

Town of Bradford, Vermont
2024 Local Hazard Mitigation Plan

***Prepared by the Two Rivers-Ottawaquechee Regional Commission and
the Town of Bradford***

02/22/2024

Date of Town Adoption:

02/27/2024

Date of Final Approval by FEMA:



FEMA

March 27, 2024

Stephanie A. Smith, State Hazard Mitigation Officer
Vermont Emergency Management
45 State Drive
Waterbury, Vermont 05671-1300

Dear Stephanie Smith:

As outlined in the FEMA-State Agreements for FEMA-4744-DR-VT, FEMA-4720-DR-VT, FEMA-4695-DR-VT, FEMA-4621-DR-VT, FEMA-4532-DR-VT, and FEMA-4474-DR-VT, your office has been delegated the authority to review and approve local mitigation plans under the Program Administration by States Pilot Program. Our Agency has been notified that your office completed its review of the *Town of Bradford, Vermont 2024 Local Hazard Mitigation Plan* and approved it effective **February 27, 2024** through **February 26, 2029** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended; the National Flood Insurance Act of 1968, as amended; the National Dam Safety Program Act, as amended; and Title 44 Code of Federal Regulations (C.F.R.) Part 201.

With this plan approval, the **Town of Bradford, VT** is eligible to apply to the Vermont Emergency Management for mitigation grants administered by FEMA. Requests for funding will be evaluated according to the eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in this community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

The plan must be updated and resubmitted to the FEMA Region 1 Mitigation Division for approval every five years to remain eligible for FEMA mitigation grant funding.

Stephanie A. Smith, State Hazard Mitigation Officer
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Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Alexis Meehan at (202) 394-6439 or Alexis.Meehan@fema.dhs.gov.

Sincerely,

MELISSA A SURETTE

Digitally signed by MELISSA A
SURETTE
Date: 2024.03.28 07:59:24 -04'00'

Melissa A. Surette, D.LP, MSEM, CEM
Floodplain Management and Insurance Branch Chief
DHS, FEMA Region 1 Mitigation Division

cc: Ben Rose, Recovery and Mitigation Section Chief, VEM
Caroline Paske, State Hazard Mitigation Planner, VEM
Matthew Hand, State Hazard Mitigation Planner, VEM
Dean Savramis, Mitigation Division Director, DHS, FEMA Region 1
Alexis Meehan, Community Planner, DHS, FEMA Region 1

CERTIFICATE OF ADOPTION

02/22/2024

TOWN OF BRADFORD, Vermont Selectboard

A RESOLUTION ADOPTING THE Town of Bradford, Vermont 2024 Local Hazard Mitigation Plan

WHEREAS, the Town of Bradford has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the **Town of Bradford, Vermont 2024 Local Hazard Mitigation Plan**, which result in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Bradford has developed and received conditional approval from Vermont Emergency Management (VEM) for its **Town of Bradford, Vermont 2024 Local Hazard Mitigation Plan (Plan)** under the requirements of 44 CFR 201.6; and

WHEREAS, the **Plan** specifically addresses hazard mitigation strategies, and Plan maintenance procedures for the Town of Bradford; and

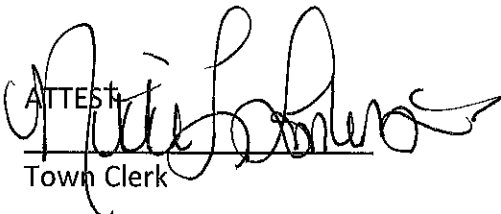
WHEREAS, the **Plan** recommends several hazard mitigation actions (projects) that will provide mitigation for specific natural hazards that impact the Town of Bradford with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this **Plan** will make the Town of Bradford eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by Town of Bradford Selectboard:

1. The **Town of Bradford, Vermont 2024 Local Hazard Mitigation Plan** is hereby adopted as an official plan of the Town of Bradford;
2. The respective officials identified in the mitigation action plan of the **Plan** are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and **Plan** maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the process of the implementation elements of the Plan will be presented to the Selectboard by the Emergency Management Director or Coordinator.

IN WITNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of Bradford this 22nd day of Feb. 2024.

ATTEST:

Town Clerk

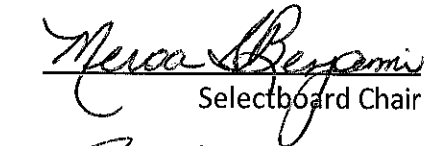
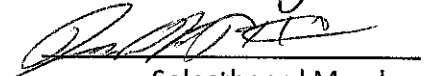

Selectboard Chair

Selectboard Member

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I. Introduction

Natural and human-caused hazards may affect a community at any time. Natural hazard events cannot be stopped; however, their impact on human life and property can be reduced through community planning. Accordingly, this Local Hazard Mitigation Plan (hereafter referred to simply as the Plan) seeks to provide an all-hazards mitigation strategy that will make the community of Bradford more disaster resistant.

“Mitigation” is defined as any sustained action that reduces or eliminates long-term risk to people and property from natural and human-caused hazards and their effects. Previous Federal Emergency Management Agency (FEMA), State and Regional Project Impact efforts have demonstrated that it is less expensive to anticipate disasters than to repeatedly ignore a threat until the damage has already been done. While hazards cannot be eliminated entirely, it is possible to identify prospective hazards, anticipate which might be the most severe, and recognize local actions that can be taken ahead-of-time to reduce the damage. These actions, also known as ‘hazard mitigation strategies’ can (1) avert the hazards through redirecting impacts by means of a structure, land treatment, or land use pattern change; (2) adapt to the hazard by modifying structures or standards or; (3) avoid the hazard through improved public education, relocation/removal of buildings in the flood zone, or ensuring development is disaster resistant.

II. Purpose of the Plan

The purpose of this Plan is to assist Bradford in identifying all hazards facing the town, ranking them according to local vulnerabilities, and identifying strategies to reduce risks from vulnerabilities of highest concern. Implementation of this plan will make our community more resistant to harm and damages in the future and will reduce public costs.

The Town of Bradford seeks to be in accordance with the strategies, goals, and objectives of the State Hazard Mitigation Plan.

The 2024 Bradford Local Hazard Mitigation Plan is the second single jurisdiction mitigation plan drafted for the Town. Previously, the Town had a town-specific 2010 Annex in the Regional (multi-jurisdiction) Pre- Disaster Mitigation Plan. In 2017 the Town adopted its first single jurisdiction mitigation plan. This new Plan is an update to the 2017 Plan.

Old assumptions have been challenged throughout, and new information has been added to make the plan stronger and more useful for the Bradford town officials and residents who will implement the hazard mitigation strategies in the future.

III. Community Profile

Bradford is located in the northeast corner of Orange County. It borders the Connecticut River and Piermont, New Hampshire to the east, the Towns of Fairlee and West Fairlee to the south, the Town of Newbury to the north, and the Town of Corinth to the west. The Town of Bradford's dominant landscape features are the Connecticut River Valley, The Waits River Valley, and Wrights Mountain. The Town contains the Bradford Village Center, which was last approved in 2016 by the Vermont Downtown Development Board. In 2020, Bradford's population was 2,790, and has leveled off from strong population growth in the latter half of the 20th century.

According to the US Census (Table H1, 2020), there were an estimated 1,356 housing units, 1200 occupied and 156 vacant, in Bradford in 2020. This represents a 5.85% increase in housing units from 2010 (equivalent to more than 7 housing units being added to housing stock figures per year). Approximately 10% of the Town's housing stock is considered vacant, and this includes units occupied for seasonal, recreational, or occasional use. About 19% of Bradford's housing units were built between 2000 and 2020, 31% of Bradford residences were built prior to 1939, according to the American Community Survey (Table DP04, 2021).

The Town lies within the service area of Green Mountain Power, which supplies electrical power to the majority of the town located along the main roads in Bradford. Washington Electric Coop supplies electric power to the western portion of Town.

Bradford is host to the largest dam in the Waits River watershed, the Waits River Dam, which is used to generate electricity. The Federal Energy Regulatory Commission regulates the Waits River Dam and manages it as a run-of-river dam, although there is a bypass reach which has low water levels. Dam break is considered highly unlikely.

Bradford owns and maintains a municipal water system, which consists of a 500,000 gallon concrete underground reservoir, a 500,000 gallon concrete tank, and a no longer in service 1,000,000 gallon open reservoir. This system provides water for the majority of U.S. Route 5 and the Lower Plain area.

Construction on Bradford's new Fire Station, located at 135 Carson Lane, was completed in 1998. It contains six bays for fire and rescue vehicles, an office for the Fire Chief, and a large meeting room. The fire department responds to a wide range of emergencies including structural fires, chimney fires, and all automobile-related rescue calls. The Fire Department responded to 206 calls in 2022 Bradford is part of two mutual aid networks. The town currently employs one full-time Police Chief, and one full-time officer. The Orange County Sheriff's Department provides extra coverage when requested by the Chief. The Vermont State Police from the St. Johnsbury Barracks provides coverage of the town during other hours. The State Police also provides backup when requested by the Town Police Department.

The Bradford FAST Squad is a first-responder service that answers emergency medical calls and provides immediate and temporary medical treatment to the sick or injured until a doctor can be secured or an ambulance arrives so the victim can be transported to a hospital. Upper Valley Ambulance, located in Fairlee, provides ambulance services to Bradford and eight other municipalities in Vermont and New

Hampshire. They provide emergency medical transportation services as well as non-emergency transportation services to hospitals, nursing homes, and residences.

IV. The Planning Process

A. Plan Developers

Kyle Katz, a Planner at the Two Rivers-Ottawaquechee Regional Commission (TRORC), assisted the Town of Bradford with updating its Local Hazard Mitigation Plan. Committee members who assisted with the revisions include:

Name	Role/Organization	How Participation Was Solicited
Ted Unkles	Planning Commission	On 05/30/2023 Kyle Katz (TRORC Staff) reached out to Ted Unkles and Gary Moore. TRORC staff coordinated with the Bradford Hazard Mitigation Plan (HMP) team to set up an introductory meeting. The first meeting was scheduled for 06/20/2023. Kyle Katz attended that meeting, followed by subsequent meetings to revise and update the LHMP. See below for more meeting- specific details.
Gary Moore	Emergency Management Director	
Phil Page	Road Foreman	
Ryan Terrill	Fire Chief, LEPC Representative	
Meroa Benjamin	Selectboard Chair	

B. Plan Development Process

The 2024 Bradford Hazard Mitigation Plan is an update to the single jurisdiction Hazard Mitigation Plan adopted by the Town in 2017. The changes to this Plan include:

- **General**
 - Updated sections: Plan Development Process, 2017 Mitigation Strategies Status Update chart, Existing Hazard Mitigation Programs, Projects & Activities, Plan Maintenance;
 - Data updates: New hazard incidents, emergency declarations, Census data;
 - Hazards have been reevaluated with the hazard ranking system used by the Vermont Division of Emergency Management and Homeland Security.
- **Hazards Analysis**
 - Hazardous Material Spills, Flash Flood/Flood/Fluvial Erosion, Extreme Cold/Snow/Ice

Storm, Structural Fire, and Severe Summer Weather remain on the list of “top hazards,” which reflect the local officials’ belief that the Town is still vulnerable to these hazards;

- Infectious Disease and Extreme Heat have been added to the list of “top hazards,” which reflects the intention/priorities of local officials to expand their analysis of hazards that the Town is or may be vulnerable to in the next five years;
- For each hazard, a location/vulnerability/extent/impact/likelihood table has been added to summarize the hazard description.

