roads were closed statewide. Farm fields became inundated, and acres of crops were destroyed. Wastewater systems were compromised as well. Orleans County was only added to the FEMA disaster declaration 4720 on July 26, 2023, and it is far too early to estimate the extent of damage. Westfield experienced flood damage, and the Town expects to seek public assistance for damaged infrastructure.

The one major flood event in Vermont's history by which all other events are judged is the Flood of 1927. Severe loss of life and property was experienced. Statewide, more than 50% of bridges and roads were damaged in the flood that occurred on November 27th of that year. Flooding was statewide. Most bridges over roads were installed after that flood and are now being methodically replaced by the Vermont Transportation Agency on state roads and highways.

Historically, most of the flooding damage in Westfield has been to roads and bridges. Fourteen respondents to the Hazard Mitigation Survey indicated they had been experienced flooding or fluvial erosion in the past ten years. Fourteen respondents also indicated that they had been unable to travel on Westfield roads, due to severe weather. Seven respondents cited Route 100. Other impassable roads were Corrow Basin Road, Ballground, Buck Hill, and Taft Brook. The Westfield Town Plan cites instances of property owners losing land to fluvial erosion.

How climate change will affect future flooding risks

As documented in Figures 1C.2 and 1C.3, rising year-round temperatures have already led to an increase in annual precipitation. As average temperatures rise, more evaporation and transpiration occur, adding more moisture to the air. When the moisture-rich air moves across the land or joins a storm system, we are more likely to experience heavy precipitation. The region's mountainous topography exacerbates this risk, since humid air that moves up along mountainsides cools and creates clouds, leading to more precipitation. Research indicates that New England will see a 52% increase in extreme precipitation events by the end of the century.² These heavier rainstorms will lead to more inundation and fluvial

² <https://home.dartmouth.edu/news/2023/06/extreme-precipitation-northeast-increase-52-2099#:~:text=With%20a%20warmer%20climate%20creating,to%20a%20new%20Dartmouth%20study.>

erosion, leaving a devastating impact on our natural and human communities, including farms, forestry operations, homes, roads, and bridges.

How population and demographic changes will affect future flooding risks

Vermont’s population, including Westfield is getting older. An aging population will have increasing vulnerabilities to all natural hazards due to mobility, health needs, financial constraints, changing communication technologies, and other factors.

How changes in land use can affect future flooding risks.

In general, changes in land use are not expected to impact inundation or erosion risk. Nevertheless, the Town has recently amended their flood hazard regulations to effectively prohibit new development in the Special Flood Hazard Areas, and this prohibition is likely to reduce future damage from inundation. The Town also adopted new regulations to effectively prohibit new development in the river corridors, and this prohibition is likely to reduce future erosion risk. Additionally, the zoning regulations’ newly designated Mountain District significantly limits new development in undeveloped lands with an elevation of 1,600 feet or more. This district contains upland forested areas that can attenuate precipitation and downslope flood flows that can contribute to inundation and erosion flooding. Finally, when the new FEMA maps are available, there may be an opportunity to amend and strengthen regulations in the future.

From 1997 to the present received assistance from FEMA from six federal flooding disaster declarations totaling more than \$386,000. The damage was primarily to roads and bridges. The NOAA Storm Event database has 46 records of flooding and flash flooding going back to 1996. (The term “flash flood” is used in this sense to describe events with a shorter duration). Significant flood and flash flood events with impacts in Westfield are identified below.

Table 2B.1.2 Significant Flood Events in Westfield Town

Date	Description and Impacts	Damage
07/15/1997	Flash flood - A cold front stalled across northern Vermont during the morning of July 15, 1997. This front focused heavy convective rain in this area. Extensive flooding with a number of road washouts resulted. Rises on area rivers were quite rapid. This was FEMA DR 1184.	Total FEMA Public Assistance (for damage to Westfield roads and bridges): \$257,069.
08/11/1998	Flash flood -- A cold front moved across the region during the late afternoon and night of August 11th into the early morning of August 12th. With a warm humid airmass in place, thunderstorms resulted in torrential downpours during the late night. Small streams and brooks quickly rose to bankfull or greater. Roads were flooded in Westfield. This was FEMA DR 1228.	Total FEMA Public Assistance to Westfield: \$55,089.
06/12/2002	Flood - A frontal boundary stalled across portions of New York and New England and helped to focus heavy rainfall across this area. Convective precipitation moved from northwest to southeast across the area from Canada. Rainfall from midday on June 11th through midday June 12th averaged 2 to 4 inches with locally higher amounts in the mountainous areas. Countywide flooding of small streams and fields started during the early morning hours of June 12th and continued into the evening of the 12th. A few minor road washouts and a few minor mudslides were reported. This was followed by continued flooding of main stem rivers through late afternoon and evening of June 13th. These main stem rivers were the Passumpsic, Lamoille and Missisquoi Rivers. This was FEMA DR 1428	\$28,411.18 in total damage to Westfield roads and bridges. Total FEMA Public Assistance: \$21,308.39.

10/16/2005	Flood - An ocean storm system moved north to the east of New England during Saturday, October 15th and into New Brunswick during Sunday, October 16th. Rain was heavy at times October 15th into October 16th. Rainfall amounts across Orleans county were 3 1/2 to 4 1/2 inches. Minor river flooding of the Missisquoi resulted in minor low land flooding and minor flooding of Rte. 100 around Westfield. The river gage at North Troy exceeded flood stage during this period.	\$5,000 in damage reported by NOAA.
07/24/2008	Flood --A cold, unstable upper atmospheric low slowly moved across the eastern Great Lakes during the afternoon of July 24th. Meanwhile, a surface low slowly traveled north along a cold front which moved into a moisture laden atmosphere across New York and Vermont. Numerous showers and embedded thunderstorms with localized heavy rainfall moved across portions of Vermont, already saturated by previous rainfall events, during the afternoon and evening hours. Much of central and northern Vermont had saturated antecedent conditions due to very significant severe weather and heavy rainfall events of July 18th and July 21st-22nd. Widespread rainfall of 1 to 2 inches occurred during the afternoon and evening of July 24th with localized amounts that exceeded 3 inches. This heavy rainfall caused flood problems across central and north central Vermont, especially portions of Washington, Lamoille, Orleans, and Caledonia counties. Route 100 between Lowell and Westfield flooded and closed.	\$2,500 in damage reported by NOAA.
04/26/2011	Flash Flood - Snowmelt from an above normal snowpack and daytime high temperatures in the 50s and 60s on the 25th and 26th, combined with rainfall of a half to one inch early on the 26th to set the stage for a significant flood event across the region. Late in the day on the 26th into the early morning hours of the 27th thunderstorms repeatedly moved over central and northern Vermont, dumping over two inches of rain into already saturated soils and swollen rivers and streams. Flash flooding during the overnight hours late on the 26th quickly transitioned into river flooding by the morning of April 27. Missisquoi at North Troy crested at 12.95 at 11:00 am EST on April 27. Route 100 near the Westfield/Lowell Town Line was closed due to flooding.	\$5,000 in damage reported by NOAA.
05/26/2011	Severe storm reported as hail. Surface low as well as upper atmospheric energy traveled along a quasi-stationary boundary across northern New York and Vermont during the afternoon and evening of May 26th. The air mass ahead of this boundary was moderately to largely unstable and the combination lead to numerous reports of damaging winds and very large hail (up to 2.5 inches in diameter). Some 25,000+ customers lost power during these storms. In addition, several rounds of thunderstorms traversed the same areas in central Vermont near the Route 2 corridor between Middlesex and Lunenburg. The end result of 3 to 5+ inches of rainfall and severe flash flooding and resultant river flooding as well. This unnamed storm was FEMA DR 1995.	\$12,385.37 in total damage to Westfield roads and bridges. Total FEMA Public Assistance: \$9,289.03
08/28/2011	Flood - Heavy rain from Tropical Storm Irene inundated roads in Orleans County Vermont. The Barton River flooded river road near Orleans, and the Barton River at Coventry crested at 10.27 feet at 04:00 am EST Aug 29, over two feet above flood stage of 8.0 feet. Other local roads near Troy were flooded by the Missisquoi river, and the Missisquoi at North Troy crested at 13.94 feet at 02:30 am EST Aug 29, almost five feet over flood stage of 9.0 feet. This was FEMA DR 4022.	\$17,850.08 in total damage to Westfield roads and bridges. Total FEMA Public Assistance: \$16,065.08.

09/05/2012	Flood - Heavy rainfall associated with moisture from the remnants of tropical cyclone Isaac produced minor flooding on the Missisquoi River at North Troy. Four to six inches of rain fell in the headwaters of the Missisquoi River late on September 4 into the early morning of September 5. The Missisquoi at North Troy rose above its flood stage of 9 feet at 16:07 EST September 5, and crested at 9.25 feet at 18:15 EST. At a stage of 9 feet minor flooding of local roads occurs.	No damage reported.
10/01/2019	Flood – Heavy rains. Several reports of water lapping or crossing Route 100 and side streets between Lowell and North Troy.	No damage reported.
11/01/2019	Flood -- Several roads flooded due to very heavy rainfall across Orleans county. Some of the more intense flooding occurred near the headwaters region of the Missisquoi near Lowell and North Troy. The Missisquoi at North Troy crested at 14.72 feet at 11:45 am. This was FEMA DR 4474.	\$30,650.33 in total damage to Westfield roads and bridges. Total FEMA Public Assistance: \$27,585.30

Table 2B.1.3: Flooding Summary Table

Location	Vulnerability	Extent	Observed Impact	Probability
Land adjacent to streams and ponds, river corridors, inundation areas around dams, roadways and areas downstream of undersized culverts and bridges	Culverts, bridges, dams. 27 structures possibly located in floodplains, and 25 in river corridors;	DR 4474, with \$30,650 in damage to roads and bridges; Missisquoi River crest at 14.72 ft. Extent data on flooding due to fluvial erosion is not available, but at least one property owner has reported the loss of land to erosion. No historical data on dam failures	Flooding to Route 100, River Road, and Loop Road, flooding on residential properties and farmlands.	Highly likely: >75% in any given year

2. Severe Winter Weather (Ice, Snow, Cold)

Winter weather often results in temporary road closures, school and business delays, and even power outages. Given the high amount of snowfall this region experiences, the town and residents are generally well prepared to deal with normal winter weather conditions. Severe winter storms, however, have been shown to affect the entire region resulting in:

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Severe Winter Weather

- Extensive damage to above-ground power and utility lines and extended power outages (as what happened in the ice storm of 1998);
- Road shutdowns, making general travel, transport, and emergency vehicle access difficult;
- Shutdown of schools, businesses, and local government services, limiting access to goods and services;
- Structural failure from excessive snow loading, especially barns (as in the storm of 2007);
- Injuries and fatalities from poor driving conditions, frostbite, hypothermia, heart attacks from overexertion, and carbon monoxide poisoning from blocked vents.

Severe winter weather affects the entire planning area. According to the *2018 Vermont State All-Hazards Mitigation Plan*: “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.”

The National Weather Service (NWS) has a new prediction tool (still in prototype) called the Winter Storm Severity Index. The purpose of this tool is to provide National Weather Service (NWS) partners and the public with an indication of the level of winter precipitation (snow and ice) severity and its potential related societal impacts. The WSSI does not depict official warnings and should always be used in context with official NWS forecasts and warnings.

Table 2B.2.1 NWS Winter Storm Severity Index (Prototype)

WSSI Descriptor	General Description of Expected Storm Severity Impacts
None	No snow or ice forecast. No potential for ground blizzard conditions.
Limited	Small accumulations of snow or ice forecast. Minimal impacts, if any, expected. In general, society goes about their normal routine.
Minor	Roughly equates to NWS Advisory Level criteria. Minor disruptions, primarily to those who were not prepared. None to minimal recovery time needed.
Moderate	Roughly equates to NWS Warning Level criteria. Definite impacts to those with little preparation. Perhaps a day or two of recovery time for snow and/or ice accumulation events.
Major	Significant impacts, even with preparation. Typically several days recovery time for snow and/or ice accumulation events.
Extreme Historic	Widespread severe impacts. Many days to at least a week of recovery needed for snow and/or ice accumulation events.

Any given storm will have different levels of impact from these individual components.

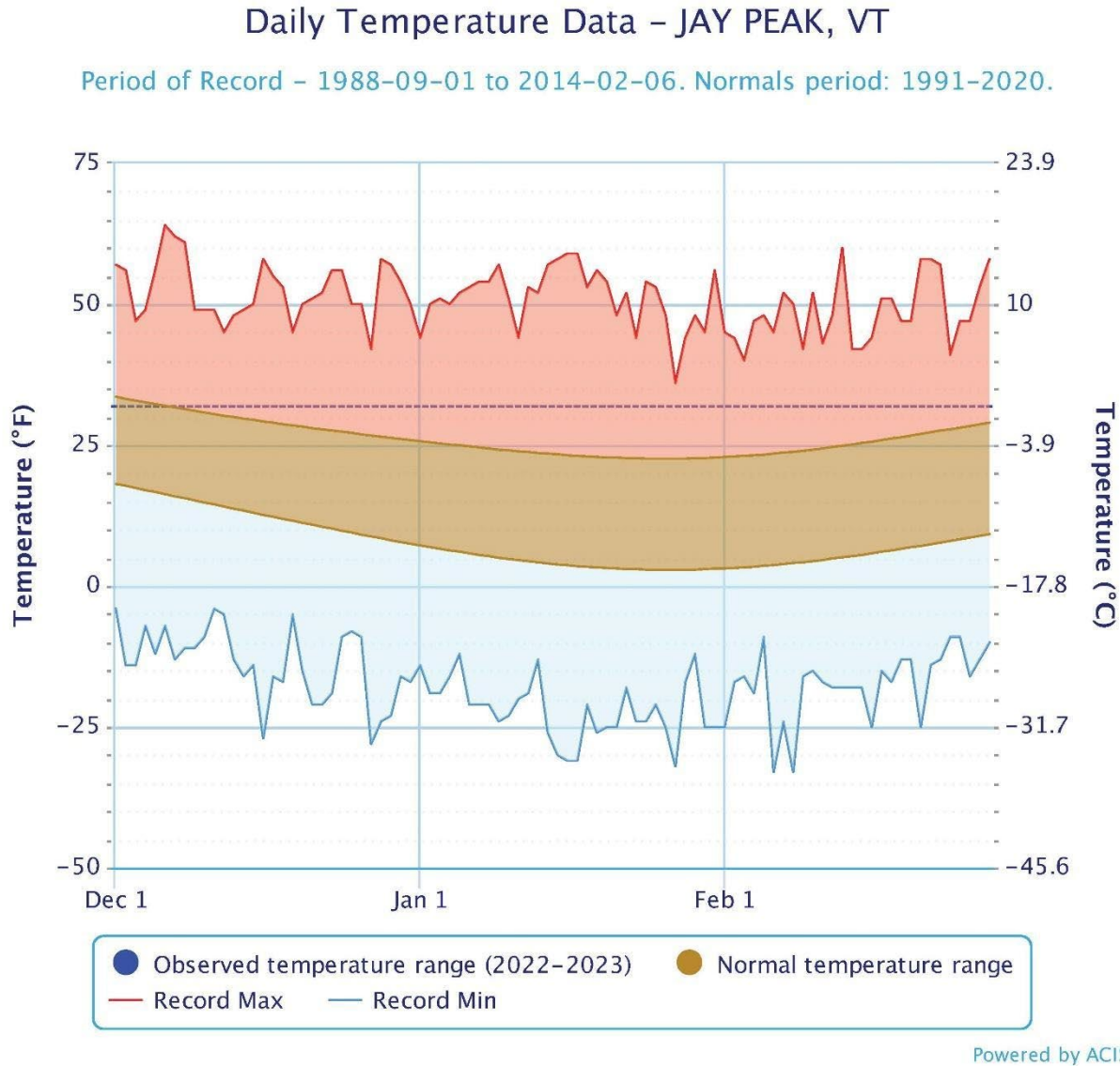
- Snow Amount
- Snow Load
- Ice Accumulation
- Blowing Snow Index
- Ground Blizzard
- Flash Freeze

Cold

Figure 2B.2.1 depicts 2023 temperatures against historic winter temperatures in the area (Jay Peak, which has the nearest dataset). The chart juxtaposes the observed temperatures ranges for the winter of 2023

with the normal temperature ranges from 1990-2020 shaded in brown. Historic highs (red) and lows (blue) for each day are also shown, with records going back to 1988. The historic low is -33° on February 6, 1993, although wind chill factors have probably even exceeded that benchmark.

Figure 2B.2.1: Historic Daily Temperatures 1988 to present.



Source: NowData (National Weather Service)

“Cold” and “extreme cold” have relative meanings for different parts of the country, but sub-zero temperatures are considered extremely cold in northern Vermont. According to National Weather Service data from the past 30 years, sub-zero temperatures in the area usually occur between December and March.

Table 2B.2.2: First and Last Sub-Zero Temperatures in Orleans County (Jay Peak), 1990-present

	First Date	Last Date
Mean	December 13	March 16
Earliest	December 6 (2004)	March 02 (2006)

Latest	December 23 (1998)	April 06 (1995)
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Extreme cold is likely to impact everyone town-wide, causing moderate-to-severe impacts to infrastructure, life, and economy. Water pipes can freeze or burst, and car batteries can die. Extreme cold can disrupt outdoor recreation. Unseasonably cold temperatures can damage agricultural crops.

The NOAA Storm Events Database has eight extreme cold/chill events for Orleans County going back to 2007. There are no reports of deaths or injuries, nor are there estimates for damage. However, nine respondents to the Westfield Hazard Mitigation Survey indicated they had been adversely impacted by extreme cold in the past ten years.

Table 2B.2.3 Extreme Cold/Wind Chill in Orleans County, 2007 to present

Date	Description
01/25/2007	An arctic cold front moved across Vermont on the 24th and delivered very cold temperatures of zero to -25° by the morning of the 25th. However, on the night of the 25th into the morning of the 26th, a secondary cold front combined with a strengthening area of low pressure near New Brunswick accounted for the combination of brisk northwest winds of 10 to 15 mph and temperatures -5° to -20°, for wind chill readings of -25° to -40°. The cold wave diminished slightly on the 27th-29th, due to a slight airmass modification and clouds across the region, but it still remained some 10 to 20 degrees below normal. However, another arctic front pushed across the area on the 29th with a replenishment of arctic air that brought early morning low temperatures on the 30th of 10 to 30 degrees below zero. Morning low in Newport was -22°.
03/06/2007	An arctic cold front swept across Vermont during the afternoon and evening of the 5th and delivered frigid temperatures along with blustery winds. Temperatures plummeted to below zero just after midnight on the 6th and were -5° to -20° by dawn. These frigid temperatures, accompanied by winds of 15 to 30 mph created dangerously cold wind chills of -20° to -40°. Brisk winds with temperatures around zero continued through the daylight hours of the 6th with wind chill readings from -20° to -30°. The winds subsided after sunset on the 6th, but it remained extremely cold through the morning of the 7th. Morning low on the 7th was -21° in Newport.
03/09/2007	Arctic high pressure settled across New England during the night of the 8th and morning of the 9th with more frigid temperatures similar to a few days earlier across Vermont. Morning low on the 9th was -22° in Newport.
01/14/2009	An arctic cold front moved across Vermont during the early morning hours of January 14th, which delivered some of the coldest temperatures across the region in several years. As the arctic front passed across northern Vermont, temperatures dropped over 20 degrees within several hours. Temperatures averaged 20 to 25 degrees below normal values, which were already at climatological winter minimums. These extremely cold temperatures led to numerous cold weather-related problems including numerous dead vehicle batteries and broken home and business water pipes. Morning lows for January 15th were -24° in North Troy, -21° in Morrisville, and -20° in Newport.
01/07/2015	An arctic cold front pushed across Vermont during the afternoon hours of January 7th with plummeting temperatures and brisk, strong winds (15 to 30+ mph) causing dangerously cold wind chills of -25° to -40° during the evening of January 7th into the morning hours of January 8th. Observed wind chills in the mountains ranged from 40 to 70 below zero. Actual low temperature on the morning of the 8th was -22° in North Troy. Dangerously cold wind chills led to delayed school openings or cancelled classes on the morning of January 8th.
01/11/2022	Arctic high pressure moving from central Canada across the Great Lakes into the northeast on January 11th. Brisk northwest winds of 10 to 20 mph delivered sub-zero air

	temperatures that combined created apparent temperatures (wind chill) in the -20° to -35° range across north-central and northeast VT and higher elevations. Numerous school districts closed school and after-school activities due to the cold and COVID-related complications.
01/14/2022	An arctic cold front moved across VT with a strong area of high pressure across south-central Canada building into VT by late Saturday into Sunday, delivering sub-zero temperatures Friday night through Sunday morning. Simultaneously, a powerful ocean storm was moving into Newfoundland Canada Friday afternoon that created brisk north-northwest winds of 15 to 25 mph with higher gusts that, combined with the arctic airmass, created dangerously cold wind chills of -25° to -40° overnight Friday night into Saturday morning. Overnight air temperatures were -10° to -20° Friday night-Saturday morning and -10° to -25° Saturday night-Sunday morning. These dangerously cold temperatures caused some postponements of outdoor activities, including festivals and some ski resorts.
02/02/2023	An arctic airmass entered Vermont during the morning hours of February 3rd (Friday) and continued through the evening hours of February 4th (Saturday). Daytime actual temperature readings fell during Friday to zero to 15 below zero and still falling by mid-afternoon with brisk west winds creating wind chills of 20 to 40 below zero. Overnight lows Friday night were 15 to 30 below zero with minimum wind chill values of 30 to 45 below zero and it wasn't until Saturday afternoon when actual air temperatures surpassed zero in spots but developing south winds still produced sub-zero wind chills. The last occurrence of something this widespread and intense, although brief, was in January 26-27, 1994. Numerous schools and businesses closed as well as outdoor events, including ski resorts. Actual low temperatures includes -24° in Newport and -21° in North Troy. Wind chill values in Newport were -46°.

Those who are especially vulnerable to the impacts of extreme cold are residents in older structures and energy-burdened households. According to most recent American Community Survey 5-year estimates (2021), more than 45% of Westfield’s housing units are at least 50 years old. Older structures are likely to be “leaky” and poorly insulated, which can nearly double average heating energy use. Heating challenges are further exacerbated by energy burden, which is measured as energy spending as a percentage of income. Energy burden, according to a 2019 study by Efficiency Vermont, is high in the rural Northeast Kingdom. While the average energy burden statewide is about 10%, Westfield’s overall energy burden is considered “high” at nearly 14%. The greatest determinant of energy burden is income, not fuel cost, so even though many residents are able to reduce their costs by burning wood, they still struggle to make ends meet.³ Energy burdened residents can get help from low- or no-cost home weatherization services, such as HEAT Squad and Northeast Employment and Training, but not everyone is aware of these services.

Structure fires are a vulnerability of extreme cold since fires are more likely to occur during the winter heating months. According to FEMA, Vermont’s crude death rate (per million in population) of 17.6 is well above the national crude rate of 11.2. These rates should be viewed with caution, since they are based on very small numbers of actual deaths. Nevertheless, the relative risk of fire in Vermont is 1.6, still slightly above the overall national risk of 1.0.⁴ The age of Westfield’s housing stock as well as its dispersed settlement pattern may be complicating factors. Residents living in remote areas accessible by class 4 roads may face a delayed response time for emergency vehicles.

³ Efficiency Vermont: 2019 Energy Burden Report <https://www.encyvermont.com/news-blog/whitepapers/vermont-energy-burden>

⁴ FEMA: Fire in the United States, 2008-2017, November 2019, 20th Edition. <https://www.usfa.fema.gov/downloads/pdf/publications/fius20th.pdf>

How climate change will affect future risks from extreme cold

Climate change has already resulted in more mild winters in Vermont. Winter temperatures are rising 2.5 times faster than the global average temperatures since 1960. However, the ensuing loss of snow cover may create new threats for cold and freezing temperatures in the future. Plants and wildlife that rely on snowpack for insulation and burrowing during the winter months may be imperiled by direct exposure to freezing temperatures. Warming is also having a direct impact on typical winter weather conditions including pond and lake ice reduction, freeze thaw cycle changes, ice dams, decreasing snowpacks impact on soil and roots, and shifting agricultural production times.

How population and demographic changes will affect future risks from extreme cold

Vermont's population, including Westfield is getting older. An aging population will have increasing vulnerabilities to all natural hazards due to mobility, health needs, financial constraints, changing communication technologies, including reduced resilience to extreme temperatures.

How changes in land use can affect future risks from extreme cold.

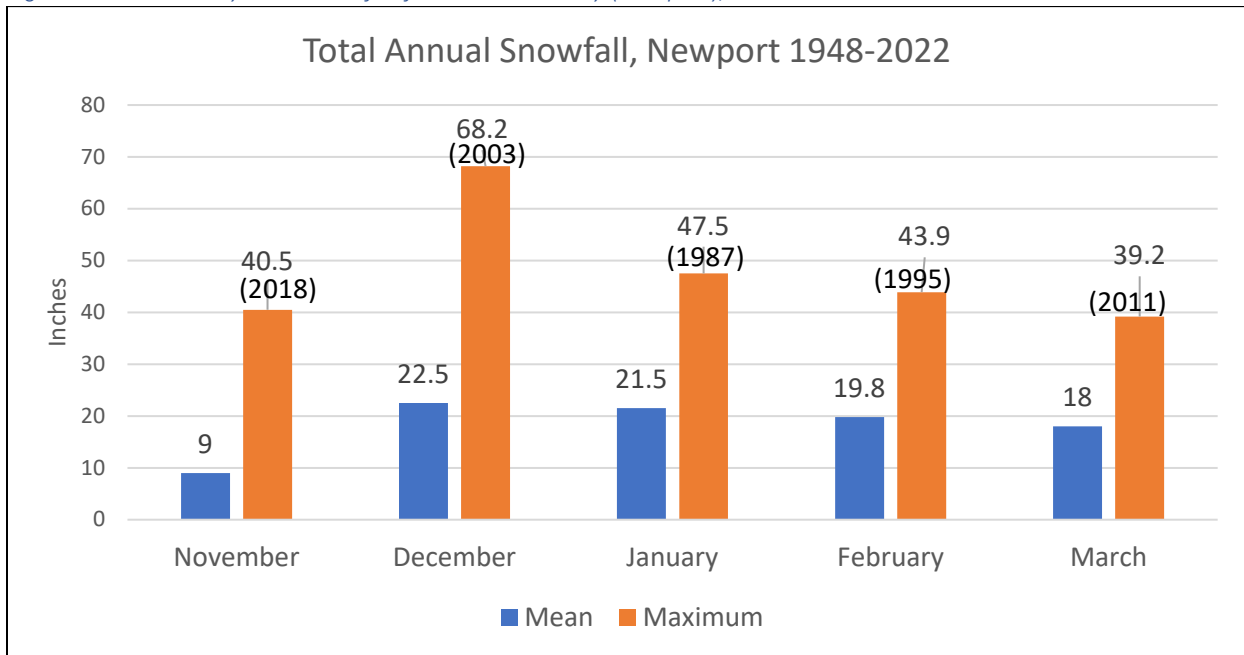
Changes in land use are not expected to increase the town's vulnerability to extreme cold. Nevertheless, future development should be compliant with current energy codes (for residential and commercial), which will help reduce vulnerability with improved thermal performance in newer structures. In older structures, aggressive weatherization and fuel-switching incentives to energy-burdened households will also help to minimize the risk by improving thermal performance and reducing reliance on combustible fuels for heat. Most recent reports from Efficiency Vermont indicate that there have been 93 residential projects in Westfield since 2021, including three weatherization and 11 cold climate heat pump installations. On the commercial & industrial sector, there have been 33 projects completed over the same period.

Snow

In general Westfield residents and business owners are accustomed to snow and businesses are unlikely to shut down because of heavy snowfall. The likeliest moderate-to-severe impacts to infrastructure would be short term because roadways are not passable during a storm. Residential properties may be impacted by snow blocking exterior heating and ventilation, creating a risk for carbon monoxide poisoning. Older or disabled residents may be especially vulnerable because they are unable to shovel. According to recent American Community Survey (ACS) estimates, there are about 30 single-person households occupied by someone over the age of 65. ACS data also indicate that there nearly 30 individuals in Westfield with some form of disability.

Heavy wet snow accumulations can cause power outages, leaving residents without heat or running water. Sixteen Westfield survey respondents indicated that they had gone without heat or running water for a day or longer, and five indicated that they had lost perishable food. One respondent was unable to perform home dialysis due to an extended power outage.

Figure 2B.2.3 Monthly Total Snowfall for Orleans County (Newport), 1948-2022



Source: NOWData, NOAA

Orleans County’s snow season can extend from October through May, with the heaviest monthly snow accumulations in December. The biggest snowstorms, however, tend to occur in February/early March. The mean average snowfall for the entire season (from 1948 through 2021-2022) is 97.7”.

The nearest and most complete data on snowfall and accumulation is in Newport. The mean number of days per year with more than 1” snow cover is 128 days. The maximum number of days with snow cover was in 1972 at 161 days, and the minimum was in 2010 with 95 days.

Historic data on snowfall in Newport have gaps, but the existing data suggests a downward trend in the annual snow cover. This trend is consistent with statewide data and loss of snow cover, which can be attributed to rising temperatures. Reductions in snow fall may leave exposed ground more vulnerable to freezing during extreme cold events, which can cause significant impacts to building infrastructure. The loss of snow cover could have a devastating economic impact in the Northeast Kingdom, which relies heavily on all-season outdoor recreation.