The following represent the avenues taken to draft the Bradford Local Hazard Mitigation Plan:

- **Activities** ***Note: The meetings with an asterisk were publicized and open to the public.*
 - 06/15/2023: TRORC staff met with the Bradford LHMP committee members to introduce the plan update process, respond to any questions, and engage in a ranking exercise to determine “Top Hazards” in the Town. The plan development timeline and public outreach strategies were discussed.
 - *07/10/2023: TRORC staff met with the Bradford LHMP committee. In the meeting, the committee reviewed the status of mitigation actions from the 2017 Plan and finalized the top hazards for the 2024 Plan. The meeting was open to the public, and a notice was posted on the town listserv¹ on 7/7/2023. A flier was also posted in several places in Town, including the town office, the post office, and the community bulletin board at Merchants Bank. TRORC staff also reached out to several local service organizations via email, describing the LHMP process and inviting the organizations to participate. These organizations included Margaret Pratt Community and Orange East Senior Center. No comments from these organizations were received. A link to the Bradford LHMP public survey was included in all outreach as an alternative way to participate. No members of the public attended the meeting and no comments were received.
 - *08/09/2023: TRORC staff met with the Bradford LHMP committee. One member of the committee attended. At the meeting, the hazard mitigation strategies were reviewed, along with the results of the hazard mitigation plan survey that was sent out to the public. The meeting and online survey was noticed on the Town Listserv on 08/01/2023 and 08/02/2023. A link to the survey was also posted on the Fire Department Facebook page², and was shared with the “Connecting Bradford”³ Facebook page as well. No members of the public attended the meeting. No comments were received at the meeting, though the results of the survey were reviewed.
 - *09/18/2023: TRORC staff met with the Bradford LHMP committee to finish developing mitigation strategies and to review the draft of the 2024 local hazard mitigation plan. The team also began outlining next steps including presenting the plan to the

¹ The Bradford listserv is subscribed to by representatives of businesses, schools/academia, and other private organizations that sustain community lifelines, as well as representatives of non-profit organizations that work directly with, or provide support to, vulnerable populations or frontlines communities.

² The Bradford Fire Department Facebook page is a source of information for emergency management personnel, town officials, and residents, as well as for organizations that work with and support vulnerable populations and frontline communities.

³ While the Connecting Bradford Facebook page is not run or sponsored by the Town, it is often visited by residents to find out what events, programs, and activities are happening in Town.

Selectboard. The meeting and a draft of the plan was noticed on 09/14/23 on the Town Listserv, and through a flier posted at the town office, the post office, and the community bulletin board at Merchants Bank. No members of the public attended the meeting and no comments were received.

- 09/27/2023: A draft of the 2024 Hazard Mitigation Plan was sent to the Bradford Selectboard Chair for comment. A draft was also sent to either the Selectboard Chair or the Town Administrator of the following municipalities for comment: Fairlee, West Fairlee, Corinth, Topsham, and Newbury. No comments were received.
- *10/12/2023: The LHMP committee presented the draft 2024 Bradford LHMP to the Selectboard at the Bradford Selectboard meeting. Members of the public were in attendance at the meeting. Several questions from the Selectboard were discussed. No comments were received from the public.
- Published Survey: A survey was published to provide an alternative form of engagement for members of the public to participate in the LHMP process. The survey asked a range of questions pertaining to natural hazards in Bradford, community assets, potential mitigation actions, and ways to keep the public notified as the process continues. The survey was published multiple times on the town listserv, and was also posted on the Fire Department Facebook page⁴, and the “Connecting Bradford” Facebook page. A total of six responses were received. A summary page of the survey results was reviewed and discussed by members of the Committee, and the results helped to inform the hazard mitigation strategies in Section VI of this Plan. The survey summary page has been provided in Appendix C of this Plan.

- **Review of existing plans, studies, reports, and technical information (44 CFR 201.6(b)(3))**

The Following sources were referenced for information during the writing of this Plan.

- State of Vermont Hazard Mitigation Plan, 2018
- Bradford Hazard Mitigation Plan (Adopted 08/10/2017)
 - This Plan was referenced extensively during the plan development process, especially in regard to the worst threats and mitigation action strategies identified in 2010.
- Bradford Town Plan (Adopted 01/28/2016)
 - The Town Plan provided TRORC’s staff with background information on the community, as well as more detail on their emergency services.
- Bradford, Vermont Zoning Bylaw (Adopted 12/12/2019)
 - The Zoning Bylaws were referenced for general knowledge and for Bradford’s Flood Hazard Regulations.
- Bradford Local Emergency Management Plan (LEMP) (Adopted 04/27/2023)
 - The Bradford LEOP was referenced for general knowledge regarding the Town’s emergency operations.
- Flood Insurance Study: Town of Bradford, Vermont (June 3, 1991)

- The Flood Insurance Study was referenced for general knowledge of Bradford’s water bodies, the Connecticut River and Waits River, and for historic flooding information.
- US Census Bureau, 2020 and 2022 Census and ACS demographic data.
 - US Census data accessed for general demographic information for Bradford.
- 2021 Vermont Climate Assessment.
 - Accessed for climate data that impacts the severity of natural hazards.
- Bureau of Labor Statistics
 - Accessed for economic data at the county level.
- 2021 Report of the State Fire Marshal
 - Accessed for state structure fire data.

Status Update on Mitigation Actions Identified in 2017

The following table outlines the mitigation actions that were proposed in the Town of Bradford 2017 Hazard Mitigation Plan. Participants in the new Plan update process reviewed these actions and reported on the status of each. Actions related to long-term mitigation of natural hazards are noted.

Mitigation/Preparedness Action	Who (Leadership)	When (Timeframe)	How (Funding/ Support)	2023 – Status of Mitigation Actions
ALL HAZARDS				
<i>Promote the active use of the Code Red communication system, called iPAWS or Integrated Public Alert and Warning System, which will assist in alerting residents to hazards when they occur. (Mitigation)</i>	Emergency Management Director	Winter 2018-Spring 2018	Local resources	Completed.
<i>Ensure that Bradford’s Local Emergency Operations Plan (LEOP) is kept up-to-date and identifies vulnerable areas and references this Plan. (Preparedness)</i>	Emergency Management Director/ Selectboard	Yearly	Vermont Division of Emergency Management and Homeland Security (VT DEMHS); TRORC; local resources	Completed. Updated yearly.
<i>Alert residents to upcoming hazards, bad weather, and potentially treacherous travel conditions by posting the VTrans Live Update Road Condition webpage on the Town Website. These resources will be used to give residents</i>	Emergency Management Director /	Fall 2017- Winter 2018	Vermont Division of Emergency Management and Homeland Security (VT DEMHS);	Completed and Ongoing.

Mitigation/Preparedness Action	Who (Leadership)	When (Timeframe)	How (Funding/Support)	2023 – Status of Mitigation Actions
<i>important information about upcoming hazards and potentially treacherous travel conditions. This town-wide notification system will reduce the loss of life during a hazard. (Preparedness)</i>	Selectboard		TRORC; local resources	
<i>Develop a methodology to consistently document infrastructure damage after weather events. (Preparedness)</i>	Road Foreman/ Town Clerk	Fall 2020	TRORC; local resources; National Weather Service; VTrans	Completed.
<i>Continue to submit Emergency management, public safety commission, highway, fire department, fast squad, and police chief reports in the annual Town Report. (Preparedness)</i>	Selectboard	Ongoing	Local resources	Completed. Updated yearly.
<i>Require Bradford employees to become Incident Command System (ICS) 100 and 200 certified. (Preparedness).</i>	Emergency Management Director	Ongoing	Local Resources	In progress. Most employees with supervisory roles are ICS certified. This action will remain in the 2024 Plan.
<i>Organize Shelter in Place Drills at the Valley Vista Center and Oxbow High School. (Preparedness)</i>	Emergency Management Director/ Selectboard	Ongoing	Local Resources	Not complete. The HMP committee determined that this strategy could not be feasibly undertaken by the town. This action will not carry over into the 2024 Plan.
<i>Maintain highway and fire mutual aid agreements. (Preparedness)</i>	Highway/Fire Department	Yearly	Local resources and with assistance from TRORC	Ongoing yearly.
<i>Distribute Vermont Division of Emergency Management & Homeland Security: Family Emergency Preparedness booklet at Town Meeting</i>	Selectboard/ Emergency Management Director	Ongoing and occurs yearly	Local resources	Completed yearly.

Mitigation/Preparedness Action	Who (Leadership)	When (Timeframe)	How (Funding/ Support)	2023 – Status of Mitigation Actions
<i>Day. (Preparedness)</i>				
<i>Ensure Red Cross Shelters, United Congregational Church, Bradford Elementary School, and Evangelical Church, are stocked with cots, blankets, and MRE (Meals Ready to Eat) (Preparedness)</i>	Emergency Management Director	Yearly	Vermont Division of Emergency Management and Homeland Security (VT DEMHS); VT Alert; local resources	Completed yearly.
<i>Continuously stock gear to help contain small spills when they occur (booms, absorbent materials, etc.). (Preparedness)</i>	Bradford Fire Department	Yearly	Bradford Fire Department resources	Completed. Stocked as needed.
<i>Maintain existing dry hydrants, by checking, servicing, flushing, and opening them annually. Proper maintenance of hydrants will reduce the loss of life and infrastructure from structure fires. (Preparedness)</i>	Fire Chief/Fire Department	Ongoing and occurs yearly.	Local Resources	Ongoing.
<i>Enlist statewide fire education trailer for use at Bradford Elementary School and at community events, which will help residents identify fire hazards in their homes. (Preparedness)</i>	Fire Chief/Fire Department	Ongoing	Local Resources, Vermont Division of Public Safety: Division of Fire Safety	Ongoing.
<i>Distribute fire prevention fliers at the school to protect young residents from loss of life during fires. (Preparedness)</i>	Fire Chief/Fire Department	Ongoing. Occurs once per year in the fall.	Local resources	Ongoing.
Structural Fire				

Mitigation/Preparedness Action	Who (Leadership)	When (Timeframe)	How (Funding/ Support)	2023 – Status of Mitigation Actions
<i>Shorten dry hydrant located at junction of Route 25 and Kenyon Rd by shortening it to improve functionality. (Mitigation).</i>	Bradford Fire Department	Summer 2019 - Fall 2019	Local resources; VT Dry Hydrant Grant Program	Completed.
<i>Remove dilapidated dry hydrant on Flanders Brook Road to eliminate confusion of emergency responders in their efforts to reduce the loss of life and infrastructure to structural fire. (Mitigation).</i>	Bradford Fire Department	Summer 2022- Summer 2023	Local resources; VT Dry Hydrant Grant Program	Not complete. This dry hydrant is located in an adjacent town. This action will not carry over into the 2024 Plan.
<i>Develop and implement easement for hydrant on Goshen Road East to reduce the loss of infrastructure from structural fire. (Mitigation).</i>	Bradford Fire Department	Summer 2020- Summer 2021	Local resources; VT Dry Hydrant Grant Program	Not complete. This action will not carry over into the 2024 Plan.
<i>Encourage businesses located in the two main blocks in Bradford Village to utilize tax benefits from Bradford Village designation to install sprinkler systems which will reduce the loss of life and infrastructure in the event of a block fire. (Mitigation)</i>	Selectboard, Planning Commission, Emergency Management Director	Spring 2019- Fall 2019	Local resources; private investment; HMGP Grant Program	Completed. This action will carry over in the 2024 Plan.
<i>Remove wooden stairway in- between Colatina Exit and Bliss Village Store. Removal of this portion of existing structure will diminish the extent of potential conflagrations and will reduce the loss of life and infrastructure from block fires. (Mitigation)</i>	Selectboard, Emergency Management Director	Spring 2019- Fall 2019	Local resources; HMGP Grant Program	Not complete. This action will carry over in the 2024 Plan.