According to the NOAA database, the record snowfall extreme for Orleans County occurred on February 5-6, 1995, in Jay Peak with 1-day, 2-day, and 3-day totals of 42”, 48” and 48” respectively.

"Heavy Snow," according to the National Weather Service, is snowfall accumulating to 4 inches or more in depth in 12 hours or less; or snowfall accumulating to 6 inches or more in depth in 24 hours or less. The NOAA Storm Event database records five heavy snow events in Orleans County from January 1, 2000 through January 31, 2022. There were no direct injuries or deaths, but all events incurred property damage:

Table 2B.2.4: Heavy Snow Events

Date	Description	Total Property Damage
1/24/2002	A cold front moved across the area with snow squalls reported across northern Vermont. Generally, 3 to 5 inches fell with the heavier squalls.	\$1,000

2/27/2002	A cold front moved across the area accompanied by and followed by snow squalls. In addition, an ocean storm spread moisture into the region. Generally between 3 and 6 inches of snow fell in the hilly terrain, with a few locally higher amounts. East Albany received 5.5".	\$1,000
2/14/2007	Snow fell heavy at times from late morning through early afternoon in southern Vermont and early afternoon through early evening elsewhere, before dissipating during the night. The deep snowfall caused numerous problems, including the blocking of numerous heat vents that resulted in the build-up of carbon monoxide and sent dozens of people seeking treatment at area hospitals. There were additional indirect injuries resulting from this storm, including vehicle accidents and cardiac arrests due to overexertion during snow removal. Snow removal operations took several days and up to a week in some urban communities. In addition, the weight of the heavy snowfall on some weaker roofs resulted in the partial or total collapse of 20 or more barn roofs and the deaths of more than 100 cattle. 26" of snow reported in Newport.	\$200,000
2/05/2014	The combination of low pressure from the Gulf of Mexico that moved into the Ohio River valley on the night of February 4th and a developing coastal low that moved south of New England on February 5th delivered widespread snowfall to Vermont on February 5th. A widespread 5" to 12" of snow fell across Vermont with the higher totals in the central and southern Green Mountain communities. Snowfall was at its peak during both the morning and afternoon/evening commutes causing hazardous travel. Six to ten inches of snow fell across Orleans County.	\$10,000
2/13/2014	A winter storm responsible for record ice and snow across the southeast United States on February 12th moved and redeveloped off the southeast US coastline on February 13th. This storm intensified as it hugged the eastern seaboard on February 13th, moved across southeast Massachusetts and into the Gulf of Maine by February 14th. Snow began to overspread southern Vermont during the mid-morning hours of February 13th, not reaching the Canadian border until the evening commute. There were two bands of heavy snowfall, snowfall rates of 1-2+ inches an hour, that moved across the region. The first band moved across southern and eastern Vermont during the afternoon hours of February 13th and again during the early morning hours of February 14th. Thursday evening and especially Friday morning's commute was hazardous with nearly all schools closed due to the storm on Friday, February 14th. Snowfall in Orleans County ranged from 12" to 18".	\$15,000
2/02/2015	A storm system moved from the Desert Southwest on Saturday (1/31) to the Mississippi Valley on Sunday (2/1) and across the Ohio River Valley and south of New England on Monday (2/2). This brought snowfall across Vermont during the early morning hours and continued into the late afternoon. A widespread 6" to 12" of snow fell across the region and it was cold with temperatures only near zero degrees. Westfield received 7" of snow. [Note: This was FEMA disaster declaration 4207.]	\$15,000

NOAA defines a *winter storm* as an event that has one significant winter weather hazard (i.e., heavy snow and blowing snow; snow and ice; snow and sleet; sleet and ice; or snow, sleet and ice) and meets or

exceeds locally/regionally defined 12 and/or 24 hour warning criteria for at least one of the precipitation elements.

How climate change will affect future risks from snow

Climate change has already resulted in more mild winters in Vermont. Winter temperatures are rising 2.5 times faster than the global average temperatures since 1960. This is likely to increase the town’s vulnerability to wet and heavy snow events that could increase impacts to power lines and critical facilities.

How population and demographic changes will affect future risks from snow

Vermont’s population, including Westfield is getting older. An aging population will have increasing vulnerabilities to all natural hazards due to mobility, health needs, financial constraints, changing communication technologies, including reduced resilience to extreme temperatures or ability to shovel snow.

How changes in land use can affect future risks from snow

Development or conversion of seasonal residences to full-time homes in more remote areas, as well as large lot residential development in remote areas, could increase vulnerability due to power outages from wet, heavy snow. However, the town’s recently amended zoning bylaws -- which creates a “Mountain District” that restricts development in some of the town’s more remote areas – might minimize this effect.

Orleans County has 111 winter storm events reported in the NOAA Storm Events database from January 1, 2000 to April 30, 2023. Winter storm events with notably heavy snow accumulations are:

Table 2B.2.5: Notable Winter Storms with Heavy Snow Accumulations

Date	Description	Total Property Damage
2/06/2001	10” snow reported in Greensboro. Barn roofs collapsed in Craftsbury and Holland, apparently due to the weight of snow after the storm ended. Minor automobile accidents were reported.	\$75,000
03/05/2001	19” reported in Newport. Snow didn’t taper off until March 6. FEMA disaster declaration EM-3167 provided \$1,542 in assistance to the Town of Westfield for snow removal.	\$75,000
10/25/2005	Steady rain on the 25th of October changed to snow by early afternoon in the higher terrain counties of Vermont. The snow was very wet and became heavy at times, accompanied by gusty winds. With foliage still on the trees, the weight of the snow easily took many trees and tree limbs down with extensive power outages. Thousands were without power. A local radio station in Derby was off the air due to power outages. Numerous accidents were reported. Some schools were closed on the 26th. By the evening of the 25th the impact of the storm was clearly being felt with 4” to 6” snowfall. Total snow accumulations in this area were 8” to 18” with lesser amounts in the sheltered valleys. Barton (Orleans county) reported 16.5”, while Cambridge (Lamoille county) received 14”.	\$100,000
12/09/2014	The heavy, wet nature of the snowfall with snow to water ratios of 8:1 or less accounted for snow-loaded trees that resulted in more than 175,000 power outages in the region from December 9th through December 12th. This was the 2nd most power outages due to weather	\$150,000

	in the state of Vermont. Up to 130 VEC customers in Westfield were without power.	
11/26/2018	Light rain changed to a pasty, heavy wet snow that resulted in downed tree limbs and power outages across VT. Snow accumulation was 16" in Newport. The heavy wet snow accounted for more than 40,000 outages, leaving 100,000 customers without power due to snow loading on power lines. Up to 495 VEC customers in Westfield were without power.	\$100,000
12/16/2022	A wet, heavy snowfall of 6' to 18' inches was common across Orleans county with the higher totals in the highest elevation. Nine inches reported in Westfield. 67 VEC customers in Westfield lost power.	\$0.00
03/14/2023	A heavy, wet snow fell across the county with a general 10 to 20 inches of snow, the higher totals across the higher terrain. This led to some tree damage and scattered power outages. Some specific snowfall totals included 13" in Westfield and 10" in Newport.	\$0.00

Ice

Ice accumulation is becoming a regular concern for winter weather, especially with rapidly fluctuating temperatures in winter months. Ice accumulation can lead to moderate to severe community-scale damage to infrastructure and economy, which includes downed trees and power lines, dangerous roadways, and extensive power outages that lead to closure of schools, services, and businesses. Ice accumulation can also lead to isolated but moderate to severe impacts to trees and plant life. Sixteen respondents to the Westfield Hazard Mitigation Survey indicated they had experienced adverse impacts from severe winter weather and ice in the past ten years, although they did not specify details.

The Vermont State Hazard Mitigation Plan considers ice to have greater impacts than hazards associated with snow. Pre-storm road temperatures and surface conditions affect the potential for ice accumulation on roads and walkways. Roads and walkways washed clear of salt and sand by rain, for example, are more likely to form ice. Subsequent snow accumulation can hide the icy layer beneath. A search of NOAA winter storm records reveals that ice accumulation was involved in 17 of Orleans County’s 111 winter storm events. Impacts were treacherous driving conditions leading to road accidents, as well as accumulation on powerlines leading to significant and prolonged power outages.

According to the NOAA Storm Event database, Westfield has experienced two significant ice storms. Both resulted in federal disaster declarations.

How climate change will affect future risks from ice

Our warming winters have already led to prolonged patterns of melting and refreezing, not to mention wintry mix of freezing precipitation. As winter temperatures continue to rise faster than summer temperatures, we can expect more ice accumulation.

How population and demographic changes will affect future risks from ice

Vermont’s population, including Westfield is getting older. An aging population will have increasing vulnerabilities to all natural hazards due to mobility, health needs, financial constraints, changing communication technologies, and other factors.

How changes in land use can affect future risks from ice

Development or conversion of seasonal residences to full-time homes, as well as large lot residential development, could increase vulnerability due to icy roads in hard-to-reach areas. However, the town’s

recently amended zoning bylaws -- which creates a “Mountain District” that restricts development in some of the town’s more remote areas – might minimize this effect.

Table 2B.2.6: Ice Storms in Orleans County

Date	Description
1/06/1998	<p>A storm system moved from the Tennessee Valley on Wednesday (January 7) and Thursday (January 8) into New England thereafter. A cold front across New England and New York associated with an arctic high-pressure system across Canada resulted in a flow of low-level cold air into Vermont. Warm moist air riding over this low-level cold air resulted in icing across portions of this area. Significant icing was generally restricted between 1500- and 2500-foot level.</p> <p>Ice accumulations during this event were generally 1/4” or less. The impact on the region ranged from ice accumulations damaging tens of thousands of trees. Downed power lines resulted from the weight of the ice, leaving thousands without power. Farmers who lost electricity were unable to milk cows with loss of income and damage to cows. Automobile travel was negatively impacted with several roads closed due to ice and fallen trees. There were numerous traffic accidents. Indirect injuries were reported due to carbon monoxide poisoning while improperly using generators. Falling tree limbs and other debris was a significant hazard during and following the storm. \$80,000 reported in damages. <i>[Note: This was FEMA Disaster Declaration 1201.]</i></p>
12/21/2013	<p>A stationary boundary was draped across the Adirondacks of New York into portions of central and northern New England from December 20th through 22nd with several disturbances delivering precipitation. An impressive battle between mild to warm moist air, south of the boundary with temperatures in the 50s, overriding a very cold, dense shallow air mass with temperatures in the teens and 20s in northwest Vermont but single digits just north across the border into Canada. First round of wintry precipitation fell across northwest Vermont, especially along the Canadian border during Friday afternoon and evening (December 20th). Most of the precipitation fell as freezing rain, approximately 1/4” to 1/3” of ice accumulation, along with some sleet. The second round began during the early afternoon hours of December 21st and peaked during the evening and overnight hours. An additional ½” to ¾” inch of ice accumulation as well as 1” to 2” inches of sleet occurred in portions of northern Vermont. Very cold temperatures (-10° to teens) followed the event with no melting, thus ice stayed on trees and utility lines through December 28th-29th, prolonging recovering efforts. The greatest impact was in northwest Vermont, especially along the Canadian border, with widespread tree and utility line damage as well as numerous vehicle accidents. More than 75,000 customers were without power from hours to days across the region. The areas impacted were similar to the Ice Storm of January 1998, but not the severity, as precipitation and ice accumulation were half of the 1998 storm. Ice jams also developed during this time period as runoff from melting snow and rainfall swelled area rivers. River rises were enough to break up and move ice cover, resulting in scattered ice jams. More than 1,000 VEC customers in Westfield went without power, many for more than two days. <i>[Note: This was FEMA Disaster Declaration 4163.]</i></p>

Table 2B.2.7: Severe Winter Conditions Hazard Summary Table

Hazard	Location	Vulnerability	Extent	Observed Impact	Probability
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Cold	Town-wide	People living in older structures; energy burdened households Structure fires Damage to water pipes Damage to agricultural crops	-33° recorded in Jay Peak on February 6, 1993; wind chill values of -46° recorded in Newport on February 2, 2023	Burst water pipes and flooding; school cancellations and delays; outdoor recreation events cancelled	Highly Likely: > 75% in any given year
Snow	Town-wide	Roofs prone to collapse from weight; Power lines and trees; impassable roads due to wet snow; indirect injuries from overexertion; carbon monoxide risk.	February 5-6, 1995, county wide extreme snow fall, with 1-day, 2-day, and 3-day totals of 42", 48" and 48" respectively. (Jay Peak)	\$1,542 in snow removal assistance from FEMA; Up to 450 VEC customers without power from a single snow event; school and business closings.	Highly Likely: > 75% in any given year
Ice	Town-wide	Road accidents, downed tree limbs, powerlines	1998 ice storm	Extended power outages; lost income from dairy operations; road accidents; carbon monoxide from improper use of generators.	Highly Likely: > 75% in any given year

3. Wind

The Beaufort Wind Scale, one of the first scales to estimate wind speeds, was created by Britain's Admiral Sir Francis Beaufort in 1805 to help sailors estimate the winds via visual observations. The scale starts with 0 and goes to a force of 12. The Beaufort scale is still used today to estimate wind strengths. The table below, which focuses on specifications for land, provides perspective on the wind strengths that can be expected in Westfield.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Wind

Table 2B.3.1: Beaufort Wind Scale

Speed				
Force	MPH	Knots (KTS)	Description	Specifications for Land
0	0-1	0-1	Calm	Calm; smoke rises vertically.
1	1-3	1-3	Light air	Direction of wind shown by smoke drift, but not by wind vanes.
2	4-7	4-6	Light Breeze	Wind felt on face; leaves rustle; ordinary vanes moved by wind.

3	8-12	7-10	Gentle Breeze	Leaves and small twigs in constant motion; wind extends light flag.
4	13-18	11-16	Moderate Breeze	Raises dust and loose paper; small branches are moved.
5	19-24	17-21	Fresh Breeze	Small trees in leaf begin to sway; crested wavelets form on inland waters.
6	25-31	22-27	Strong Breeze	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
7	32-38	28-33	Near Gale	Whole trees in motion; inconvenience felt when walking against the wind.
8	39-46	34-40	Gale	Breaks twigs off trees; generally impedes progress.
9	47-54	41-47	Severe Gale	Slight structural damage occurs (chimney-pots and slates removed)
10	55-63	48-55	Storm	Seldom experienced inland; trees uprooted; considerable structural damage occurs.
11	64-72	56-63	Violent Storm	Very rarely experienced; accompanied by wide-spread damage.
12	72-83	64-71	Hurricane	This is approaching a Category One Hurricane, according to the Saffir-Simpson Wind Scale: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.

Source: NOAA

Hurricanes are rare in Vermont, as are tornadoes, and only three have been reported in Orleans County since 1990 (none in Westfield). The National Oceanic and Atmospheric Administration (NOAA) lists three types of wind events that have affected Westfield from 1/1/1990 to 4/30/2023:

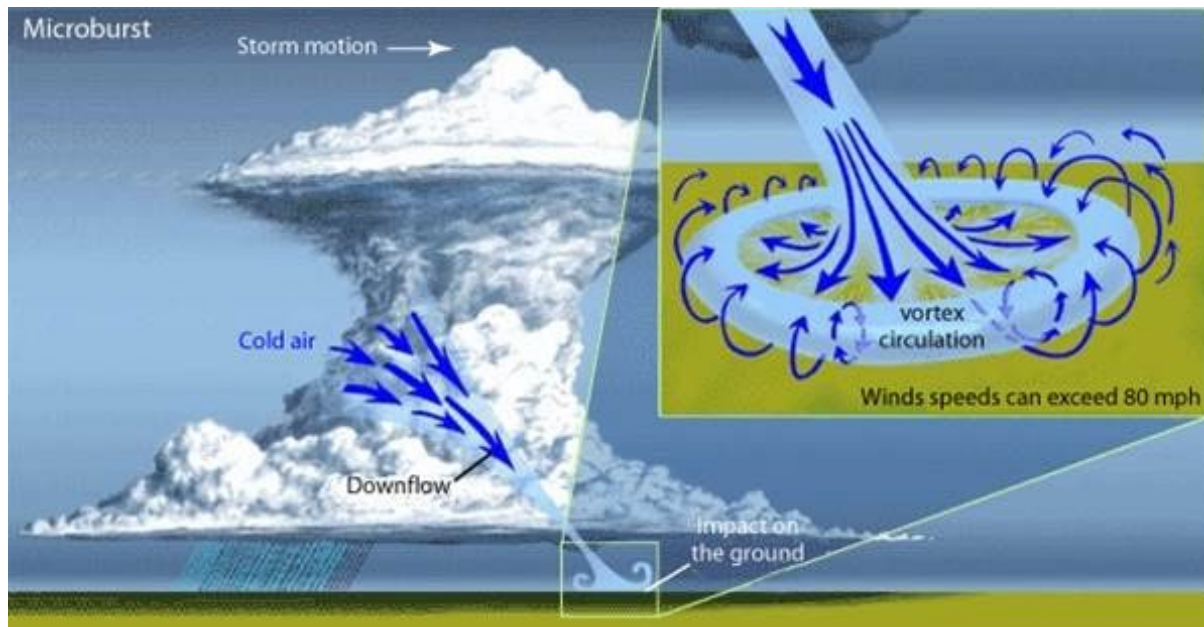
- **Thunderstorm Wind:** Winds arising from convection (occurring within 30 minutes of lightning being observed or detected), with speeds of at least 50 knots (58 mph), or winds of any speed (non-severe thunderstorm winds below 50 knots) producing a fatality, injury, or damage. There are 119 thunderstorm wind events recorded in the NOAA database, and three events with impacts in Westfield.
- **Strong Wind:** Non-convective winds (i.e. not associated with a thunderstorm) gusting less than 50 knots (58 mph), or sustained winds less than 35 knots (40 mph). There were 24 events reported in the NOAA Storm Event Database from 1/1/1990 to 4/30/2023 in Orleans County. There were no specific impacts reported for Westfield, but one event was the notorious Halloween storm of 2019, which incurred flooding impacts in Westfield and sustained power outages.
- **High Wind:** sustained non-convective winds of 35 knots or greater lasting for 1 hour or longer, or winds (sustained or gusts) of 50 knots for any duration, on a widespread or localized basis. There are 14 high wind events in the NOAA database, one with reported impacts in Westfield.

Westfield residents frequently experience downed trees and power outages from wind. Thirteen respondents indicated they had experienced wind damage in the past 10 years. Two respondents cited downed trees. Since most residents are on private wells, they also lose their water when the power goes out. One survey respondent reported having to use a generator.

The most damaging winds that Westfield experiences are “straightline” winds, i.e. thunderstorm winds that are not rotational like a tornado. Of particular concern are thunderstorm winds associated with a microburst, which can even approach 11 or 12 of the Beaufort Scale.

The National Weather Service defines a microburst as a localized column of sinking air (downdraft) within a thunderstorm, that is usually less than or equal to 2.5 miles in diameter. (Figure 2B.3.1)

Figure 2B.3.1: Microburst



Source: NOAA

Ideal conditions for microbursts occur in hot humid conditions and can be exacerbated by instability, high levels of precipitative water, and converging air in the middle of a thunderstorm. It occurs when large amounts of water or hail are suspended in the updraft. Evaporational cooling and sinking air weaken the updraft to the point where it can no longer hold up the large core of rain or hail. Subsequently, the core plummets to the ground, spreading out in all directions. The location where the microburst first hits the ground incurs the greatest damage, which include high winds. The phenomenon usually lasts just a few minutes, but the damage can be intense.

Forecasting for microbursts is near to short term (6-12 hours) and is based on the atmospheric conditions likely to lead to a microburst. However, microbursts can also occur without any warning at all because they can form quickly between radar scans.

Non-convective winds, though of lesser magnitude, have also caused damage in Westfield.

How climate change will affect future risks from wind

As climate change accelerates, Westfield is likely to experience more wind damage from hurricanes, tropical storms, as well as severe thunderstorms and microbursts. As more greenhouse gases are emitted, heat is being trapped in the atmosphere and is more readily absorbed by oceans due to the high heat capacity of water. Thus, as climate change accelerates, we can expect warmer temperatures of the ocean, which can in turn lead to stronger hurricanes and tropical storms. Similarly, warm, moist air can contribute to more severe thunderstorms and microbursts, which are more likely to produce the straightline winds that already cause damage in Westfield.

How population and demographic changes will affect future risks from wind

Vermont’s population, including Westfield is getting older. An aging population will have increasing vulnerabilities to all natural hazards due to mobility, health needs, financial constraints, and changing communication technologies.

How changes in land use can affect future risks from wind

The community’s low-density development, inter-dispersed with significant tree cover is likely to make more residential properties vulnerable to damage from downed trees and power lines. Given prevailing development trends, land use changes are not anticipated to change vulnerability to wind. However, more development in remote areas would increase vulnerability to long-term power outages due to wind events. The town’s recently amended zoning bylaws -- which creates a “Mountain District” that restricts development in some of the town’s more remote areas – might minimize this effect.

Table 2B.3.2: Significant Wind Events in Westfield, 1990 to present

Date	Type	Magnitude	Description and Impacts	Damage
5/31/1990	Thunderstorm wind	Not specified	An area of strong low pressure moved across southern Canada during Sunday, May 31st. Thunderstorms and showers moved across the county, some with strong winds and very heavy rain. Trees were blown down in Westfield, Vermont. Frequent cloud to ground lightning was reported.	\$5,000
11/02/1999	High wind	Not specified	A storm system over the Tennessee Valley Tuesday morning, November 2, 1999 moved northeast into the St. Lawrence Valley Wednesday morning, November 3, 1999. Strong winds developed ahead of this system. Trees were uprooted in Newport Center with power outages. Across the county, numerous trees and power lines were blown down. Power outages were reported in Lowell, Westfield, Craftsbury, Coventry, Irasburg, Derby Center, Troy, Jay, Morgan and Holland.	\$15,000
05/06/2010	Thunderstorm wind	50 kts	Trees downed by thunderstorm winds along Route 100 in Westfield.	\$2,000
08/01/2016	Thunderstorm wind	50 kts	A MCS (Mesoscale Convective System) developed in an extremely warm, humid and unstable airmass across southern Quebec, during the late evening of the 1st, and moved southeast into New Hampshire and Maine by midnight. However, the western edge clipped extreme northern Vermont with severe thunderstorms. A second round of severe thunderstorms moved into western Orleans county and knocked down numerous trees between Lowell and Westfield along Route 100.	\$10,000
11/01/2019	Strong Wind	48 kts	Strong winds with wind gusts in excess of 50 mph at times caused numerous downed tree limbs and subsequent power outages. Also,	\$75,000

			due to saturated soils many trees were uprooted as well, leading to closed roads and some structural damage. 1,140 VEC customers in Westfield lost power, some for nearly a day. <i>(Note: This event resulted in FEMA Disaster Declaration 4474, and Westfield received public assistance funds. See Section 2B.1 Flooding)</i>	
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Table 2B.3.3: Wind Hazard Summary Table

Location	Vulnerability	Extent	Observed Impact	Probability
Town-wide	Downed trees, downed power lines, extended power outages; potential for injuries from falling debris or power lines; disruption to services and businesses	Thunderstorm winds on 5/06/2010 and 08/10/2010 approaching 50 kts	Trees lost, roads blocked, power outages	Highly Likely: > 75% in any given year

4. Drought

Drought is defined as a shortage of water relative to need. According to the Vermont 2018 Hazard Mitigation Plan, drought is a complex phenomenon for several reasons:

- It is difficult to monitor and assess because it develops slowly and covers extensive areas, as opposed to other disasters that have rapid onsets and obvious destruction.
- The effects of drought can linger long after the drought has ended.
- Drought is an inherent, cyclical component of natural climatic variability and can occur at any place at any time, making it difficult to determine the onset, duration, intensity, and severity, all of which affect the consequences and corresponding mitigation techniques.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Drought

Extended periods of drought during a Vermont growing season can be devastating for agriculture. USDA data show occasional payouts from crop insurance due to drought damage, but this data is at the county level, so it is not possible to determine if these losses occurred in Westfield. Furthermore, not all local growers carry crop insurance. Forestry operations are susceptible to drought as well, because extended warm and dry seasons can increase risk of disease. Drought also weakens or kills wildlife, and the dieback of vegetation and increased risk of wildfire destroys habitat.

Drought can also result in loss of potable water when wells run dry. Although the surface waters may appear to have recovered from a period of drought following a return to normal precipitation, replenishing groundwater levels is a longer process. Low water levels in wells can yield higher

concentrations of metals (uranium, iron, sulfur, arsenic, and manganese) in drinking water, making the water unsafe to drink.

Drought conditions are also favorable for wildfires. Low water levels can also affect recreation and fishing. Low water levels, paired with rising temperatures, can trigger the occurrence of blue-green algae in lakes and ponds.

High winds, low humidity, and extreme temperatures can all amplify the severity of the drought. The severity of a drought depends on the duration and extent of the water shortage, as well as the demands on the area’s water supply. Drought classification categories range accordingly:

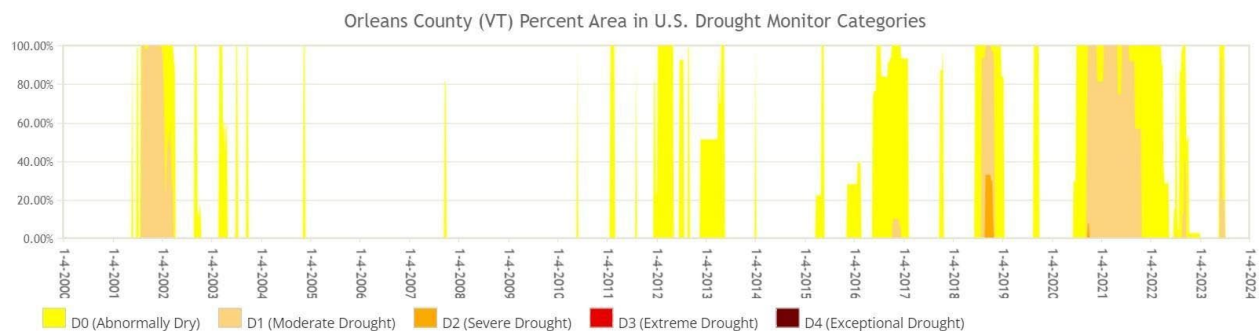
Table 2B.6.1: Drought Severity Table

Classification	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits pastures or crops not fully recovered
D1	Moderate Drought	Some damage to crops, pastures. Streams, reservoirs, or wells low, some water shortages developing or imminent. Voluntary water-use restrictions requested.
D2	Severe Drought	Crop or pasture losses likely. Water shortages common Water restrictions imposed.
D3	Extreme Drought	Major crop/pasture losses. Widespread water shortages or restrictions.
D4	Exceptional Drought	Exceptional and widespread crop/pasture loss; Shortages of water in reservoirs, streams, and wells creating water emergencies.

Source: U.S. Drought Monitor <https://droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx>

According to the US Drought Monitor, Orleans County has recently experienced the longest period of dry/drought conditions in decades (Figure 2B.6.1). All of Orleans County experienced a minimum of abnormally dry conditions (D0) from July 7, 2020 through March 28, 2022. Nearly all of Orleans County experienced moderate drought (D1) from September 22, 2020 to November 1, 2021. Minor portions of the county also experienced severe drought (D2) from September 29 to October 12 of 2020.

Figure 2B.4.1: Drought Conditions in Orleans County, 2000-Present



Source: US Drought Monitor

In late 2020, USDA Farm Services Agency issued a declaration of drought-related disaster conditions, making all Vermont farmers eligible to apply for emergency loans. With drought conditions persisting for more than a year, the State of Vermont reactivated its Drought Task Force in July 2021.

The Agency of Natural Resources maintains a crowd-sourced database called the ANR Drinking Water Drought Reporter. <https://anrmaps.vermont.gov/websites/droughtreporter/>

The database does not identify any water outages or shortages for Westfield, but two respondents to the survey indicated they had been affected by drought in the past 10 years. Moreover, two respondents were “very,” and 8 respondents were “mildly concerned” about future impacts from drought.

How climate change will affect future risks from drought

It seems paradoxical that while climate change is generally bringing increased levels of precipitation that Vermonters should experience drought. However, climate change also is linked to climate instability and extremes. Regarding future precipitation patterns, we can expect too much...or not enough.

How population and demographic changes will affect future risks from drought

Vermont’s population, including Westfield is getting older. An aging population will have increasing vulnerabilities to all natural hazards due to mobility, health needs, financial constraints, and changing communication technologies.

How changes in land use can affect future risks from drought

While there is not significant development pressure in Westfield, wells for new development are more susceptible to failure during droughts if they dug wells, in shallow bedrock, located near topographic high points, or constructed in areas where bedrock is close to the ground surface.

Table 2B.4.2: Drought Risk Summary Table

Type	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Drought	Townwide	Crop damage, loss of drinking water, unsafe drinking water, higher occurrence of algae blooms, increased risk of wildfire	2+ years of abnormally dry/moderate drought conditions countywide	Two survey respondents affected by drought. No water outages reported.	Highly Likely: >75% in any year

5. Invasive Species

Invasive species are defined as plants, insects, and other organisms that were either accidentally or intentionally introduced from other places and that can negatively impact agriculture, recreation, forestry, human health, the environment, and the economy. Invasive plants, which are categorized as either terrestrial or aquatic, can cause environmental devastation by changing soil composition, changing water tables, and disrupting insect cycles. They often lack food value upon which wildlife depends. Invasive animals can threaten biodiversity by preying upon native species or out-competing for food and nutrients.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Invasive Species

Human activity can contribute to the spread of invasive species. Non-native insects, for example, can inadvertently get transported into the region via wooden shipping crates or firewood. Aquatic invasives, such as Zebra Mussel larvae can be introduced on boats, either in the ballast water or on the hull. Landscaping and cultivating can spread invasives as well, as is the case with garlic mustard and Japanese knotweed, and these plants can readily establish a monoculture. Potted plants can carry cocoons of Asian Jumping Worms, which can deplete soils of nutrients and damage plant roots. At least one Westfield resident has reported the presence of jumping worms.