Mitigation/Preparedness Action	Who (Leadership)	When (Timeframe)	How (Funding/Support)	2023 – Status of Mitigation Actions
<i>Consider implementing a cement firewall in the village blocks in Bradford Village to limit the spread and reduce the loss of life and property in the event of a block fire. (Mitigation)</i>	Selectboard, Emergency Management Director	Spring 2020-Fall 2020	Local resources; HMGP Grant Program	Complete. This action has been considered and will not carry over into the 2024 Plan.
Hazardous Material Spill				
<i>Ensure that all emergency response and management personnel continue to receive HAZMAT Awareness training at a minimum. (Preparedness)</i>	Bradford Fire Department	Yearly	Bradford Fire Department resources	Ongoing, annually.

Mitigation/Preparedness Action	Who (Leadership)	When (Timeframe)	How (Funding/Support)	2023 – Status of Mitigation Actions
Flash Flood/Fluvial Erosion/Severe Summer Weather/Tropical Storm				
<i>Upgrade culverts on Hackett Hill Road. Upgraded culverts appropriately handle the hydraulic capacity of streams and therefore protect town infrastructure from flooding. (Mitigation)</i>	Selectboard	Spring 2017-Fall 2018	VTrans; local resources; Better Roads Grant Program; HMGP Repetitive Loss Grant	Complete.
<i>Upgrade culverts on Mink Hill Road. Upgraded culverts appropriately handle the hydraulic capacity of streams and therefore protect town infrastructure from flooding. (Mitigation)</i>	Selectboard	Spring 2019-Fall 2020	VTrans; local resources; Better Roads Grant Program; HMGP Repetitive Loss Grant	Complete.
<i>Upgrade culverts on Fairground Road. Upgraded culverts appropriately handle the hydraulic capacity of streams and therefore protect town infrastructure from flooding. (Mitigation)</i>	Selectboard	Spring 2017-Fall 2018	VTrans; local resources; Better Roads Grant Program; HMGP Repetitive Loss Grant	Complete.

Mitigation/Preparedness Action	Who (Leadership)	When (Timeframe)	How (Funding/ Support)	2023 – Status of Mitigation Actions
<i>Upgrade culverts on Goshen Road East. Upgraded culverts appropriately handle the hydraulic capacity of streams and therefore protect town infrastructure from flooding. (Mitigation)</i>	Selectboard	Spring 2017- Fall 2018	VTrans; local resources; Better Roads Grant Program; HMGP Repetitive Loss Grant	Complete.
<i>Conduct a road erosion inventory to document erosion sections on Town road infrastructure to prepare for Municipal Roads General Permit and to improve infrastructure to ensure long term mitigation of damage to town owned property from flood waters. (Mitigation)</i>	Selectboard	Summer 2018-Fall 2019	VTrans; Better Roads Grant Program; local resources	Complete.
<i>Communicate with Depot Street Businesses, ARC Contractors, North Country Organics, Carroll Concrete, and Oxbow Veterinary Clinic, about elevating structures and hazardous materials. (Mitigation)</i>	Selectboard	Fall 2020- Winter 2020	Local structures	Not complete. This action will not carry over into the 2024 Plan. Several of these businesses are already elevated, and it is unrealistic that structures would be elevated unless required to following substantial damage.
<i>Develop a schedule and capital budgeting program to replace undersized culverts. Upgraded culverts appropriately handle the hydraulic capacity of streams and therefore protect town infrastructure from flooding. (Mitigation)</i>	Selectboard/ Road Foreman	Fall 2018- Spring 2019	TRORC; local resources	Complete. The culvert schedule is complete. The CBP and culvert replacement is ongoing. This action will carry over in the 2024 Plan.
<i>Update Bradford's flood hazard area regulations to ensure that they are compliant and consistent with state and federal guidelines and statutes. (Mitigation)</i>	Planning Commission	Fall 2021- Fall 2022	Municipal Planning Grant; TRORC; local resources	Complete.

Mitigation/Preparedness Action	Who (Leadership)	When (Timeframe)	How (Funding/ Support)	2023 – Status of Mitigation Actions
<i>Consider adopting river corridor regulations, which will incorporate VT ANR’s river corridor maps, helping residents and planners know what land is necessary for riparian functions and to prevent the threat to current and future development. (Mitigation)</i>	Selectboard	Fall 2022- Fall 2023	ANR; MPG; local resources	Not completed. This action will carry over into the 2024 Plan.
<i>Support projects to protect or restore, including riparian plantings, strategic areas of floodplain to provide areas for flood storage, which will help alleviate peak flood flows and reduce the loss of property during a flood. (Mitigation)</i>	Selectboard/ Planning Commission	Spring 2021- Fall 2021	Upper Valley Land Trust; Upper Valley Trout Unlimited; local resources	Ongoing. This action will carry over in the 2024 Plan.
<i>Keep up-to-date with Vermont Road and Bridge Standards, which will help Bradford design structures that mitigate flood damage to Town Infrastructure. (Mitigation)</i>	Road foreman/ Selectboard	Spring 2018- Summer 2018 (or when updated by VTrans)	Local resources	Complete and ongoing.
<i>Request an updated flood map from FEMA, which will more accurately represent frequently flooded areas and will allow the town to properly monitor and restrict the construction of infrastructure in areas that are vulnerable to flooding and severe weather. (Mitigation)</i>	Town Zoning Administrator	Fall 2020- Winter 2021	Local resources; FEMA	Not completed. This action will not carry over into this update of the LHMP. New flood maps are currently being developed by FEMA throughout Vermont, and are likely to be published in 2025 or 2026.
<i>Plan for, budget, and maintain roads for safe winter travel. (Preparedness)</i>	Selectboard	Ongoing and occurs yearly.	Local resources	Ongoing, annually.

Mitigation/Preparedness Action	Who (Leadership)	When (Timeframe)	How (Funding/Support)	2023 – Status of Mitigation Actions
<i>Continue efforts throughout Town to maintain and improve ditching in rights-of-way of Town maintained roads. (Mitigation).</i>	Road Foreman	Ongoing	Local Resources; Better Roads Grant Program	Ongoing, annually.
Extreme Cold/Snow/Ice Storm				
<i>Clear and maintain town road rights-of-way to protect town infrastructure. (Mitigation)</i>	Highway Department/ Selectboard	Summer 2020-Fall 2020	Local resources	Ongoing, annually.
<i>Encourage Green Mountain Power to clear and maintain utility corridors, which will protect town and utility infrastructure. (Mitigation)</i>	Emergency Management Director	Fall 2017-Fall 2018	Green Mountain Power; local resources	Not complete. This action will be revised and will carry over into the 2024 Plan.
<i>Develop a periodic program to clear tree limbs and maintain town road rights-of-way, and work with local utilities to ensure that utility corridors are cleared and maintained. (Preparedness)</i>	Selectboard	Fall 2021	Green Mountain Power; local resources	Not complete. This action will not carry over in the 2024 Plan.
<i>Update and maintain existing list of populations that are vulnerable to extreme cold and other hazards. Call and visit vulnerable residents, if necessary, in the event that a hazard occurs. By maintaining this list, the health of vulnerable populations will be protected. (Preparedness)</i>	Selectboard, Emergency Management Director	Ongoing and occurs yearly.	Local resources	Ongoing, updated annually.
<i>Distribute safe winter driving informational materials to residents by means of Bradfordlistserv. Safe winter driving mitigates the loss to human health. (Preparedness)</i>	Selectboard, Town Clerk	Yearly	Local Resources	Complete and ongoing.

vulnerabilities to hazards and addresses the Town's changes in priorities to different hazards. Based on these changes in priorities, several new hazards are addressed in detail in this Plan that were omitted from the previous 2017 Plan that currently pose a risk to the Town. All top hazards from the 2017 Plan remain top hazards in the 2024 Plan, reflecting the continued concern for these hazards in Bradford. Additionally, Infectious Disease has been added as a top hazard. The Covid-19 pandemic has increased local concern around the need to prepare for possible future pandemics and disease outbreaks. The health, economic, and social impacts of this hazard are still felt in town and throughout the country, better preparation for the next outbreak will help the town mitigate the impacts of a future outbreak. The Severe Summer Weather hazard was expanded to include Extreme Heat, which ranked high in the hazard ranking table.

There is relatively minimal development occurring in the Town of Bradford. According to the Bradford Zoning Administrator, there are an estimated 5-10 new residential dwellings permitted per year, a very small number considering there were 1,356 total housing units in the 2020 Census. From 2010 to 2020 there was an increase of 75 overall housing units. While total housing units has increased, the total population has not. This could be indicative of an increase in seasonal housing or second homes. The development pattern for commercial development tends to be within the Bradford Village Designated Downtown along Route 5 and in the Lower Plain area, which is at the intersection of route 5 and Route 25. There has been little commercial development since 2017. A Tractor Supply opened on Lower Plain Road several years ago, and the Tool Barn recently added an expansion. Neither development increases Bradford's vulnerability to natural hazards. There are no plans for large-scale development on the horizon. The Lower Plain area has a low vulnerability to future flooding due to large floodplain areas along the Connecticut River. Recent development has not changed current hazard vulnerabilities in Bradford.

Between 2010 and 2021, Bradford has seen the number of residents over the age of 65 increase from an estimated 14.4% to 22.2% of the total population (US Census Bureau, ACS Table S0101). This number is likely to grow as an estimated 14% of residents are currently in the age range of 55-64 years. Older residents are often more vulnerable to extreme weather events and hazard conditions, including extreme heat, cold and heavy snow. Ensuring mitigation strategies address the needs and vulnerabilities of older residents is a priority for the Town.

Future development along Route 25 and 25B is vulnerable to flooding due to its proximity to the Waits River. Future land use will likely follow the existing land use of this area, which is largely residential. Future development in this area should be avoided to limit the detriment to health and property.