Education and outreach are critical to the effective management of invasives. Westfield does not have a Conservation Commission, but the Orleans County Natural Resource Conservation District can assist with outreach and education to reduce the spread of invasives.

Vermont Invasives (www.vermontinvasives.org) is an educational resource created by the State of Vermont and the University of Vermont Extension. The site identifies three non-native insects which currently threaten Vermont: the emerald ash borer (EAB), Asian long-horned beetle (ALB) and hemlock woolly adelgid (HWA). These three pests threaten more than 14 different species of trees in Vermont, including maple, elm, horse chestnut, willow, ash, poplar, European mountain ash, hackberry, and hemlock. The Emerald Ash Borer (EAB) burrows through the ash tree’s inner bark, depriving the tree of water and nutrients. A healthy tree infested by EAB can die within one to four years. Ash trees account for about 5% of the state’s forest composition, and most are expected to die, resulting in safety hazards from falling trees, loss of tree cover (and loss of capacity to sequester carbon), and riverine debris in high water and flooding events. Vermont Agency of Natural Resource maps show all of Westfield to be in an EAB infested area.

How climate change will affect future risks from invasives species

Climate change significantly contributes to the spread of invasives. For example, warmer temperatures weaken native species such as maple, yellow birch, and American Beech, while allowing forest pests such as the hemlock woolly adelgid to overwinter and reproduce. Increased flooding in Vermont – already attributed to climate change in Vermont – can also intensify the spread of invasive species. This concept was clearly demonstrated during Tropical Storm Irene, when floodwaters uprooted Japanese knotweed plants along Vermont’s waterways. Years later, the fight to eradicate the knotweed has become even more protracted as it spreads along streambanks and areas beyond, choking out native plant communities and destabilizing banks.

How land use and population and demographic changes will affect future risks from invasive species

Changes in prevailing development trends described earlier in this plan, changes in land use or population demographics are not expected to impact asset vulnerability to invasive species.

Table 2B.5.1: Invasive Species Hazard Summary Table

Location	Vulnerability	Extent	Observed Impact	Probability
Town wide, with habitats specific to individual species, such as roadways, wetlands, forests.	Forests, agriculture, waterways, native species; risk of downed trees in public rights of way. Vulnerable frontline communities include agricultural producers. General	Japanese Knotweed along major waterways; Asian jumping worms; wild parsnip reported in feed crops.	Compromised natural habitat, including streambanks and forests. Compromised soil stability along waterways.	Highly Likely: > 75% in any given year

	population and emergency service providers may be vulnerable to falling trees.			
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6. Hail

Hailstorms usually occur in Vermont during the summer months and typically accompany passing thunderstorms, when updrafts carry raindrops into extremely cold areas of a cloud. The raindrops form into chunks of ice known as hailstones. The size of the hailstone is directly related to the severity and strength of the thunderstorm. As long as the ice is continually pushed back into the cold areas, it continues to hit water droplets, which then freeze to the hailstone, adding another layer of ice. The ice accumulations continue until the hailstones become too heavy to remain in the cloud, or the updraft slows down.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Hail

The NOAA Storm Events Database reports 44 hail events in Orleans County since 1964, but because hailstorms tend to be extremely localized, only events reported in Westfield, North Troy, and Jay are included here.

Table 2B.6.1: Hail Events in and near Westfield

Date	Size of hail	Description	Total Property/Crop Damage Reported
05/26/2011	2.5"	A surface low as well as upper atmospheric energy traveled along a quasi-stationary boundary across northern New York and Vermont during the afternoon and evening of May 26th. The air mass ahead of this boundary was moderately to largely unstable and the combination led to numerous reports of damaging winds and very large hail (up to 2.5 inches in diameter). Some 25,000+ customers lost power during these storms. In addition, several rounds of thunderstorms traversed the same areas in central Vermont near the Route 2 corridor between Middlesex and Lunenburg. The end result of 3 to 5+ inches of rainfall and severe flash flooding and resultant river flooding as well.	None reported, but the hail event occurred during a severe unnamed storm that resulted in a disaster declaration (DR-1995)
07/17/1998	1.75"	Reported in North Troy: A warm and moist airmass was in place across Vermont as a cold front moved across the area during the afternoon and evening. Thunderstorms associated with the front resulted in locally large hail and torrential rainfall. In Orleans county between the towns of North Troy and Newport golf ball size hail was reported.	\$5,000
07/18/2016	1"	Reported in Jay: Several rounds of thunderstorms developed ahead of a cold front across northern NY and then moved into VT and intensified during afternoon of July 18th. There were several reports of wind damage with these storms, mainly trees and utility lines. Quarter sized hail reported.	--

Severity of hail is measured on the TORRO Scale, ranging from "HO-Hard Hail," with the maximum size of hailstone about the size of a pea, to "H10-Super Hailstorm," with the maximum size of the hailstone about the size of melon. However, size may not always be a reliable indicator of severity for agricultural growers, since small hailstones – especially when driven by strong winds – can easily strip crop heads and destroy young plants. A single hail event can wipe out an entire season's crops. One at least one local

grower could specifically attest to crop losses. USDA data show occasional payouts from crop insurance due to hail damage, but this data is at the county level, and not all local growers carry crop insurance.

Due to the unpredictability of hailstorms, there is little in the way of hail mitigation in Vermont. Structural mitigation efforts such as hail nets are not cost-effective for small growers. Most efforts related to hail are in the response and recovery sectors. In addition to crop insurance, USDA’s Farm Service Agency may on occasion provide emergency loans to growers in the event of a disaster declaration. The Vermont Farm Fund, administered by the Center for an Agricultural Economy in Hardwick, also provides emergency loans to agricultural producers.

How climate change will affect future risks from hail

Hailstorms occur infrequently in Vermont, and it is not clear that climate change will increase their frequency.

How land use and population and demographic changes will affect future risks from hail

Changes in prevailing development trends described earlier in this plan, changes in land use or population demographics are not expected to impact asset vulnerability to hail.

Table 2B.6.2: Hail Hazard Summary Table

Location	Vulnerability	Extent	Observed Impact	Probability
Town-wide	Local growers	Up to 2.5” hail reported on 05/25/2011	\$5,000 in property damage associated with July 1997 event; personal account of hail damage to crops	Highly Likely: > 75% in any given year

7. Heat

The Centers for Disease Control reports that more people die from heat than other weather-related events. The actual number of deaths are most likely underreported because heat can exacerbate other underlying conditions such as heart and respiratory disease, leading to death.⁵ The impacts of extreme heat can be particularly challenging in regions such as the Northeast Kingdom where residents are not accustomed to high temperatures and are less likely to live in air-conditioned structures.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Heat

As a rule, the National Weather Service considers “excessive heat” to be an event when the maximum heat index is expected to be 105° or higher for at least two days and nighttime air temperatures will not drop below 75°. However, these criteria can vary widely across the county, especially in areas like Orleans County which is unaccustomed to extreme heat conditions. The primary impact of extreme heat or prolonged periods of hot weather is to human life. Hot conditions, especially when combined with sun and high humidity, can limit the body’s ability to thermoregulate properly. Prolonged exposure to hot conditions can lead to heat cramps, heat exhaustion, heat stroke, or exacerbate other pre-existing medical

⁵ Centers for Disease Control, Heat Related Illness: Picture of America Report,

conditions. Some of these impacts require medical attention and can be fatal if left untreated. Children and the elderly are especially vulnerable to heat-related illnesses.

Vermonters are at greater risk for serious heat-related illnesses, and even death, when the statewide average temperature reaches 87°F or hotter.⁶ Working with the Vermont State Climate Office, the Vermont Department of Health analyzed 14 years of temperature and mortality data, and ten years of surveillance data for emergency department (ED) and urgent care visits. The research found that on days when the statewide average temperature reached 87°F, ED visits for heat-related illnesses such as heat exhaustion and heat stroke increased eightfold, and there was one additional death per day among individuals aged 65 and older. Deaths due to heart disease, stroke, and neurological conditions were relatively more common on these days reaching at least 87°F, as compared to cooler days.

The NOAA Event Database has no extreme heat events for Orleans County. July is traditionally the hottest month of the year in Westfield with the greatest number of days over 87°, but hot days can occur from May through September, with occasional outliers as early as April.

Using 87° as a standard, the hottest July on record for the East Albany area was 2018, with 10 days reaching 87° or more. (Complete records for the East Albany area only go back to 2003.) The highest temperatures recorded in the area are 88°. The nearest comprehensive analysis on hot days on a *climate scale* (three decades or more) is St. Johnsbury, and the data indicate that the number of days per year with temperatures of 87° or higher is rising.

Just because the Northeast Kingdom is one of the cooler regions of Vermont, our population is not less vulnerable to heat. In fact, Department of Health data indicate that Orleans County has some of the highest concentrations of communities with high heat vulnerability indices. The Vermont Heat Vulnerability Index draws on 17 different measures from six different themes: population, socioeconomic, health, environmental, and heat illness. Westfield’s heat vulnerability

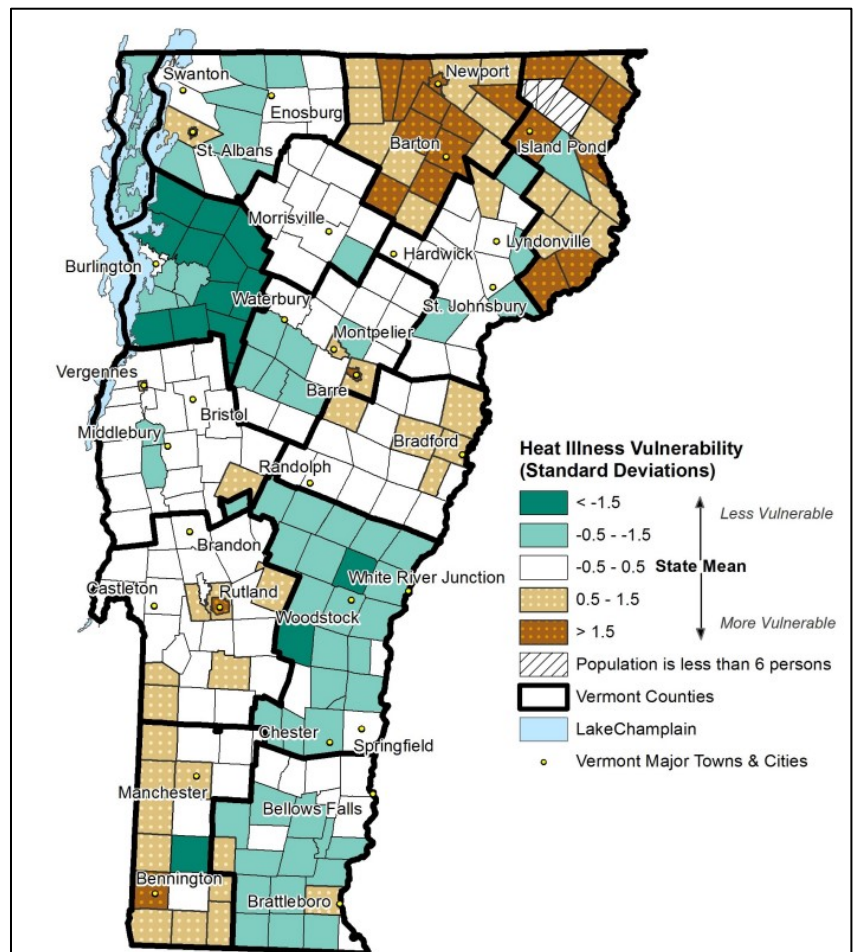


Figure 2B.7.1 Heat Vulnerability Index: Vermont Dept. of Health

⁶ Vermont Department of Health: Heat Vulnerability in Vermont, Local Indicators of Heat Illness Risk. 2016. https://www.healthvermont.gov/sites/default/files/documents/2016/12/ENV_EPHT_heat_vulnerability_in_VT_0.pdf

index exceeds the state by a factor of 1.5.

Although the immediate risks of excess heat are to human health, there are other vulnerabilities to consider. Excess summer heat can lead to increased evapotranspiration and soil drying, stressing or even depleting water supplies. Additionally, hot weather can increase thermal stratification in water bodies, creating more favorable conditions for cyanobacteria blooms. Research also suggests that rising temperatures have likely exacerbated drought conditions, elevating the risk for wildfires.

New guidance released by the Vermont Department of Health highlights the health risks from extreme heat. The report is informed by the 2021 heat wave in the Northwestern US and Western Canada, an area with a similar summer climate to Vermont. More than 1,400 people died during that event. (A similar scale in Vermont would have been about 45 deaths.

Between 2009 and 2019, the Vermont Department of Health reports an average of 104 heat-related emergency department (ED) visits per year and 12 total heat-related deaths across Vermont. Heat-related ED visits have trended up over that period by more than 2 additional ED visits each year. 2018 was the deadliest year in recent record, with 173 heat-related ED visits and 5 heat-related deaths in total, including 90 ED visits and 4 deaths during a 6-day heat wave in early July. These numbers only include ED visits and deaths specifically attributed to heat in a hospital or death record, so individuals with underlying conditions may not be captured in these figures. (Data at the Orleans County level is not available.

How climate change will affect future risks from heat

As average annual temperatures continue to rise due to climate change, the Vermont Department of Health anticipates a statewide increase to an average of 33 days per year by end of century.⁷

How population and demographic changes will affect future risks from heat

Vermont’s population, including Westfield is getting older. An aging population will have increasing vulnerabilities to all natural hazards due to mobility, health needs, financial constraints, and changing communication technologies. Elders are especially susceptible to heat illness. Nearly all the Vermont heat deaths recorded by the Department of Health were individuals over the age of 50. An increase in energy burden (which is a function of income, not energy costs associated with cooling and ventilation) could increase heat risks for low-income households. Efficiency Vermont reports Westfield’s energy burden rate to be higher than state averages – about 14%. This risk could be reduced through the same services that promote efficiency and weatherization. (See the profile on extreme cold.)

How changes in land use can affect future risks from heat

Given the prevailing low-density developments in Westfield, we do not expect changes in land use to impact future heat risks. However, in general, removing tree cover and increasing impervious surfaces will increase heat locally.