Depending on the location, new development in the Town of Bradford may be vulnerable to flood or fluvial erosion hazard. Fortunately, the town's moderately slow growth rate and interest in pursuing options for reducing flood risks help reduce these risks. The Town's Zoning Bylaws, which include the Flood Hazard Overlay District, regulate new development within the Special Flood Hazard Area, which help reduce threats to structures built near flood hazards. However, the areas vulnerable to flood hazards and fluvial erosion hazards are not necessarily analogous. Therefore, the Town's Flood Hazard Overlay District may not protect new development from fluvial erosion hazards.

C. Town Capabilities for Implementing the Mitigation Strategy

(Existing Hazard Mitigation Programs, Projects & Activities)

The Town of Bradford is currently engaged in the following hazard mitigation programs, projects and activities:

	Type of Existing Authority / Policy / Program / Action	Resources: Staffing & Funding	Ability to Expand/Improve on
Community Preparedness Activities	Program—Annual update of Bradford’s Local Emergency Management Plan (LEMP). Last updated and approved on 04/27/2023.	Volunteer time from the Emergency Management Director; assistance from TRORC. Funding from Vermont DEMHS.	This document is reviewed and updated each year to ensure that the contact information of emergency response personnel is up-to-date. This information is then sent to Vermont Emergency Management for their records. Current program works well, and there is no need to expand or improve on.
	Program—Participation in LEPC #12	Volunteer time from Emergency Management Director and the Fire Chief. Funding from LEPC #12 and assistance from TRORC.	The Town’s current participation in the LEPC #12 is satisfactory. Therefore, there is currently no need to expand or improve on this program.
	Participation in Citizens’ Emergency Response Team (CERT)	Staff time from the Town Clerk	The Town participates in LEPC #12, the CERT program in Orange and Windsor counties.
	Action— Designation of Red Cross Shelter Shelters designated at Bradford Congregational Church, Bradford Elementary School, and the Evangelical Church.	Staff/volunteer time from the Town Clerk, Emergency Management Director Funding from American Red Cross.	This is a one-time action. There is no need to expand on it at this time.
Insurance Programs	Authority/ Program— participation in National Flood Insurance Program (NFIP)	Assistance from TRORC and Vermont ANR. Funding from local resources— annual town budget.	The Town’s initial Flood Insurance Rate Map (FIRM) was dated 01/31/1975. The Town’s current Flood Insurance Rate Map (FIRM) was dated 06/03/1991. The Town continues its participation in the NFIP by administering and enforcing its “Flood Hazard” zoning district. The Town employs a Zoning Administrator, who enforces the “Flood Hazard” regulations. New FEMA FIRM maps are expected to roll out in the next several years and will be automatically adopted by the current flood regulations. The Town has the authority and intends to consider strengthening the Flood Bylaw in the next planning cycle.

Land Use Planning / Building Codes	Policy/Program— Bradford Municipal Plan Adopted on 10/12/2023, includes a “Flood Resilience” section.	Volunteer time from Planning Commission, and assistance from TRORC and other state agencies on specific subject matter. Funding from Municipal Planning Grants.	The Town Plan is updated every eight years, as required by statute. The Planning Commission may expand or improve on any section it deems necessary, or that is required by changes in state statute.
	Completed Authority— Bradford Zoning Regulations Bylaw Adopted on 12/12/2019, includes a “Flood Hazard” zoning district	Volunteer time from the Planning Commission, and assistance from TRORC. Funding from Municipal Planning Grants.	During the Town Plan review/update period, the Zoning Ordinance is also reviewed and updated if needed.
	Vermont has adopted statewide residential and commercial building codes for safety and energy standards. Building codes are enforced by Vermont’s Division of Fire Safety. Residential and Commercial Building Energy Standards are building energy codes that apply to all new residential and commercial construction in the State.	Bradford does not enforce a local building code, however, the Zoning Administrator is required to provide a copy of the RBES and CBES to zoning permit applicants.	The Town has limited financial and staff capacity to enact and enforce building codes. Building codes are enforced at the state level by the Vermont Division of Fire Safety.
Hazard Control & Protection of Critical Infrastructure & Facilities	Policy/Program—Bradford Hazard Mitigation Plan Adopted on 08/10/2017	Volunteer time from Town officials; assistance from TRORC and Vermont DEMHS. Funding from FEMA; Vermont DEMHS; TRORC.	The 2024 Bradford Local Hazard Mitigation Plan will replace the 2017 Plan. Future iterations of the Town’s LHMP will be updated by the Town at least every five years.
	Program—Town road network inventory and capital budget planning	Staff time from the Town Road Foreman; and assistance from TRORC. Funding from VTrans Better Backroad grant program.	The Town does not currently have a road inventory. This action has been carried over into the 2017 Plan.
	Program— Culvert inventory.	Staff time from Town Road Foreman; assistance from TRORC. Funding from VTrans; local personnel time and funding.	The Bradford Road Foreman routinely updates the status of culverts in Town and maintains a comprehensive inventory of culverts. The most recent culvert inventory was undertaken in 2020.
	Ongoing Action— the Fire Department distributes fire prevention fliers at the School.	Time from the Volunteer Fire Department and funding from Fire Department budget.	This action is ongoing annually and it has been carried over into the 2024 Plan.
	Ongoing Action— the Town places emergency-related information in the Annual Report and on the Town’s website.	Staff time from Town Office personnel and funding from the Town’s budget.	This action is ongoing annually and has been carried over into the 2024 Plan.

D. Plan Maintenance

This Plan (the Bradford Local Hazard Mitigation Plan) will be regularly monitored, updated and evaluated by discussing its effectiveness and incorporating any necessary revisions. Making note to incorporate any necessary revisions in the update process. This update, monitoring, and evaluation will occur annually at an April Selectboard meeting along with the annual review of the Local Emergency Management Plan (LEMP). At this meeting, the Selectboard will monitor the implementation of the hazard mitigation and preparedness strategies outlined in this Plan by noting those that have been completed, and identifying the next steps required to implement the Plan's remaining strategies. Comments from local officials and the public will be incorporated when relevant.

This meeting will constitute an opportunity for the public and other town officials to hear about the town's progress in implementing mitigation strategies and to give input on future activities and Plan revisions. The public will be given the opportunity to comment at this meeting. Evaluation of the Local Hazard Mitigation Plan will consist of a thorough analysis of the status of mitigation and preparedness strategies and whether they are being implemented according to the time frames included in tables in this Plan. The Town of Bradford will evaluate the status of mitigation strategies to assess that goals of the Local Hazard Mitigation Plan are being met. Adherence to the mitigation, preparedness, and ongoing strategy implementation tables included in this Plan will constitute the degree of effectiveness of the Plan. The Town will also evaluate the status of vulnerabilities detailed in this Plan to evaluate their validity. The update of the Plan will bring up to date materials that have become outdated due to the passage of time. Bradford's Emergency Management Director will be the principal point of contact and will take primary responsibility for the monitoring, evaluation, and update process described here. He or she will bring the Plan's maintenance activities to the Selectboard's agenda and discussions.

Updates and evaluation of this Plan by the Selectboard and the Local Emergency Management Director will also occur within three months after every federal disaster declaration directly impacting the Town of Bradford. The Town will monitor, evaluate, and update this Local Hazard Mitigation Plan at an April Selectboard meeting and after every federally declared disaster directly impacting the Town according to the graphic in Appendix B. The Town shall reference the Local Hazard Mitigation Plan when working on Town Plan amendments or changes to the Town's bylaws.

At least one year before the Plan expires, the update process will begin (through annual updates, monitoring of progress and evaluation that will occur at the April Selectboard meeting). In subsequent LHMP updates, applications for funding should be submitted 2.5 years prior to expiration to ensure the update is funded prior to Plan expiration. For this next Plan update, the Two Rivers-Ottawaquechee Regional Commission (TRORC) will help with Plan updates if assistance is requested by the Town of Bradford and if funding is available. If TRORC is unable to assist the Town, then Bradford's Town Clerk, Emergency Management Director, Administrative Assistant, or Selectboard will update the Plan, or the Selectboard may appoint a committee of interested citizens (including the current local Emergency Management Director) to draft changes. Ultimately, it will be the Town's responsibility to update their Local Hazard Mitigation Plan.

The process of evaluating and updating the plan will include continued public participation through public notices posted on the municipal website; the municipal building; One or more area newspapers; and notice on the TRORC newsletter and website, inviting the public to the scheduled Selectboard (or specially scheduled) meeting. The public will be given the opportunity to comment during this process. Additional stakeholders may be invited to the meeting including: local businesses and non-profit organizations based in the Town, VTrans, and the Vermont Agency of Natural Resources (VT ANR). VT ANR can provide assistance with NFIP outreach activities in the community, models for stricter floodplain zoning regulations, delineation of River Corridor areas, and other applicable initiatives. These efforts will be coordinated by the Selectboard and the Planning Commission.

Updates to the Plan will address changes in community mitigation strategies; new town bylaws, zoning and planning strategies if appropriate; progress on the implementation of initiatives and projects; effectiveness of implemented projects or initiatives; and evaluation of challenges and opportunities including overall effectiveness of plan goals and actions in reducing vulnerabilities. If new actions are identified in the interim period, the plan can be amended without formal re-adoption during regularly scheduled Selectboard meetings.

Bradford shall also incorporate mitigation planning into their long-term land use and development planning documents. The Bradford Municipal Plan was last updated and adopted on 10/12/2023. The 2017 Local Hazard Mitigation Plan, the previous version of this Local Hazard Mitigation Plan for the Town of Bradford, provided guidance in the development of the Bradford Municipal Plan, including directing goals, policies, and recommendations towards mitigating the effects of future hazards on health and property in the Town. The 2013 Vermont Legislature passed a law requiring all towns to incorporate flood resiliency elements into their town plans as of July 2014. The Town of Bradford added a flood resiliency element to their Town Plan when it was updated January 28, 2016. Flood hazard and fluvial erosion hazards were identified, and strategies and recommendations were provided to mitigate risks to public safety, critical infrastructure, historic structures and public investments. This Local Hazard Mitigation Plan will incorporate information from the Town's Flood Resiliency Element.

The Town should review and incorporate elements of the Local Hazard Mitigation Plan into updates for the municipal plan, zoning regulations, and River Corridor bylaws. The Town shall also consider reviewing any future TRORC planning documents for ideas on future mitigation projects and hazard areas. During the Municipal Plan update process, the planning commission will review and consider incorporating mitigation actions and priorities described in this Local Hazard Mitigation Plan into Bradford's Municipal Plan. Mitigation strategies will directly influence goals, policies, and recommendations in future updates to the Bradford Town Plan. In the most recent update to the Bradford Town Plan, one recommended action in the Flood Resilience section is "To continue working to develop mitigation plans, and emergency preparedness and recovery procedures from flooding." The incorporation of the goals and strategies listed in the Local Hazard Mitigation Plan into the municipal plan, zoning regulations, flood hazard bylaws, and River Corridor bylaws will also be considered after declared or local disasters.