Table 2B.7.1: Extreme Heat Hazard Summary Table

Location	Vulnerability	Extent	Observed Impact	Probability
Town-wide	Children, seniors, people with underlying conditions, people below the poverty	July 2018, with 10 days 87° or higher	Increased hospitalizations due to heat-related illness (VT Dept. of Health data), five	Likely: >10% but < 75% in any year; at least one chance in next 10 years

⁷ Vermont Department of Health: Vermont Climate and Health Profile Report: Building Resilience Against Climate Change in Vermont, September 2016

	line; water supplies and water bodies; livestock		heat-related deaths reported statewide in the summer of 2018	
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8. Infectious Disease Outbreak

The COVID-19 pandemic resulted in the first ever major disaster declaration of all 50 states, five territories, and the District of Columbia. In March of 2020, by Executive Order No. 01-20, the Governor declared a State of Emergency for Vermont, and restrictions to protect public health were enacted.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Infectious Disease Outbreak

While a variety of measures were recommended by the Center for Disease Control and the Vermont Department of Health to help curb the spread of disease, including frequent hand washing, wearing masks, and keeping a distance of 6 feet from other persons, vaccination was identified as the best way to keep from getting and spreading COVID-19. In Vermont, the vaccine was first made available to residents and staff of long-term care facilities in December 2020, and then to those 75 and older in mid-January 2021. The Vermont State of Emergency was extended for over a year until all restrictions were lifted on June 14 of 2021, when the benchmark of an 80% vaccination rate for the eligible population of Vermont was reached.

Even though the State of Emergency is behind us, the long-term impacts are still unclear. As of August 2023, the Vermont Department of Health reports that COVID hospitalizations are low. As of July 2023, the Vermont Department of Health reports 992 COVID deaths in Vermont, with 7,152 cases and 49 deaths in Orleans County. The death toll is based on death certificates that list COVID as a cause or probable cause of death. The Department of Health does not publish death counts at the municipal level.

Essential services, government operations, schools and businesses were severely disrupted during COVID, requiring rapid implementation of safety protocol to continue critical operations. While “social distancing” was an appropriate response to mitigate the spread, all sectors of Westfield’s population experienced some form of disruption, especially those with no broadband or spotty broadband coverage. The pivot to a virtual environment has demonstrated that reliable broadband is a vital utility for business, work, school, healthcare, and civic involvement.

The Jay Westfield school went remote from March 16 until the end of the school year. Understandably, the Town government had to pivot as well. Act 162 allowed the Town to hold Town Meeting via Australian Ballot in 2021 and 2022. Town offices could only be reopened and operated in compliance with the State’s “Work Safe” guidance as authorized by the Governor’s executive order. 2021 was marked by a series of closing or cancellations of events, such as Christmas caroling on the Common and library programming. The library was closed twice to comply with COVID protocols, and the recycling center was closed for three weeks.

With so many individuals unable to work or working reduced hours, food insecurity (defined as a lack of consistent access to enough food for an active, healthy life⁸) increased. In a University of Vermont survey, 441 Vermonters were interviewed at the following intervals: March/ April 2020, June 2020, and March/ April 2021. Of those surveyed, 31.9% were food insecure at some point during the pandemic. Of

⁸ Feeding America. What is Food Insecurity? <https://hungerandhealth.feedingamerica.org/understand-food-insecurity/>

those who experience food insecurity during the pandemic, 46.9% were food insecure prior to the pandemic but the remainder were *newly* food insecure. The survey also found that those who were more likely to experience food insecurity were people without a college degree, those with a job disruption, households with children, women, and younger people.⁹

Business also experienced losses. One major employer in town, a value-added agricultural producer, experienced revenue losses due to the loss of restaurant and institutional customers. Both grocery stores in town had to introduce adaptive measures, such as curbside pickup and delivery.

How climate change will affect future risks from infectious disease

COVID’s unprecedented disruption of daily life is a grim reminder that climate change increases the risk of future infectious disease outbreaks. According to the Centers for Disease Control, vector borne illnesses such as Lyme disease, West Nile virus disease, and Valley fever are already on the rise and spreading to new areas of the United States. Milder winters, warmer summers, and fewer days of frost make it easier for these and other infectious diseases to expand into new geographic areas and infect more people.

How population and demographic changes will affect future risks from heat

The overall population of Vermont and the Northeast Kingdom is aging, and with an aging population, vulnerability to hazards – including infectious disease – will increase.

How land use changes will affect future risks from heat

Development that puts further pressure on wildlife and habitat can contribute to the spread of infectious disease. However, given prevailing development trends, it is not expected that land use changes will alter asset vulnerability.

Table 2B.8.1: Infectious Disease Outbreak Hazard Summary Table

Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Townwide	Seniors, people with underlying conditions; critical facilities and healthcare, and schools	Statewide emergency declaration from March 13, 2020 to June 14, 2021.	49 confirmed deaths in Orleans County, local outbreak, no published data on death counts at the municipal level, job loss, loss of business revenue, food insecurity; isolation; disruption of community activities and local government.	Highly likely: >75% in any given year

9. Lightning

The NOAA National Severe Storms Laboratory described lightning as a “giant spark of electricity in the atmosphere between clouds, the air, or the ground. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the opposite charges build up enough, this insulating capacity of the air breaks down and there is a

⁹ University of Vermont. Food Security Impacts of the COVID-19 Pandemic: Following a Group of Vermonters During the First Year <https://scholarworks.uvm.edu/calsfac/186/>

rapid discharge of electricity that we know as lightning. The flash of lightning temporarily equalizes the charged regions in the atmosphere until the opposite charges build up again.”

The opposite charges can occur within the thunderstorm cloud or between the cloud and the ground. The latter (cloud to ground) is the most dangerous and destructive form of lightning, especially when there is a net positive charge from the cloud to the ground. While the National Weather Service estimates that positive lightning accounts for just 5% of all lightning strikes, it is also responsible for an outsized share of damage in the form of fires and power outages.

Lightning actually produces a thunder clap. That is because the energy in the lightning channel briefly heats the air to about 50,000° F, which is hotter than the surface of the sun. The extreme heat causes the air to explode outward in a shockwave that we hear as thunder.

Lightning occurrence is measured two ways: *lightning counts* (number of strikes), and *lightning density* (the number of strikes over a measured area, such as a square kilometer). Texas has highest number of strikes, and Florida has the greatest density. Vermont is a relatively low-risk area: It ranks 48th in count and 43rd in density.¹⁰

Despite the relatively low occurrence, some Westfield residents reported damaged equipment from lightning strikes. Five survey respondents reported damage from severe thunderstorms, and a review of Vermont Electric Cooperative’s outage records reveals that lightning has caused four power outages on Trumpass Road. The largest outage was on August 31, 2012, when 738 connections were out.

Climate modeling and research indicates that rising temperatures will increase the occurrence of lightning in the contiguous United States by about 12% per increase in degree Celsius in global warming, and by about 50% by the end of the century.¹¹

Lightning rods can help protect a building from a direct lightning strike by intercepting the strike and dispersing the energy safely into the ground. However, comprehensive lightning protection measures, such as electrical surge protection for incoming power, data, and communications are needed to prevent destructive surges and fires caused by lightning entering a structure through wires and pipes.

How climate change will affect future risks from lightning

As climate change accelerates, Westfield is likely to experience more severe thunderstorms and microbursts due to the increased rate of moisture in the air. As more greenhouse gases are emitted, heat is being trapped in the atmosphere and is more readily absorbed by oceans due to the high heat capacity of water. Warm, moist air can contribute to more severe thunderstorms and microbursts – which may be accompanied by damaging lightning strikes.

How population and demographic changes will affect future risks from lightning

The overall population of Vermont and the Northeast Kingdom is aging, and with an aging population, vulnerability to hazards will increase.

How land use changes will affect future risks from lightning

Given the prevailing development trends in Westfield, it is unlikely that changes in land use will affect future risks from lightning strikes. Development in remote areas may be more vulnerable from ensuing power outages and fires, but it is also possible that the new zoning regulations that limits dispersed

¹⁰ Vasailia XWeather: Total Lightning Report for 2022: <https://www.xweather.com/annual-lightning-report>

¹¹ National Center for Biotechnology Information, 2014: Projected Increase in Lightning Strikes in United States due to Global Warming. <https://pubmed.ncbi.nlm.nih.gov/25395536/>

settlement patterns in higher elevations and remote areas may reduce these risks. Future development that incorporates proper grounding techniques may also limit vulnerability.

Table 2B.9.1: Lightning Hazard Summary Table

Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Townwide	Electrical and telecommunication systems; home appliances and computers; dry brush and vegetation, which could catch fire from a positive strike	Lightning strike on Trumpass Road with 738 connections out	Power outages and damaged computer equipment.	Likely: >10% but < 75% in any year; at least one chance in next 10 years

C. Hazard Specific Information for Non-Profiled Risk

1. Landslide

Landslides are sudden failures of steep slopes and can cause significant damage to streams, infrastructure, and property. While landslides can be linked to fluvial erosion, they can also be caused by slope steepening due to non-fluvial erosion, increased loading on the top of a slope, or pore-water issues. Landslides can destroy or damage structures and infrastructure that lie either above or below the slope.

The 2018 Vermont State Hazard Mitigation Plan notes that while minimal data exists on damages associated with landslides, they often occur in tandem with periods of significant rainfall and erosion. Disaster declarations and estimates specific to landslide-only damages are not well defined. The 2018 Plan also notes that “Vermont has not previously developed a landslide inventory or an adequate tracking system to establish frequency of this hazard.” Excess rainfall on already saturated soils recently contributed to landslides Barre and Ripton, and in general, the July flooding has increased the likelihood of risk of additional landslides. Unlike flooding, however, landslide risks can be difficult to predict because they are not associated with river levels.

2. Earthquake

The risk of earthquake is low in Vermont -- low enough that it is not prudent to invest in mitigation. According to FEMA Seismic Hazard Maps, Westfield (and nearly all of the state) is in a “Seismic Design Category B” area, which means that only moderate shaking is to be expected in an earthquake. Although the sensation can be extremely frightening, the potential for damage is slight. The nearest reported earthquake was of a 2.2 magnitude about 11 km ENE from Ticonderoga, NY, which occurred on June 30, 2017 and was felt by people in Montpelier and Plainfield, VT.

3. Wildfire

Wildfires are relatively uncommon in Vermont, but they have potential for moderate to severe community-scale damage to town infrastructure, personal safety, as well as loss of wildlife and wildlife habitat. In Richmond, approximately two acres burned in early May 2022. Several acres burned in Putney in that same year, and two to three acres of woodland burned in Rochester, resulting in a fatality.

The risk for wildfire is usually greatest in the spring, shortly after snowmelt extending into the beginning of June. During this period weather conditions are favorable for drying wildland fuels, dead grasses,

leaves and twigs. Low humidity and gusting winds, combined with dry wildland fuels, can make controlling a wildfire difficult and dangerous. Hot and dry conditions in the summer can also elevate wildfire risk. Campfires, logging operations, and even lightning strikes can cause a summer fire. In the fall, after leaf drop, warm and dry conditions and a delayed snowfall can raise the risk of wildfire as well.

Fire danger ratings are determined by forest fuel conditions, recent weather conditions, and various fire start risk factors. During non-snow periods of the year, the Department of Forests, Parks and Recreation monitors forest fire danger levels daily. Open burning is regulated in every town in Vermont and Town forest fire wardens are responsible for issuing open burning permits, if fuel and weather conditions are safe for outdoor burning. Fire wardens have the authority to ban open burning in their towns during times of high fire danger or hazardous local conditions. Unfortunately, routine disregard of open burning regulations contribute to the risk.

Extended periods of warming due to climate change, combined with an extended period of drought conditions and an early snowmelt, have raised the risk of wildfire. Westfield has no history of wildfires. No respondents to the Westfield Hazard Mitigation Survey indicated that they were adversely impacted by a wildfire in the past ten years, the majority of respondents were unconcerned about future risk. Three respondents were mildly concerned about wildfires, and three respondents were very concerned.

3. MITIGATION STRATEGIES

A. Mitigation Goals

- Prevent/reduce the loss of life and injury resulting from all-hazard events.
- Prevent/reduce the financial losses and infrastructure damage incurred by municipal/residential, agricultural, and commercial establishment due to disasters.
- Include hazard mitigation planning in the municipal planning process, including the Town Plan, municipal budget, and Local Emergency Management Plan.
- Ensure the general public is part of the hazard mitigation planning process.

This section of the plan satisfies 44 CFR § 201.6(c)(3)(i): Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?

B. Evaluation of Mitigation Strategies

In support of these goals, the Town considered a set of proposed mitigation actions for consideration in a publicly warned Selectboard meeting on September 18, 2023. Based on input from the selectboard, the Hazard Mitigation Team then used an abridged STAPLEE evaluation worksheet (Appendix A) to score the strategies on social and political readiness, administrative and technical feasibility, range of public benefit, range of environmental benefit, local cost, and availability of outside resources. Based on the scoring, the planning team then made final choices among mitigation strategies. Taking staff and volunteer capacity into consideration, the group determined how much they felt the Town could commit to over the next five years, to lessen the impacts and possible losses for Westfield from hazard events in the future.

When determining the proposed mitigation actions for the 2023 plan, the Hazard Mitigation Team also evaluated the prioritized mitigation actions from the original plan. Priority actions from the previous plan that are marked with an asterisk are to be carried forward into the plan update.

Table 3B.1: Update on Mitigation Actions from 2005 Westfield Hazard Mitigation Plan

Hazard	Mitigation Strategy	Priority	Update
Flooding	Road and culvert upgrades: Continue to upgrade potential flood areas in town.	High	The original plan called for cost-effective solutions, and then review grant sources for appropriate funding. This has been ongoing, as funds are available. This initiative will be carried forward into the plan update.
All	Generator for emergency shelter: A proper shelter with backup power is needed due to frequent flooding.	High	As the emergency operations center, the Westfield Town Clerk’s office now has a generator. In 2014, Westfield voters supported the purchase of a backup generator at the Westfield Community Center, which can operate as an emergency shelter if activated by the Selectboard.
ALL	Pre-Agreement with the Vermont Red Cross: This will expedite a shelter during the next hazard.	High	This is no longer an option because the Vermont Red Cross only maintains agreements for large, regional shelters.

***cost definitions: Low is < \$5,000, Medium is \$5,000 to \$50,000, and High is \$50,000 or more.**

A. ALL HAZARDS:

1. Integrate this Hazard Mitigation Plan into the Town Plan and bylaw.

- Why: The Town Plan establishes the legal basis for regulatory programs, such as the Flood Hazard Bylaws.
- Who: The Planning Commission updates the Town Plan and amends the bylaws, and they are adopted by the Selectboard.
- Cost*: Low to medium, depending on the use of consultants.
- Resources: Planning consultants, Regional Planning Commission, Municipal Planning Grant Program (offered annually)
- When: The Plan officially expires in 2026, but it can be amended at any time. Ideally, a town plan update should begin no later than 12 months prior to expiration (which would be January 2025). Once the plan is updated to reflect this hazard mitigation plan, it can be done on an ongoing basis. Town bylaws may be updated at any time, provided the Town Plan remains current. Bylaw review and update is an ongoing activity, although it should be noted that the Town recently completed an extensive overview of its zoning bylaws.

2. Establish an Emergency Communications Plan that reaches multiple audiences.

- Why: Diversity and inclusivity should be at the core of an emergency communications plan. Not everyone has or uses the internet, and messaging needs to incorporate redundant communications modes that overlap and reach potentially isolated and vulnerable populations. Vermont Emergency Management maintains a template for a long-form Local Emergency Management Plan, which can address communications and information sharing. Consider adopting this form of LEMP in the future.
- Who: The Selectboard, the Emergency Management Coordinator, the Westfield Disaster Shelter Initiative
- Cost: Low to medium, if an onside consultant is hired to design the plan.
- Resources: Vermont Emergency Management, the Regional Planning Commission, communication consultants. Town budget can cover activities of standing committees. Municipal Planning Grants and FEMA mitigation grant may cover the cost of outside consultants.
- When: The plan should be in place six months of adopting this plan.

B. FLOODING, WIND, EXTREME COLD, SNOW, ICE

1. Encourage family emergency preparedness.

- Why: Each family should have a personal plan for disaster or emergency situations. A minimum plan would include water, flashlights with spare batteries, portable storage for important documents, an evacuation plan, and a meeting place or contact person in the event family members become separated or are not together when the emergency

conditions arise. There are Emergency Preparedness Workbooks available at the Town Offices.

Who: The Westfield Disaster Shelter Initiative

Cost: Low

Resources: The regional planning commission may have some technical assistance or templates available. Emergency Management Performance Grants may be a possible source of funding. If not available, the regional planning commission can cover these costs through its annual work plan funded by the appropriations from member municipalities.

When: Spring through summer 2025, and then ongoing, as needed. A message through social media can remind residents to get the booklets if inclement weather is expected.

C. FLOODING (INUNDATION AND FLUVIAL EROSION)

1. Review the FEMA draft maps when they become available

Why: Westfield's current maps are severely lacking in detail. New maps will be digitized and include base level engineering to more accurately illustrate inundation hazards. The draft maps should be reviewed by the entire community before they become effective.

Who: The Planning Commission

Cost*: Low

Resources: Vermont Department of Environmental Conservation, regional planning commission. Both entities are committed to providing technical support. Both entities are committed to providing technical support, and the DEC has executed a contract for the regional planning commission to provide service. It is highly unlikely that additional funding will be needed, since any support beyond the current scope of work in the contract can be covered with the regional planning commission's annual technical assistance budget.

When: Draft maps were expected summer of 2024 but are not yet available. This action is entirely dependent on release of the draft maps.

2. Continue to evaluate Westfield's flood regulations to make the community more flood resilient

Why: Westfield's recently amended regulations address inundation hazards as well as river corridors. There may be additional opportunities to make the regulations more flood resilient, or even help the town to participate in the Community Rating System. Some of these measures will also allow the community to receive more state financial assistance in the next federal disaster. The best way to assure this happens is to continue to stay abreast of trainings and outreach efforts by the Vermont DEC.

Who: The Planning Commission

Cost*: Low to medium, depending on the use of outside consultants

Resources: Vermont Department of Environmental Conservation, regional planning commission. Both entities are committed to providing technical support. Both entities are committed

to providing technical support It is highly unlikely that additional funding will be needed.

When: When FEMA releases the draft maps, the town’s flood hazard regulations will be reviewed by FEMA’s legal counsel for ongoing compliance with the National Flood Insurance Program. **As is the case with Action C1, this action is dependent on the release of FEMA draft maps.**

3. Continue to bring hydrologically connected Road Segments up to standard to reduce sediment deposit in water bodies.

Why: Ongoing compliance with the Municipal Roads General Permit requirements appears to be working. Roads that were brought up to compliance through rock-lined or seeded ditching and grading and crowning improved our roads’ ability to convey the excessive rainfall experienced in the latest flood.

Who: The Road Foreman, aided by the road erosion inventories

Cost*: High, as a single-year could cost as much as \$50,000. This can be implemented over time, as grant funds are available.

Resources: Regional transportation planner can assist with grant writing and implementation, as can Vermont Local Roads, and the Conservation District. Grant writing activities can be supported through the regional planning commission technical assistance budget, or Vtrans program funds, and Federal Highway Administration (FHWA) Local Technical Assistance Program (LTAP).

When: Ongoing to 2036, when we are expected to reach full compliance. According to the most recent Town Erosion Inventory Progress Report, the Town has 63 non-compliant segments requiring improvement by then, but this total includes roads segments with incomplete data. There are 13 non-class 4 very high priority road segments that must be improved by end of calendar year 2025, and one class 4 very high priority road segment that must be improved by end of calendar year 2028.

4. Continue to upgrade bridges and culverts along flood prone road segments.

Why: The majority of flood damage occurs on Westfield road ways. Upsizing culverts and replacing bridges as funds are available will help to minimize washouts. Of particular interest are culverts on Loop Road, which regularly wash out and are replaced.

Who: The Road Foreman

Cost: High

Resources: Hazard Mitigation Funds either through FEMA or VEM.

When: Initiate pursuit of funding within six months of this plan adoption (spring 2025).

5. Explore the viability of a sewer connection in Westfield Village.

Why: Shallow soils, poor drainage, and small lots make on-site waste disposal difficult. Excess rainfall frequently causes bad smells in the Village, indicating possible system failures, which may cause contamination of water supplies.

Who: The Selectboard, aided by the Planning Commission

Cost: High

Resources: Clean Water State Revolving Fund provides low-interest loans and subsidies in support of clean water projects. Funds have already been committed to the Town.

When: Now and over the course of the next year and possibly the next. The Town of Westfield is currently participating in the CWSRF program and is completing an engineering assessment. This activity does not commit the Town to a construction/implementation project, and there is no guarantee of political support for implementation, since it represents a major investment.

D. SEVERE WINTER WEATHER (EXTREME COLD, HEAVY SNOW, ICE ACCUMULATION)

1. Appoint a local energy coordinator

Why: Energy burdened households will be less likely to resort to dangerous measures in extreme cold event, and they will be safe and comfortable. An energy coordinator, possibly assisted by an energy committee, can make people more aware of the low- and no-cost weatherization resources available to them.

Who: The Selectboard, who appoints an energy coordinator

Cost*: Low

Resources: HEAT Squad, NETO, VECAN, Municipal Energy Resilience Grants, Efficiency Vermont, Town Budget, passed by the voters at Town Meeting.

When: Spring 2025

2. Maintain virtual meeting capacity.

Why: This eliminates needless travel when road conditions are treacherous.

Who: The Selectboard and the Town Clerk

Cost*: Low

Resources: The communications union district, Internet services provider. Some small grants may occasionally be available to assist with purchase of streaming and teleconferencing equipment, such as Vermont Community Foundation.

When: Ongoing

3. Publish the Westfield Highway Department Winter Operations Plan in the Town Report every year.

Why: This is an easy and low-cost way to instill safe driving practices in inclement weather.

Who: The Road Foreman and the Town Clerk

Cost*: Low

Resources: Staffing costs covered by the annual operating budget, adopted by the voters annually, at Town Meeting Day.

When: March 2025

E. DROUGHT

1. Examine earth extraction policies in relation to groundwater retention and protection, especially in instances that damage neighboring water supplies.

Why: The Westfield Zoning bylaws currently require board review of proposed earth extraction operations, primarily from a site reclamation perspective. There is an opportunity to implement additional considerations for operations that will disturb less than 5,000 cy or rock per year and subsequently not come under best management practices under Act 250. This might help to protect private wells that are already stressed by drought. The Sutton Unified Development Regulations might provide a good example. They were developed with consideration and input from the Act 250 Coordinator. <http://www.nvda.net/files/sutton-bylaw-42618.pdf#page=27>

Who: The Planning Commission

Resources: Agency of Natural Resources and the Regional Planning Commission

Cost: Low, possibly a grant from Municipal Planning Grant Program is other revisions to bylaws are being considered at the same time.

When: The Planning Commission is due for a consultation with the regional planning commission in FY2025, and this can be discussed then. The consultation must happen by June 30, 2025. Consultations are part of the regional planning commission's work contract, funded by the Agency of Commerce and Community Development.

2. Expand postings about drought conditions.

Why: A sign-board outside the town offices, as well as posters in public places such as the Community Center and the Recycling Center can alert residents to the increased vulnerability for water contamination and fire risk from the use of residential fireworks and non-permitted burning.

Who: The Selectboard

Cost: Low, materials for signage will most likely be covered by the Town budget.

When: Institute a policy for signage and posting in 2024 and then implement on an ongoing basis as necessary.

3. Make information from Vermont Department of Health readily available during periods of drought.

Why: The Vermont Department of Health has excellent resources available for residents whose private wells may be affected by drought. The site provides links to licensed drillers, as well as links to financial resources for residents with limited income. <https://www.healthvermont.gov/environment/drinking-water/drought-and-your-well>

Who: The Selectboard

Cost: Low, no funding resources required

When: Institute a policy for signage and posting in 2024 after Town Meeting Day and then implement on an ongoing basis as necessary.

4. Encourage use of the Agency of Natural Resources drought reporter:

<https://anrmaps.vermont.gov/websites/droughtreporter/>

- Why: The web-based reporting tool is crowd-sourced. Although it can help provide insight into the extent and impact of future drought conditions, it's only going to be effective if people use it consistently.
- Who: The Selectboard and the Town Clerk
- Cost: Low to none. Any staffing costs associated with this endeavor would be covered in the Town's annual operating budget, adopted annually at Town Meeting.
- When: Annually as a simple reminder in the Town Report (in spring 2025), and on an ongoing basis as needed through social media. The reminder can be paired with messaging about the above-mentioned Department of Health web site, since that web site links to the drought reporter.

F. INVASIVES

1. Identify areas along roadways with severe infestation and work with road crew to identify appropriate management practices.

- Why: Invasive plants can be inadvertently spread by ongoing road maintenance, such as roadside mowing. Fortunately, the statewide basin planners have developed a training module for road crews to recognize and potentially address terrestrial invasive species. The training modules will be available in the 2024.
- Who: The road foreman and road crew
- Resources: Vermont Agency of Natural Resources
- Cost: Low, no funding required. Attendance for trainings could be included in annual work plan. Any staffing costs associated with this endeavor would be covered in the Town's annual operating budget, adopted annually at Town Meeting.
- When: Fiscal year 2024 (dependent on when the training modules are available).

G. HAIL

1. Make local growers aware of recovery options in the event of crop loss.

- Why: Not everyone can carry crop insurance, but there are a few options for small local growers who experience losses. The Vermont Farm Fund offers emergency loans of up to \$15,000 at 0% interest. On occasion, the Vermont Community Foundation has offered grants to help farmers who have experienced natural disasters. The regional development corporation can help get the word out. Information can also be made available from the Town web site and through social media.
- Who: The Selectboard
- Resources: Vermont Farm Fund, Vermont Community Foundation, the Regional Development corporation

Cost: Low, no funding needed. Costs to the Regional Development Corporation could be covered through its annual work plan, funded by the State of Vermont, and through appropriations from member municipalities.

When: Summer 2024 and ongoing, as needed as disasters occur.

H. HEAT

1. Work with home health care providers and volunteers to increase awareness of heat illness. The Vermont Department of Health has outreach and training materials to spot the symptoms of heat illness and administer first aid.

Why: Home health care and service providers are most likely to maintain ongoing contact with Westfield's most heat vulnerable populations. They can be alerted by the Vermont Department of Health, who maintain extensive list serves to notify stakeholders of anticipated heat advisories.

Who: SASH, Orleans Essex Visiting Nurse Association, Northeast Kingdom Community Action

Resources: Vermont Department of Health

Cost: No additional resources needed

When: Summer 2024, when another heat advisory occurs

2. Explore cooling options for the Community Center.

Why: The Vermont Department of Health maintains a map of cooling centers open to the public. The nearest cooling centers in Westfield are the Pumphouse Water Park at Jay Peak and Big Falls State Park. <https://www.healthvermont.gov/environment/climate/hot-weather> Neither option may be suitable for Westfield's most heat-vulnerable populations, such as seniors and people with underlying conditions. To be an effective cooling center, the Department of Health recommends that a cooling site should, at a minimum, be ADA accessible, open to the general public, have bathrooms, areas where guests and users can sit, and be widely publicized. The Community Center is a good candidate. Heat pumps, which are energy efficient, have been found to be effective cooling options in many public buildings.

Who: The Westfield Disaster Shelter Initiative

Resources: The Town Health Officer, the Emergency Management Director, Grant funding resources, Efficiency Vermont

Cost: Medium (although rebates and grants may help defray costs) Municipal Energy Resilience Program may be a potential funding source

When: Winter of 2024

I. INFECTIOUS DISEASE

1. Maintain virtual meeting capacity for all local government operations.

Why: The risk of COVID remains, and further outbreaks are likely. Virtual meeting capacity reduces the risk of spread, especially among vulnerable populations.

Who: The Selectboard
Cost: Low. Cost of maintaining telecommunication capacity is covered in the Town's annual operating budget, adopted at Town Meeting Day.
When: Spring 2025

2. Improve broadband availability and affordability

Why: Broadband access proved to be lifeline during the pandemic, especially for obtaining necessary goods and services. Unfortunately, spotty service areas remain. Westfield can continue to be represented on the Communications Union District to ameliorate this.

Who: The Communications Union District representative from Westfield

Cost: High (for expansion of infrastructure). Grants may help to defray this. Potential funding sources include Northern Border Regional Commission, USDA Rural Development, or Economic Development Administration

When: Spring 2025 (when representatives are appointed by the selectboard.)

J. LIGHTNING

1. Ensure that all data and telecommunications equipment in town-owned critical facilities (Town Offices and Community Center) remain properly grounded and protected.

Why: Grounding is the most fundamental technique for protection against lightning damage. While it is impossible to stop a lightning surge, continuous grounding can give lightning a direct path that bypasses valuable equipment, and safely discharges the surge into the earth. Additionally, the proper use of surge protection devices a low resistance path to ground so that the surge bypasses the equipment.

Who: Selectboard

Resources: Data and telecommunications service providers, Efficiency Vermont. Costs of grounding could be covered in the Town's annual budget, adopted at Town Meeting Day.

Cost: Medium

When: Check equipment annually

C. Municipal Capacity

Westfield is a small town, dependent on an engaged base of volunteers to get much of the work done. The town is too little populated to need, or to be able to support a large professional staff. The Town has a three-member Selectboard. Their Town Clerk covers many of the responsibilities normally carried by the town manager and the town planner in larger communities. There is a Town Treasurer and a Zoning Administrator. The Town has a Road Foreman.

As is typical of a small community, Westfield depends on many volunteers, many of whom served on multiple boards and in multiple capacities.