V. Community Vulnerability by Hazard

A. Hazard Identification

Mitigation efforts must be grounded in the rational evaluation of hazards to the area and the risks these hazards pose. This is done through a process, which in essence asks and answers three basic questions:

- What bad things can happen, given the town’s vulnerabilities?
- How likely are they to occur?
- How bad could they be?

This process, which is laid out in the table below, is an attempt to inventory the known hazards, establish the likelihood of them occurring in the future, and then assess the community’s potential vulnerability to each. In performing this analysis, we are then able to prioritize actions that are designed to mitigate the effects of each of these disaster types and ultimately make Bradford a safer place.

It is important that we learn from the past in order to avoid the same disasters and their outcomes. Disasters that have occurred within the Town of Bradford, 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 this historical data can inform our perspective of what might happen in the future, it is by no means a prophecy. While Bradford might not have been impacted by a specific hazard in the past, this does not necessarily mean it will never be affected in the future.

Indeed, the advance of climate change means that old weather patterns may not remain consistent. For instance, in recent years, Vermonters have seen an increase in the number and severity of storms, especially rainfall events. Armed with historical data and a healthy respect for climate change and the unknown, we have tried our best to identify hazards and prepare for the future.

A significant change between this Plan and the 2017 plan is the way in which hazards are assessed. This Plan follows closely the hazard assessment approach taken in the 2018 State Hazard Mitigation Plan. The table below displays the ranking criteria used to score both the potential impact and the frequency of occurrence. The Hazard Mitigation Planning Team evaluated the probability of hazard events occurring in the future.

The following table reflects the hazards that we believe can be expected, or are at least possible, in the central Vermont area. We have considered factors such as frequency of occurrence and potential community impact to rank each and determine which hazards pose the greatest threats to life and property in Bradford. The most significant threats (bolded in the table, below) are then followed-up with discussion and mitigation strategies throughout the rest of this Plan.

	Probability	Potential Impact					Average:	Score:
Hazard Impacts		Infrastructure	Life	Economy	Environment			
Inundation Flooding *	4	4	3	3	2	3	12	
Ice and Snow Storms*	4	4	3	3	1	2.75	11	

Severe Summer Weather*	4	3	2	3	3	2.75	11
Hazardous Materials Spills*	3	2	4	4	3	3.25	9.75
Fluvial Erosion*	4	4	1	1	3	2.25	9
Infectious Disease*	4	1	4	3	1	2.25	9
Structural Fire*	3	4	4	3	1	3	9
Extreme Heat*	4	2	2	2	1	1.75	7
Wildfire	3	2	2	2	3	2.25	6.75
Drought	3	1	1	3	4	2.25	6.75
Invasive Species	3	1	1	3	3	2	6
Tropical Storm/Hurricane	2	3	2	3	3	2.75	5.5
High Winds	3	3	1	2	1	1.75	5.25
Wastewater Contamination	3	1	2	1	3	1.75	5.25
Ice Jams	3	3	1	2	1	1.75	5.25
Extreme Cold	2	3	3	1	1	2	4
Dam Failure	1	4	4	4	4	4	4
Hail	3	1	1	1	1	1	3
Tornado	1	3	3	2	3	2.75	2.75
Landslides	1	3	2	2	3	2.5	2.5
Earthquakes	1	1	1	1	1	1	1

*Top Hazards

See Appendix A to view the Hazard Ranking Methodology that was used by the Hazard Mitigation Committee in determining the ranking in the preceding table.

LHMP committee discussed the results of the hazard ranking activity and decided to focus on hazards that scored highest in probability of occurrence as well as potential impact.

For the purposes of this Plan, Severe Summer Weather, which includes Hurricanes/Tropical Storms, hail, high winds and lightning, have been combined into one hazard profile area for analysis due to their overlapping events and potential impacts to the Town. The Hazard Mitigation Committee chose to include Extreme Heat as a top hazard since it ranked fairly high in the hazard assessment and extreme heat events are becoming more frequent and more intense. Similarly, ice jams have been detailed and analyzed in concert with flash flood/flooding/fluvial erosion due to the overlapping events, extents, impacts, and observed history of occurrence. While Ice Jams do not generally cause significant damage, they are a frequent occurrence in Bradford and will therefore continue to be included. While Extreme Cold did not score as high as other hazards, it will be included with Snow and Ice Storms since extreme cold events occur annually and can pose significant risk if accompanied by winter weather that disrupts power lines or closes roads, which can leave residents vulnerable. Due to low probability and/or small potential impact, the mitigation committee chose not to detail the following hazards in this LHMP: drought, wastewater contamination, earthquakes, dam failure, tornadoes, wildfire, landslides, and invasive species infestation. All these hazards scored quite low, therefore posing a lack of risk to the community to justify mitigation. Refer to Appendix A for definitions of the hazard ranking terms used in the above chart.

After engaging in discussions using their best available knowledge, the Town of Bradford identified the following “top hazards” (based on frequency of occurrence and potential impact) that they believe their community is most vulnerable to:

- Flash Flood/Flood/Fluvial Erosion and Ice Jams
- Hazardous Material Spills
- Extreme Cold/Snow/Ice Storm
- Structural Fire
- Severe Summer Weather
- Infectious Disease

The impact of a loss of services is a common element of the hazards discussed in this Plan. These include not only large-scale services such as the loss of transportation and communication ability, but also the loss of services more directly associated with basic needs such as water, food preparation, and heat. Loss of power for an extended period of time has the potential to greatly impact households who are entirely reliant on a functional power supply in order to prepare food, heat the household, and ensure that the water supply is available. While many residences in Bradford utilize a variety of methods to ensure these basic needs, it is important to be aware that a number of households rely on electricity alone for all of these functions. In addition to the plans described in the Bradford LEMP, it is important to reinforce the need for adequate generators in this Plan, so that the town is prepared to ameliorate the effects of a sustained power loss in Bradford. Included in this would be an adequate supply of fuel for these generators.

The Committee noted that the combination of hazards would have a potential impact on the Town that would likely cause larger impacts. Similarly, the occurrence of one hazard has the possibility to lead into another hazard. The combination of hazards occurring simultaneously was not reflected on the hazard ranking table and the scores assigned by the Hazard Mitigation Committee to specific hazards.

A further focus that is important to address in this Plan includes the awareness of the population demographics of Bradford. This includes a comprehensive idea regarding the number of individuals in the town who may require assistance in the event of a severe weather incident. Age and ability should be factors taken into account and, as discussed in the LEMP, there should be individuals responsible for creating and updating such a list, including members of the ambulance service, town offices, the health officer, and service officer.

Each of these “top hazards” will be discussed in the following sections. Within each section, previous occurrences of each hazard will be listed, including the County-wide FEMA Disaster Declarations (DR-#), where applicable. Hazards information was gathered from local sources (ex., town history book), the National Climatic Data Center’s (NCDC’s) Storm Events Database (1950-2012 and 2006-2012), the Spatial Hazard Events and Losses Database for the United States (SHELDUS) 1960-2012, and Special Reports produced by the National Weather Service in Burlington, Vermont. Often data was only available at the county level, but when available, town-specific data was used. This section also includes a description of each “top hazard” and a hazard matrix that will also include the following information (please see each hazard profile for a hazard-specific matrix):

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Type of Hazard	General Areas in Community that may be	Community structures, systems, populations, or other assets as	The strength or magnitude and details of the	Financial impact from an event and/or the number	<u>Occasionally:</u> 1-10% probability of occurrence per year, or at least one chance in

	vulnerable.	defined by the community that are susceptible to damage and loss from hazard events.	most notable event(s).	of structures that are impacted.	the next 100 years. <u>Likely:</u> >10% but <100% probability per year, at least 1 chance in the next 10 years <u>Highly likely:</u> 100% probable in a year
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B. Hazard Profiles for Hazards Posing Highest Vulnerabilities

1. Flash Flood/Flood/Fluvial Erosion & Ice Jams

The most frequent form of flooding in the State of Vermont and the Town of Bradford is riverine flooding, or overbank flooding, which occurs to rivers when they receive more rain or snowmelt from their watershed than they typically experience. Flooding causes the inundation of land that is normally dry. Overbank flooding is experienced more frequently in mountainous and hilly areas where water moves with higher velocities. Flash floods occur when severe storms drop high amounts of rainfall in short periods of time. Flash floods occur more frequently in areas with steep slopes and narrow stream valleys. Riverine erosion is the gradual wearing away of land masses by rivers and streams. River channels are constantly changing. As rivers flow and water moves downstream, water exerts energy upon riverbanks and causes erosion.

Flooding is one of the worst threats to Bradford’s residents and infrastructure. Past instances of flooding in Bradford have included rain and/or snowmelt events that cause flooding in the major rivers’ floodplains and intense rainstorms over a small area that cause localized flash- flooding. Both kinds of events can be worsened by the build- up of ice or debris, which can contribute to the failure of important infrastructure (such as culverts, bridges, and dams).

Similarly, Ice jams are a hazard of specific concern with overlapping extent and impact to flash flooding and fluvial erosion. Such events can occur with little to no warning and quickly escalate into life-threatening situations, thereby increasing the impact of such events when they happen. Ice jams are most prone to occur when heavy rains and rising temperatures cause rapid snow melt. Rivers, as a consequence, swell and ice layers begin to break, which then flow downstream and create obstructions around natural and man-made barriers. The majority of ice jams happen between the months of January and March, and the lead time for an ice jam or flow can range anywhere from a few hours to only one hour. The flows can cause water to rise by multiple feet per hour or even multiple feet within minutes. This can mean that there is insufficient time to prepare for rising water and ice levels. While flooding from ice jams is not often major, it has the possibility to be catastrophic, particularly in places that have an historic pattern of growth along waterways. Ice jams can have a disastrous impact on waterways and surrounding structures and infrastructure, and they can cause severe erosional issues along with endangering local fish and wildlife populations.

The worst flood disaster to hit the Town of Bradford, as well as the overarching region and the State of

Vermont, occurred on November 3, 1927. This event was caused by up to 10 inches of heavy rain from the remnants of a tropical storm that fell on frozen ground. Eighty-four Vermonters, including the Lieutenant Governor, were killed. The flooding in the White River valley was particularly violent, with an estimated 120,000 to 140,000 cubic feet/second (cfs) flowing out of the White River at West Hartford, Vermont. Like many towns in the region, the Town of Bradford received heavy precipitation, seeing roughly 7-8 inches of rainfall over the storm period.

A more recent flooding event that devastated the region and the state was the result of Tropical Storm Irene, which occurred on August 28, 2011. Record flooding was reported across the state and was responsible for several deaths, as well as hundreds of millions of dollars of home, road and infrastructure damage. Due to the strong winds, 50,000 Vermont residents were initially without power, and many did not have electricity restored to their homes and businesses for over a week. Despite the damage wrought, the flooding caused by Tropical Storm Irene is considered to be the second greatest natural disaster in 20th and 21st century Vermont, second only to the Flood of 1927.

The Town of Bradford suffered some damage to property and infrastructure during Tropical Storm Irene, and no lives were lost. It is estimated that Tropical Storm Irene dropped 6.79 inches of rain over the Town of Bradford in a very short span of time, some of the highest precipitation totals in Orange County (which averaged 5-7+ inches over its land area). However, Bradford did not sustain widespread damage to health and property during Tropical Storm Irene unlike other Towns in Orange County. The county-wide damage for Orange County totaled \$5 million. The Town of Bradford reported minimal damage during Tropical Storm Irene (approximately \$3,420.00 according to FEMA’s Public Assistance database).

Unfortunately, flooding is very common across the region, with many events impacting the Town of Bradford specifically, and Bradford has been hit hard by other flooding events that pre-date Tropical Storm Irene. As such, flooding is one of the worst threats to Bradford’s residents and infrastructure. The following list indicates the history of occurrence with regard to this hazard in Orange County (given the small population of Bradford, town-specific data is limited); an asterisk “*” denotes the instances in which town-specific data is available, and federal disaster numbers are listed where appropriate. No detailed data was available for fluvial erosion damage in Bradford in terms of numbers of acres lost or amount of fill that that was used to compensate for fluvial erosion after flooding during each event. No detailed extent data was available in Bradford for ice jams in terms of physical size of ice jams.

History of Occurrences:

Date	Event	Location	Extent and Impacts
07/9/2023-07/11/2023 DR-4720	Flood, Flash flood	Statewide	Extent and impacts are still being evaluated. Between 6”-12” of precipitation across the state over several days caused heavy flooding in Central Vermont. Bradford experienced road washouts but no major damage to town infrastructure.
Period from 06/30/2017 – 07/02/2017	Flash flood	County-; region-wide	Heavy rains throughout central Vermont over a 3-4 day period resulted in saturated soils, leading to flash flooding in parts of Orange County. Precipitation measured in Corinth between June 30 and July 2 nd totaled approximately 4.77”, with the heaviest precipitation of 2.38” falling on July 2. Damage to property in Bradford is not known.
Period from 02/25/2017 - 02/26/2017	Flood, ice jam	Orange County	Warm temperatures and thunderstorms and rainfall in late February resulted in melting snow, ice jams, and flooding in sections of Orange County, Vermont. An ice jam on the Waits River in Bradford resulted in the closure of sections of Route 25 between

Date	Event	Location	Extent and Impacts
			Bradford and Corinth. Damage to property in Bradford is not known.
Period from 06/25/2013—07/11/2013 (DR-4140)*	Severe Storms, Flooding, and Fluvial erosion	County-; region-wide	Severe storms caused flooding and fluvial erosion throughout the region, causing damage to some infrastructure and facilities. During this period, the neighboring Town of Corinth received 7.96 inches of precipitation. There were several outages that occurred in Bradford during the disaster period. On 6/24 126 Green Mountain Power customers lost power for 2 hours. On 6/28 41 GMP customers lost power for .4 hours. No damage was claimed in the Town of Bradford.
08/28/2011 (DR-4022, TS Irene)*	Tropical Storm, Flooding, and Fluvial Erosion	Bradford, County-wide; Vermont	Widespread rainfall amounts of 3-5 inches occurred across Vermont with 5 to 7+ inches across much of southern, central Vermont. Devastating flash flooding occurred across much of central and southern Vermont mountain valleys with substantial and some record breaking flood stages on larger rivers. This flood event will likely rank second to the November 1927 flood in the scope of meteorological and hydrological conditions/impacts as well as loss of life (84 in 1927), but likely first in monetary ((approx. \$500. million statewide vs \$350. million (1927 in 2010 dollars)). There were nearly 2400 roads, 800 homes/businesses, 300 bridges and a half dozen railroad tracks destroyed or damaged from the flooding and fluvial erosion caused by Irene. According to spotter's reports, Bradford received over 5.7" of rain in 24 hours and 6.79 inches of rain in 48 hours. There was \$3,420.00 in damage total for Bradford according to FEMA's Public Assistance database (captures at least 70% of total damage). Power outages were minimal in Bradford with only several isolated incidents that affected singular power customers at a time.
3/7/2011*	Ice Jam, Flooding, and Fluvial Erosion	Bradford; County-wide	Heavy rainfall preceded a cold front that swept through Vermont that caused temperatures to drop and changed rain to heavy sleet and wet snow. Rainfall totaled about 2 inches in the morning before changing to ice/sleet. Snow accumulations added another 6-7 inches of precipitation. Rapid snowmelt and heavy rainfall caused ice-covered rivers to melt and ice jams to form in Rowell Brook in Bradford. Ice jam caused flooding on Route 25 and Rowell Brook Road. Outage data was unavailable for this event.
9/30/2010-10/1/2010	Flooding and Fluvial Erosion	County-wide	An area of low pressure and a pocket of tropical moisture associated with the remnants of Tropical Storm Nicole caused heavy rain in Vermont on September 30 and October 1, 2010. Bradford experienced 3.75 inches of rain in 24 hours, and experienced 5 inches in 48 hours. Outage data was unavailable for this event.
07/21/2010*	Severe Weather and Flash Flooding	Bradford; County-wide	Several storms strengthened into super cells that produced widespread wind damage to trees, power poles and structures as well as large hail in excess of golf ball size in diameter. Very heavy localized rains caused some temporary problems in many communities. 2.43 inches of precipitation was experienced in Bradford. Outage data was unavailable for this event.
08/21/2009	Flash Flooding and Fluvial Erosion	Bradford; County-wide	Thunderstorms produced torrential downpours in nearby Chelsea, who experienced significant damage on several roads due to flash flooding and fluvial erosion. Damage was severe in Bradford, which received 1.26 inches in precipitation. Outage data was unavailable for this event.
08/07/2008* (Part of DR-1790 VT)	Flooding and Fluvial Erosion	Bradford; County-wide	Thunderstorms with heavy rainfall in a moist atmosphere moved through central and southern Vermont during the afternoon and evening hours. Bradford reported \$15,080.21 in damage. Bradford received 2.6 inches of rain in 24 hours with an additional 1.22 inches of rain in the previous 24 hours. No significant power outages occurred.

Date	Event	Location	Extent and Impacts
07/11/2007 (DR 1715 VT)	Flash Flooding and Fluvial Erosion	County- wide	Localized heavy rainfall exceeded 3 inches within a two hour time frame. Some localized storm totals approached 6 inches across very hilly or mountainous terrain, which resulted in flash flooding and fluvial erosion of several communities in Orange County. Outage data was unavailable for this event.
1/18/2006	Flash Flooding and Fluvial Erosion	County- wide	A powerful storm moved across Ontario and Quebec that brought rising temperatures and caused snow melt. Widespread rainfall of 1.5 to 2.5 inches combined with increased runoff caused flooding and ponding of roadways across Orange county. Outage data was unavailable for this event.
9/12/2003*	Severe Storm, Flooding, and Fluvial Erosion	Bradford; County- wide	Bradford experienced \$5,710.12 in damages.
6/26/1998- 6/27/1998	Flooding and Fluvial Erosion	Bradford; County- wide	An area of low pressure caused heavy consecutive rainfall in Orange County, Vermont from June 26 through June 27. Bradford experienced 4-8 inches of rain over the two days, which resulted in extensive flooding, with some roads experiencing as much as 2 feet of water. Washouts and erosion occurred on many town roads, including Chelsea Road and Goshen Road. The Waits River flooded, as well. Power outages did occur in Bradford, but specific outage data was unavailable. Damage from this storm set an important precedent in Bradford for road, culvert, and ditch maintenance. Town upsized all damaged culverts to substantially larger sizes, began to maintain a culvert inventory and capital budget road improvement program, and purchased an excavator for ditch improvement.
06/28/1973— 06/30/1973 (DR-397)	Flooding	County- wide	As much as 6 inches of rain fell in 24 hours in some locations. 3 deaths occurred and \$64 million in damage occurred in Vermont.
11/02/1927— 11/04/1927 ("Flood of 1927")	Flooding	County- wide; Vermont	Considered to be one of VT's most devastating events, the flood took out 1285 bridges, miles of roads and railways, and countless homes and buildings. 84 people were killed, including Lt. Gov. S. Hollister Jackson. Rainfall totaled 4-9" statewide, following a month with 150% the normal amount of rain.

There are several locations in Bradford that are specifically vulnerable to flooding. Vermont Route 25 is vulnerable due to its proximity to the Waits River. Rowell Brook Road, in the southern part of Town, is also vulnerable and experiences fluvial erosion. Old Creamery Road, which crosses the Waits River, has experienced historic ice jams. Other vulnerable roads that parallel streams, brooks, and rivers include Millpond Road, Chase Hollow Road, Flanders Brook Road, and Rabbit Track Road. Current ditching and culvert conditions in Bradford are exceptional, and current and recent road maintenance has prepared Bradford's infrastructure well for rain and flooding events. However, with the expected increased frequency and intensity of storm events, vulnerable roads may experience future damage.

As part of its Zoning Regulations, the Town of Bradford has a Flood Hazard Overlay Zoning District that

limits development within areas of potential flooding. The Flood Hazard Overlay District prohibits development in the Floodway. Restricted development in the special flood hazard area is permitted. See the Bradford Zoning Regulations for specific details. The Bradford Zoning Regulations were adopted on December 12, 2019. There are 24 total properties that are located within the special flood hazard areas. These consist of 10 single-family residences, 4 government buildings, 2 industrial properties, and 8 commercial properties. If all of these properties were destroyed in a flood, the resulting damage would equal \$6,483,224. Specific commercial properties that are located in the special flood hazard areas include Alexanders Restaurant and Pub, the Bradford Golf Club, the North Country Organics, ARC Mechanical Contractors, and the Oxbow Veterinary Clinic. The Bradford wastewater treatment plant is also located in the special flood hazard area. Bradford has mapped Special Flood Hazard Areas along the Connecticut River, the Waits River, and Halls Brook.

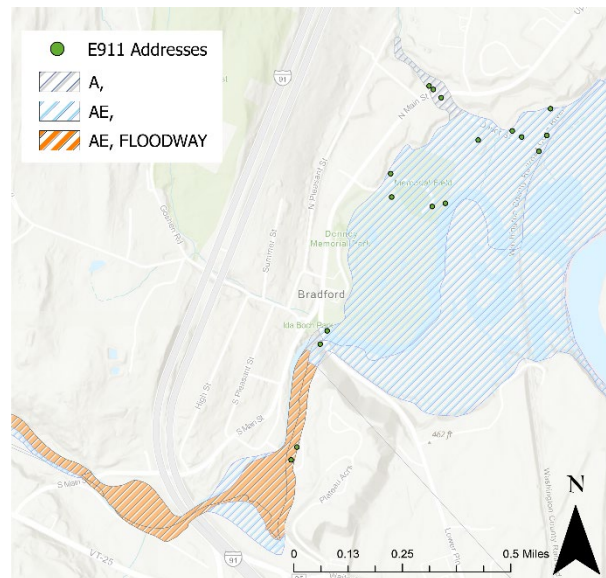


Figure 1 Inset of E911 Addresses in the Flood Zone in downtown Bradford

Across Vermont, most child and elder care facilities are not registered with the State. Most child day care in Bradford is likely private in-home care, but there are also five licensed childcare providers. Bradford childcare providers include My Second Home, Watch Them Grow Childcare Center Inc., Valley Cooperative Preschool Inc, Bradford Elementary School Preschool, Orange County Parent Child Center, Bradford Elementary School and After School Program, and the private residence of Emily Pryer. None of these facilities are located within the mapped special flood hazard area. However, the residence of Emily Pryer, located on Rabbit Track Road, is within the mapped ANR River Corridor, is within .5 miles of Roaring Brook, and is at a moderate risk of flood damage. Finally, low-income housing is not registered with the State. There is currently 1 mobile home park located in Bradford, Whistle Stop Mobile Home Park, located on Whistle Stop Way, which is off of Waits River Road behind Farmway.