**This section satisfies 44 CFR § 201.6(c)(3):
Does the plan document each participant's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs?**

Table 3B.3: Status of Community Resources and Capabilities

Resource	Description	How it can help implement Hazard Mitigation Goals	Opportunities to expand capabilities?
Westfield Town Plan	Plans for coordinated town-wide planning for land use, municipal facilities. Establishes the legal basis for land use regulations.	Flooding was a major hazard identified in the 2005 Hazard Mitigation Plan. The plan addresses flood resilience, which became a statutory requirement in 2014.	The Town Plan is current but is set to expire in 2026. Amendments to the plan should incorporate relevant findings and strategies from this Local Hazard Mitigation Plan.
Westfield Planning Commission	Drafts amendments to the town plan and the zoning and flood hazard regulations.	Helps to keep flood risks at the forefront with the general public and ensures ongoing participation in the National Flood Insurance Program.	The flood hazard regulations could be made more robust to address risks such as fluvial erosion and loss of floodplain storage. This effort will take outreach and education to build public consensus. The planning commission can lead that effort, with technical assistance from the regional planning commission, the basin planners, and the Vermont River Management Program.
National Flood Insurance Program (NFIP), joined 1998	Enables all residents in Westfield to obtain flood insurance, whether or not a structure is located in a mapped flood hazard area. The most effective date of the Flood Insurance Rate Map used to administer the regulations is 04/01/1998. There are four policies in effect with a total coverage of \$1,062,000. There have been no claims made or paid, and there are no repetitive loss structures.	Covers damage caused by flooding and informs residents of flood risk. Effective in ensuring that future development is safe from flooding.	The Flood Insurance Rate Maps are paper maps that are lacking critical detail. New digitized draft maps will be released by FEMA soon. When the maps are released, FEMA will request a review of the local regulations for compliance with the FEMA's standards.

Flood Hazard Regulations (Zoning Administrator)	<p>Ensures compliance with zoning and flood hazard regulations.</p> <p>The community also regulates development in the river corridor, which allows them a higher reimbursement under ERAF.</p> <p>As with all other towns in the Northeast Kingdom, Westfield has no local building codes. The State of Vermont has adopted building codes for commercial building safety and energy standards. The codes are enforced by Vermont's Division of Fire Safety. The energy code also applies to residential buildings, and the onus of enforcement is on the developer or applicant, who must produce a certificate of compliance.</p>	<p>Administers the local flood regulations to minimize flood hazard risk.</p> <p>Substantial Damage is damage of any origin (fire, flood, earthquake, etc.) sustained by a building where the cost of restoring the building to its pre-damage condition would equal or exceed 50% of the pre-damage market value of the building. Substantially Damaged buildings are required to be brought into compliance with floodplain regulations.</p> <p>Westfield's existing floodplain regulations track substantial improvements over a three-year period.</p>	<p>Flood hazard regulations are highly technical, and all local administrators rely on the State River Management Program for ongoing support and training.</p>
Local Emergency Management Plan	<p>Establishes basic municipal procedures for emergency response.</p> <p>This gets updated annually.</p>	<p>The LEMP establishes a game plan for call-outs, evacuations, etc.</p>	<p>The long-form LEMP provides more detail and establishes a communications plan for emergencies.</p>
Westfield Disaster Shelter Initiative	<p>Headed by the local Emergency Management Coordinator, this team also consists of the Town Clerk and the selectboard.</p>	<p>Coordinates response to local emergencies and extended power outages.</p>	<p>The group is looking for volunteers.</p>
Town Health Officer	<p>Responsible for investigating possible health hazards and risks and taking action to eliminate them.</p>	<p>Facilitates and supports testing of drinking water and septic systems.</p> <p>Enforces health laws.</p>	<p>Can keep the public aware of health risks associated with natural hazards.</p>
Regional Emergency Management Committee (REMC)	<p>Volunteer organization involved in hazard mitigation efforts.</p>	<p>In 2021, the REMC replaced the two Local Emergency Planning Committees in the Northeast Kingdom with one organization to focus on natural AND man-</p>	<p>We anticipate that a broader regional process will be more efficient. Since this is a relatively new board, local representatives to the board should monitor for</p>

		made disasters, such as hazardous materials release. The Local Emergency Management Director and one emergency services representative from each town and city in the region serve as voting members of the committee.	necessary improvements to the planning process, as they arise.
Municipal Roads General Permit (MRGP)	State standards have been updated to include the MRGP to control runoff and drainage on hydrologically connected road segments. Compliance is being phased in over time.	Effective in controlling road erosion and stormwater runoff. Provides funding sources for compliance.	Work with regional planning commission to pursue grant opportunities to implement recommended improvements.
Infrastructure & Road Maintenance Programs	Town Bridge and Culvert Inventory	Effective in tracking and planning for upgrades to most vulnerable infrastructure	Technical assistance from the regional planning commission can be helpful.

4. KEEPING THE PLAN RELEVANT

A. Plan Maintenance and Monitoring

Each spring, during the process of updating the Local Emergency Management Plan for Westfield, the Town Clerk and the Selectboard will take that opportunity to also review the list of implementation commitments in this hazard mitigation plan. The annual check-in will serve as a reminder of upcoming commitments for the year and enable them to note those tasks completed, by updating their status. The annual evaluation process will be initiated and led by the Town Clerk or designee. Key members of the planning team, the road crew and fire department will be invited to participate in a warned public meeting to review how the goals of the plan are being met, using the Implementation Tracker in Appendix B. The Tracker is intended to aid municipal officials in evaluating the mitigation actions for Westfield, and to facilitate the annual monitoring of the plan. The completed Implementation Tracker will then be posted to the Town’s website, along with a copy of the adopted Local Hazard Mitigation Plan. The town will reserve a Selectboard meeting to review the updated Implementation Tracker and solicit public comment.

Subsequent hazard events will also trigger a review of the plan. Following a disaster (during the recovery phase) the town will use the experience to assess the current plan’s ability to address the impact of the most recent disaster and edit the plan accordingly. This assessment will follow the same process, with the Town Clerk or designee initiating and leading the review, with members of the original planning team participating accordingly. The review and assessment will also be discussed in a Selectboard meeting. Using the annual progress reports and evaluation narratives as a guide, along with perceived changes in risk or vulnerabilities supported by data and/or observation, strategies will be captured in accordance with FEMA guidelines, which includes reconvening the planning team during the update process. The town will establish a “Mitigation File” that documents all evaluations and progress reports, along with

actions, especially related to infrastructure improvement projects. While the progress reports are designed to capture the specific actions the town has accomplished related to implementation, keeping a narrative list with dates on all actions relatable to mitigation will be helpful for updating the plan at the end of its five-year cycle, when the Town must submit an updated plan to FEMA for approval. Nevertheless, if any evaluation indicates that a change to mitigation strategies is necessary, Greensboro's Local Hazard Mitigation Plan can be updated at any time in the plan's five-year life cycle without triggering a second FEMA approval. Through formal planning notification and opportunity for engagement, the public can continue to contribute to town mitigation initiatives.

B. Integration of the Plan

Westfield's Town Plan will be updated during these next five years. The priority mitigation actions will be noted in the Town Plan to provide for stronger integration of this plan's goals. The Zoning Bylaws are currently being updated, and stronger flood resilient measures are being considered. The Planning Commission, Selectboard members, and the Town Clerk will seek to maximize integration.

C. Next LHMP Update

The next update of this plan will be initiated by the Town Clerk in the spring of 2026. This effort will be assisted by the members of the Westfield Disaster Initiative, whose members have experience and responsibilities related to planning, safety, and infrastructure for the town.

The planning team will review the measures in this plan on the relative effectiveness of those completed and why any that were not completed were not addressed in the time period. The team will also update the information in this plan on natural hazards to include those experienced since 2023. The team will invite broad public input to help them determine those strategies that need continued work or revision and any new directions that should be included in an updated plan. That public process will definitely include at least one public meeting and could include the use of an online survey to reach more people, including the nonresident property owners. The team will also request public input on the scoring of the strategies using a system equal or very similar to the STAPLEE method. The team will aim to have a completed draft update of the plan by December 2027, acknowledging that time is needed by the state and federal reviewers before the final updated plan can be adopted.

Mitigation action	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total
Integrate this Hazard Mitigation Plan into the Town Plan and Bylaw.	5	3	2	5	5	3	3	3.714286
Establish an Emergency Communications Plan reaches multiple audiences.	5	4	3	5	5	4	3	4.142857
Encourage family emergency preparedness	5	5	3	5	5	5	3	4.428571

S (ocial) It doesn't hurt anyone, and it's compatible with social and cultural views
T (echnical) It reduces losses long-term with minimal secondary adverse impacts
A (dministrative) The staffing and funding to do it is there
P (olitical) Everyone's behind it
L (egal) Whoever is doing it has the authority to do it
E (conomic) It's cost effective
E (nvironmental) It's environmentally sound

1 Poor
 2 Below average/unknown
 3 Average
 4 Above average
 5 Excellent

Mitigation action	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total
Review the FEMA draft maps when they become available.	5	3	3	3	5	4	4	3.857143
Amend Westfield's flood regulations to make the community more flood resilient.	4	5	3	3	5	4	5	4.142857
Continue to bring hydrologically-connect road segments up to standard to reduce sediment deposit in water bodies.	5	5	5	5	5	5	5	5
Continue to upgrade bridges and culverts along flood prone road segments.	5	5	3	4	5	5	5	4.571429
Explore the viability of a sewer connection in Westfield Village.	2	5	2	2	5	2	5	3.285714

Evaluate Loop Road Bridge

S (ocial) It doesn't hurt anyone, and it's compatible with social and cultural views
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E(conomic) It's cost effective
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2 Below average/unknown
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5 Excellent

Mitigation action	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total
Appoint a local energy coordinator.	5	5	3	5	5	5	5	4.714286
Maintain virtual meeting capacity.	5	5	3	5	5	5	5	4.714286
Publish the Westfield Highway Dept. winter operations plan in the Town Report every year.	5	4	3	5	5	5	5	4.571429

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Mitigation action	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total
Drought								
Examine earth extraction policies in relation to groundwater retention and protection, especially in instances that damage neighboring water supplies.	3	3	3	2	5	5	5	3.7
Expand postings about drought conditions.	5	3	3	3	5	4	5	4.0
Make information from the VT Dept. of Health readily available during periods of drought.	5	3	4	4	5	4	5	4.3
Encourage use of the Agency of Natural Resources drought reporter.	5	3	2	4	5	3	5	3.857143

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Mitigation action	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total
Invasives								
Identify areas along roadways with severe infestation and work with road crew to identify appropriate management practices.	4	3	2	4	5	4	5	3.9
Hail								
Make local growers aware of recovery options in the event of cross loss.	5	4	4	5	5	4	5	4.6

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Mitigation action	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total
Heat								
Work with home health care providers and volunteers to increase awareness of heat illness.	5	3	2	5	5	5	4	4.1
Explore cooling options for the Community Center.	5	4	3	4	5	3	4	4.0
Infectious Disease								
Maintain virtual meeting capacity for all local government operations.	3	3	3	4	5	4	5	3.9
Improve broadband availability and affordability.	4	4	4	4	5	5	4	4.3
Lightning								
Ensure that all data and telecommunications equipment in town-owned critical facilities (Town Offices and Community Center) remain properly grounded and protected.	5	4	4	5	5	3	4	4.3

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Appendix B: Westfield Hazard Mitigation Tracker

Note: Maintaining this file annually will aid the Town in evaluating effectiveness of the plan and identify future actions.

Hazard: All	Action	Responsible Entity	Timeline	Progress Noted/New Actions Needed
Any new hazards/events noted?	Integrate this plan into Westfield Town Plan and Zoning Bylaw	Planning Commission	2026	
	Establish an Emergency Communications Plan that reaches multiple audiences.	Selectboard, Emergency Management Coordinator, Westfield Disaster Shelter Initiative	Six months of LHMP adoption	
Hazard: Flooding, Wind, Extreme Cold, Ice	Action	Responsible Entity	Timeline	Progress Noted/New Actions Needed
Any new hazards/events noted?	Encourage family emergency preparedness	Westfield Disaster Shelter Initiative	Ongoing	
Hazard:Flooding (Inundation and fluvial erosion)	Action	Responsible Entity	Timeline	Progress Noted/New Actions Needed
Any new hazards/events noted?	Review the FEMA Work Maps when they become available.	Planning Commission	Imminent – but beyond the town’s control	
	Continue to evaluate Westfield’s flood regulations to make the community more flood resilient	Planning Commission	On release of the FEMA Work Maps and ongoing	
	Continue to bring hydrologically connected road segments up to standard to reduce sediment deposit in water bodies.	Road Foreman	Ongoing to 2035	
	Continue to upgrade bridges and culverts along flood prone road segments.	Road Foreman	Ongoing	
	Explore the viability of a sewer connection in Westfield Village	Selectboard, aided by Planning Commission	Now and over the course of next year	

Hazard: Winter Weather (Extreme Cold, Heavy Snow, Ice Accumulation)	Action	Responsible Entity	Timeline	Progress Noted/New Actions Needed
Any new hazards/events noted?	Appoint a local energy coordinator	Selectboard	6 months from adoption of plan	
	Maintain virtual meeting capacity	Selectboard and Town Clerk	Ongoing	
	Publish the Westfield Highway Department Winter Operations Plan in the Town Report every year.	Road Foreman and Town Clerk	Ongoing	
Hazard: Drough	Action	Responsible Entity	Timeline	Progress Noted/New Actions Needed
Any new hazards/events noted?	Examine earth extraction policies in relation to groundwater retention and protection	Planning Commission	2024	
	Expand postings about drought conditions.	Selectboard	2024 and ongoing as needed	
	Make information from VT Dept. of Health readily available during periods of drought.	Selectboard	2024 and ongoing as needed	
	Encourage use of the ANR drought reporter	Selectboard and town clerk	Ongoing	
Hazard: Invasives	Action	Responsible Entity	Timeline	Progress Noted/New Actions Needed
Any new hazards/events noted?	Identify areas along roadways with severe infestation and work with road crews to identify appropriate management practices.	Road Foreman and crew	2024 (when training modules become available)	
Hazard: Hail	Action	Responsible Entity	Timeline	Progress Noted/New Actions Needed
Any new hazards/events noted?	Make local growers aware of recovery options in the event of crop loss.	Selectboard	Ongoing as needed	

Hazard: Heat	Action	Responsible Entity	Timeline	Progress Noted/New Actions Needed
Any new hazards/events noted?	Work with home health providers and volunteers to raise awareness of heat illness. Vt. Dept. of Health has outreach and training materials.	SASH, Orleans Essex Visiting Nurse Association, NEKCA	Ongoing	
	Explore cooling options for the Community Center	Westfield Disaster Shelter Initiative	Ongoing	
Hazard: Infectious Disease	Action	Responsible Entity	Timeline	Progress Noted/New Actions Needed
Any new hazards/events noted?	Maintain virtual meeting capacity for all local government operations.	Selectboard	Ongoing	
	Improve broadband availability and affordability	CUD representative	Ongoing	
Hazard: Lightning	Action	Responsible Entity	Timeline	Progress Noted/New Actions Needed
Any new hazards/events noted?	Ensure all data and telecommunications equipment in town-owned facilities is properly grounded	Selectboard	Ongoing as needed	