Recent studies have shown that the majority of flooding in Vermont occurs along upland streams, as well as along road drainage systems that fail to convey the amount of water they are receiving. These areas are often not recognized as being flood prone, and property owners in these areas are not typically required to have flood insurance. It should be noted that, while small, mountainous streams may not be mapped by FEMA in NFIP FIRMs (Flood Insurance Rate Maps), flooding along these streams is possible, and should be expected and planned for. Flash flooding in these reaches can be extremely erosive, causing damage to road infrastructure and to topographic features including stream beds and the sides of hills and mountains. The presence of undersized or blocked culverts can lead to further erosion and stream bank/mountainside undercutting.

It is not only property located in the SFHA that is vulnerable to flooding. Bradford has mapped River

Corridor Areas⁵ for Roaring Brook, Mill Pond Brook, Meadow Brook, Chase Brook, the Waits River, and the South Branch of the Waits River. According to the Vermont Agency of Natural Resources' mapped River Corridor Area, there are 60 total properties that are within the mapped River Corridor but are *not* located in the Special Flood Hazard Area. These consist of 37 single-family residences, 7 multi-family residences, 5 camps, 3 mobile homes, 4 industrial properties, and 3 commercial properties. If all of these properties were destroyed in a flood, the resulting damage would equal \$10,119,112.

Furthermore, climate change research and precipitation trend analysis suggests that intense, local storms are occurring more frequently, which indicates that Bradford will experience high intensity rainfall and flooding events in the future, resulting in increased damages and impacts to town assets. According to the 2021 Vermont Climate Assessment, average annual precipitation in Vermont has increased by 21% since 1900, and that extreme weather events, such as floods, will continue to increase in frequency⁶. Due to Bradford's topography of steep slopes and narrow river valleys, fluvial erosion also has a high probability of future occurrence.

Following a significant damage event (whether it be from flooding or other hazard), the Administrative Officer (AO) is required to make Substantial Improvement or Substantial Damage determinations for damaged structures in the Special Flood Hazard Area. This will involve the AO reviewing the damaged property as soon as possible following the event, and determining the estimated cost of work, along with the structure's market value. The AO has several options available for estimating damage, including FEMA's *Substantial Damage Estimator Tool* and qualified estimates made by town officials, contractors or engineers. The AO may request technical assistance from VT ANR and the Regional Floodplain Managers on how best to evaluate for substantial damage, as not all events will require the same approach. If a structure is determined to have been substantially damaged (no matter the cause), it is required to be brought into compliance with Bradford's Flood Hazard Area Bylaw. The AO is required to maintain a record of all Substantial Improvement/Substantial Damage determinations.

The Bradford Road Foreman is proactive in his road budgeting and upgrading. He readily replaces culverts and improves ditches. Following storm and heavy rain events, the Road Foreman evaluates any damage caused on Rowell Brook Road, and roads and infrastructure near Wrights Mountain and Hackett Hill.

In 2020, Bradford completed a town-wide culvert inventory with the assistance of TRORC. 85% of the Town's culverts were evaluated to be in either good or fair condition. Only 27 culverts were considered to be in poor condition.

Certain population groups are also more vulnerable to flood events. Residents living within flood hazard

⁵ River corridors encompass an area around the present channel for fluvial erosion, channel evolution and down-valley meander migration are most likely to occur. River corridor widths are calculated to represent the narrowest band of valley bottom and riparian land to accommodate the least erosive channel and floodplain geometry (i.e. equilibrium conditions) that would be created and maintained naturally within a given valley setting. Vermont DEC Flood Hazard Area and River Corridor Protection Procedures; Draft October 06, 2014; pages 6-7.

⁶ <https://site.uvm.edu/vtclimateassessment/chapters/executive-summary/>

or river zones often are at higher risk to life and property. However, given Vermont's topography, many structures not in recognized flood zones may be at risk as well. Certain demographic groups are also more at risk and less able to respond to damaging flood events. Older residents may be less able to respond during or after a flood event, while low income residents may have less capacity to pay for the necessary repairs resulting from flood damage.

While perhaps not directly a flooding issue, heavy rains and saturated soils could begin to compromise portions of the retaining wall on North Pleasant Street. Monitoring of the retaining wall will need to be ongoing to ensure its condition does not worsen and put nearby infrastructure and development at risk. The retaining wall is buckling and has been deteriorating for years. The retaining wall will likely need to be addressed in the near future, and will be included as a strategy in the Hazard Mitigation Strategies section.

Photos showing compromised sections of the retaining wall along North Pleasant Street



Finally, in an effort to help reduce the Town’s vulnerabilities to flooding and protect structures and road infrastructure, it is important to restore floodplain and increase the number of areas for retention wherever possible. Equally important to reducing flood vulnerabilities is the process of stabilizing river banks in areas that are vulnerable to slides and/or have the potential to damage critical or important infrastructure.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Flash flood/flood/Fluvial Erosion and Ice Jams	Many of Bradford’s roads are vulnerable to erosional flooding due to steep terrain. Some of the most vulnerable for fluvial erosion or flooding include Vermont 25, Rowell Brook Road, and Old Creamery Road. Old Creamery and Appleton Road are specifically vulnerable to ice jams.	Culverts, bridges, road infrastructure, public and private infrastructure are vulnerable to flooding. There are 24 total properties that are located within the special flood hazard areas. These consist of 10 single-family residences, 4 government buildings, 2 industrial properties, and 8 commercial properties. If all of these properties were destroyed in a flood, the resulting damage would equal \$6,483,224.	Tropical Storm Irene- 4”-7” across county (5.7” in Bradford).	\$15,080.21 in damage total for Bradford according to FEMA’s public Assistance database (captures at least 70% of total damage).	Likely

2. Hazardous Material Spill

Hazardous materials include any biological, chemical, or physical substances that can harm human beings or the environment. ⁴ These materials can be released in a variety of different ways to varying degrees of severity. When hazardous materials are released, response is required in order to minimize the extent of contamination and to reduce the impact on human health and property.

Based on available VT Tier II data, there are 19 sites in town that have sufficient types and/or quantities of hazardous materials to require reporting. 16 businesses currently file a Tier II report with the State. These sites include the local businesses, Perry’s Oil Service, Carroll Concrete, ARC Mechanical Contractors, and T. Copeland and Sons, along with government buildings such as, the VTrans District Garage, Bradford Town Garage, and the Vermont State Police Station. The Village of Bradford is predominantly located along Vermont Route 5. The Waits River, which is impounded by the Waits River Dam and the Smith Hydropower Station, flows underneath Route 5, and therefore presents a risk to contamination in the event of spill. A railroad parallels Route 5 and the Connecticut River throughout the Town, and regularly transports heating fuel and propane. The railroad may transport other hazardous materials, though it is unknown whether this is the case. Interstate 91 runs through the Bradford lengthwise from North to South. There are 28 critical facilities in the Town of Bradford, including 12 hazardous material storage facilities.

Based on E911 data, there are an estimated 899 total structures located within 1,000 feet of a potential HAZMAT spill on major roads, such as Route 5, Route 25, Route 25B, Interstate 91, and all railroads. This includes 697 residential structures and 121 commercial properties. Government buildings that are vulnerable to HAZMAT incidents include the Bradford Fire Department, Oxbow High School, Bradford Elementary School, the Bradford Academy, and the Bradford Post Office. In the event that 5% of these structures were involved in a HAZMAT incident, the estimated damage would be \$8,258,365.

As climate change increases the likelihood of extreme weather events, hazardous materials spills may become more common. The location of storage facilities, industrial operations, and wastewater treatment facilities within flood zones or near to streams and rivers could pose a spill hazard during periods of flooding and heavy precipitation. Severe summer weather, or winter storms that bring heavy snow and ice could damage transformers, plow trucks, and other equipment, leading to more frequent spills.

The State of Vermont currently has one fully-trained HAZMAT response team, with vehicles located in Barnet, Colchester, Pittsford, and Putney. The HAZMAT crew chief on call is available within minutes of a call for the team but on-scene response would be a matter of hours. In the event of a serious accident in Town, there would be little time for evacuation and response would be difficult. Two members of the HAZMAT response team reside in Bradford.

The following data was retrieved from the Vermont Department of Environmental Conservation’s Spill List and by searching the archives of local newspapers. The online database of spills consists of those that have been reported. It is difficult to encompass the hazardous material spills that were not reported, and those are not reflected in the table. The table is used to illustrate the ease with which trucks and the day-to-day activities in the Town have the potential to create a hazardous material spill and dangerous conditions for emergency responders and town residents.

⁴ Tufts University. (2016). *Hazardous materials spill*. Office of Emergency Management. Retrieved from <http://emergency.tufts.edu/guide/hazardous-spill/>

History of Occurrences:

Date	Event	Location	Extent and Impacts
01/10/2023	VTrans excavator, blown line.	MM 99.4 I91 NB	An estimated 10-15 gallons of hydraulic oil was released, spraying over a nearby guardrail and pavement. VTrans crew performed cleanup.
12/16/2022	Transformer spill	544 Kenyon Road	A tree fell on a transformer, resulting in the release of an estimated 5 gallons of transformer oil. Three 55 gallon drums of soil, snow, debris and PPE were collected for disposal at the US Ecology hazardous waste facility in Williston.
12/16/2021	Fuel oil discharge	386 Fairgrounds Road	A fuel oil delivery connected to the wrong tank, resulting in a release of 300 gallons of #2 fuel oil. Most oil was secured in a containment system. An estimated 20 gallons of oil impacted the ground surface.
07/11/2019	Transformer spill	Huntington Terrace	A shorted transformer released 10 gallons of non-PCB oil (MODF) over nearby vegetation. Heavy rain made cleanup difficult.

02/05/2019	Hydraulic oil spill	Route 25	A plow truck lost approximately 5 gallons of hydraulic oil between South Road and Chelsea Road. No cleanup was possible.
03/20/2018	Fuel oil leak	307 South Main Street	A ruptured tank resulted in a release of 86 gallons of #2 heating oil in the Copeland Apartments. The apartments were evacuated by the Fire Department, and cleaning companies were brought in to clean the affected areas.
10/17/2017	School bus fire.	Oxbow Drive	A school bus engine fire resulted in a 20 gallon diesel spill. Half of the spill was captured with absorbents, while half of the spill was contained to a swale and the soccer field.
07/03/2017	Transformer spill	Rowell Brook Road	7 gallons of MODF were released when a pole-mounted transformer was downed during a storm.
03/22/2017	Hydraulic oil spill	Route 25	A plow truck traveling between Topsham and Bradford lost 20 gallons of hydraulic oil. The oil was not recoverable.
10/31/2016	Disposal of cooking grease in storm drain.	K-D Welch Service Road	A storm drain became clogged due to the disposal of cooking grease. The storm drain was pumped. There was no release into the waterway and the grease was contained in the catch basin. Quantity of disposed grease unknown.
10/26/2016	Fuel Oil Spill	155 Upper Plain Road	Dead River conducted an inspection and discovered broken vent pipe and contents of UST were being displaced. Rainwater infiltrated an Underground Storage Tank, causing the release of #2 fuel oil via a vent pipe.
4/5/2016	MODF Spill	GMP Substation 55 Falls View Rd	A mounted transformer leaking pad released 5-10 gallons of mineral oil dielectric fluid to spill.
9/22/2014	Hydraulic Oil	Farm Way: 286 Waits River Road	A blown hydraulic hose occurred while emptying dumpster and resulted in 15 gallons of spilled hydraulic oil.
1/31/2015	Transmission Oil	Route 25	4 gallons of Lube/gear/transmission oil were released on Route 25 near the Bradford VTrans garage.
3/27/2012	#2 Fuel Oil Spill	Clark Residence: 4229 Waits River Road	During a house fire the above ground storage tank in basement was removed and set on the ground. Once the house was restored, petroleum was noted in the drinking water well. It was determined that 50 gallons of #2 fuel oil were spilled.
5/5/2011	Diesel Oil Spill	Route 25	A Perry's Oil propane truck crashed and caused the release of 2-4 gallons of diesel fuel oil. Bradford and Corinth Fire Departments responded to the scene to oversee the loading and righting of propane. Bradford Fire Department cleaned up fluids released with pads speedi-dri.
10/30/2011	Hydraulic Oil Spill	Route 5	A hose blew on a VTrans plow truck during plowing from the junction of Route 25 and Fairground Road and I-91. 10-15 gallons of hydraulic oil spilled and were not recovered.
4/22/2010	Grease spill	Depot Road	1 steel drum labeled "methanol" was found and estimated release was 55 gallons. Drum was later tested and found to contain food-grade grease.
12/29/2010	Hydraulic Line Failure	Route 25	A Vermont Agency of Transportation hydraulic line failure caused 19 gallons to leak from Topsham to Bradford. Recovery was not possible.
9/8/2009	Fuel line leak	Demars Residence : 138 Upper Plain Road	A brass line ruptured in the basement of residence and led to the release of 50-60 gallons.
12/10/2009	Blown Line	I-91 northbound	A blown line caused 5 gallons of released fuel line.

9/2/2009	Blown Hydraulic Hose	Route 25	A leak began at the Vermont Agency of Transportation garage on Fairground Road. The culprit truck continued through Bradford Village, up Route 25 to 25, proceeded west on Route 25 to Flanders Brook Road. Altogether 25 gallons were released.
2/2/2008	Plow Truck line failure	I-91 Northbound	A Vermont Agency of Transportation truck blew its main hose and continued to plow over many miles. The blown hose was not noticed until the plow wouldn't list. Overall release was estimated at 30 gallons.
1/3/2005	Diesel Oil Spill	57 Fairground Road	While refueling at the Bradford Agency of Transportation garage, 10 gallons of diesel oil were released on frozen gravel surface. AOT cleaned with sorbent.
5/13/2004	Diesel Oil Spill	Bradford Armory	A leaking fuel tank was noted during safety inspection and determined that 25 gallons of diesel oil had been released. Soil was excavated and removed.
11/16/2004	Diesel Oil Spill	Interstate 91	A log truck rolled over on the interstate and caused the release of 50 gallons of diesel fuel oil. Soils were excavated and removed.
7/28/2000	Diesel Oil Spill	Bradford Mini Mark: Route 25 and Route 5	A diesel spill resulted in the release of 35 gallons of diesel oil.
11/17/1998	Hydraulic leak from a forklift	Twin State Fertilizer	A hydraulic leak from a forklift caused the release of 20 gallons of material.
8/14/1996	Leaking fuel line	Fairground Road	A leaking fuel line led to the release of 100 gallons of diesel fuel oil. 30 yards of soil was excavated and removed.
1982-1993	PCE contamination	Depot Street	The Former Maska, a hockey apparel manufacturing operation, used and did not properly dispose of PCE (perchloroethylene/tetrachloroethylene) during a ten year period. The site is currently under active site management. The plume of hazardous material was maintained with an institutional control so that there is no migration of substance or threat to human health.

The Town of Bradford has experienced hazardous material spills in the past, and the potential for a major spill exists in the future. Interstate 91 runs through the town, which provides a significant hazardous material spill threat. Major state highways in Bradford include Route 5 and Route 25, and these routes witness considerable truck traffic. A truck accident and a resulting hazardous material spill could be exceedingly disastrous for the Town and its residents, as these two routes intersect in the southeast portion of the Town. These routes serve as the main thoroughfares for trucks and other motor vehicles transporting a wide range of goods, including a wide range of hazardous materials, within the confines of Bradford. Route 5 follows the Connecticut River through Bradford, and, as a result, additional water contamination issues could be created if a hazardous material spill were to occur along either of these major routes. Depot Street, which is located off of Route 5 north of the Bradford Village area, contains businesses that use or store hazardous materials.

A hazardous material spill in Bradford, in addition to impacting residents, businesses and surface waters, may also impact the water supply. There is one major public water supply in Bradford, which is located on Route 25 and services the Bradford village area. The source protection area of the public water supply is close to Interstate-91, and could be impacted by a hazardous material spill near the exit. Contamination of the water sources is possible from hazardous material spills.

In order to prepare for hazardous material spills in Bradford, most members of the Bradford Fire

Department are trained to the HAZMAT Awareness level.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Hazardous Materials Spill	Vermont Route 25, Route 5, and Interstate 91. Along the Green Mountain Railway line.	Road infrastructure, nearby structures (Bradford Fire Department, Oxbow High School, Bradford Elementary School, the Bradford Town Clerk, and the Bradford Post Office), the Waits River and the Connecticut River.	Initially, local impacts only; but depending on material spilled, extent of damage may spread (ex. Into groundwater).	There are 899 total structures within 1,000 feet of a potential HAZMAT spill on major roads (Vermont I-91, Route 5, and Route 25). This includes 697 residential structures and 121 commercial properties.	Likely

3. Extreme Cold/Snow/Ice Storm

Winter storms are a regular occurrence in Vermont. They can consist of extremely low temperatures, intense wind chills, high snow accumulation levels, and/or ice accumulation. Severe winter storms can cause serious damage, including collapse of buildings due to overloading with snow or ice, brutal wind chills, downed trees and power lines, and stranded vehicles. People can be at risk of freezing in extended power outages if they lack wood heat or backup power, and individuals shoveling large accumulations of snow can also be at risk from frostbite, hypothermia, and heart attacks caused by cold and overexertion. While snow removal from the transportation system is standard fare in Vermont winters, extreme snow or ice can close rail and road systems, further jeopardizing any stranded persons that are in danger of freezing or needing medical assistance. Extreme cold in the Town of Bradford is defined as below zero degrees Fahrenheit for two or more consecutive days.

Severe winter storms include a blizzard on February 15-17 in 1958, which dumped over 30 inches and resulted in 26 deaths in New England. On December 26-27 in 1969, another blizzard left 18-36 inches of snow in northwestern Vermont and a whopping 45 inches in nearby Waitsfield. A string of storms in March 2001 hit the state, beginning with 15-30 inches on March 5-6th (later declared a federal disaster), 10-30 inches on the 22nd, and 10-20 inches on the 30th. Recent years have seen wet snow storms that have toppled trees and caused widespread power outages.

The worst winter storm in terms of damage to hit the state recently was not a snow storm, but an ice storm. In January of 1998, just the right combination of precipitation and temperature led to more than three inches of ice in spots, closing roads, downing power lines, and snapping thousands of trees. This storm was estimated as a 200-500 year event. Power was out up to 10 days in some areas, and 700,000 acres in of forest were damaged in Vermont. Amazingly, there were no fatalities in Vermont, unlike Quebec where 3 million people lost power and 28 were killed. The Town of Bradford was impacted by this ice storm.

The most recent severe winter storm to hit Vermont began on December 9th, 2014 and lasted until

December 11th, 2014. During this period of time, much of the state of Vermont was hit with heavy, wet snow that ranged from accumulation totals anywhere from a few inches to almost two feet along parts of the Green Mountains. The heavy, wet snow stuck to tree limbs and power lines which led to widespread power outages and significant damage to the state’s power infrastructure. Over 100,000 customers without power statewide, some for multiple days, and the damage to power infrastructure caused by the storm surpassed that which was incurred as a result of the 1998 ice storm or Tropical Storm Irene. In addition to damage to power infrastructure, towns hit by the storm had significant amounts of debris clean up and removal to contend with in the spring of 2015.

While winter storms with heavy and wet snow can cause significant damage to infrastructure and property, freezing rain events are becoming a more common hazard and source of damage. In 2020, one freezing rain event led to a three day power outage and road closures throughout town. A similar event around Christmas of 2022 led to over a week of road closures. As freezing rain events increase in frequency, they will likely become more of a hazard than wet snow events.

Over the past few winters, Bradford has received numerous snow storms that have dropped significant amounts of snow over a day or two day period. However, the details of these events and the damage they caused are overshadowed by winter weather events of the past. This is not to say such extreme events will not repeat themselves. It should be assumed that extreme winter weather events will continue to occur, despite general warming trends we are beginning to experience due to climate change.

History of Occurrences:

Date	Event	Location	Extent and Impacts
03/13/2023-03/14/2023	Winter Storm	Bradford; County Wide; State-wide	A winter storm brought heavy snow and high wind gusts to much of the region. Many areas saw snowfall rates of 1-2 inches per hour. Corinth recorded 10” of snow on March 14 th . The heavy snow and strong wind led to power outages, with 90,000 customers losing power throughout the State. Many roads were closed due to accidents, and many schools were closed as well.
03/03/2022 – 03/04/2022	Winter Storm	Bradford; County Wide; State-wide	A winter storm brought snow and mixed precipitation to much of Vermont. Snowfalls generally ranged between 7-12 inches, with nearby Corinth recording 9”.
02/03/2023 – 02/04/2023	Extreme cold/ wind chill	Bradford; County Wide; State-wide	An arctic airmass led to dangerously cold temperatures throughout much of Vermont. Daytime temperatures ranged from 0 to 15 degrees below zero. Wind chills ranged from 20-40 below zero. The extreme temperatures led to school closings and the canceling of outdoor events.
12/16/2022-12/17/2022	Winter Storm	Bradford; County Wide;	A wet snowstorm moved into southern Vermont, bringing heavy, wet snow and causing numerous power outages. 17.2” of snow was reported in nearby Corinth. More than 100,000 power customers were impacted by the storm. Estimated damage costs are not known.
02/03/2022 – 02/04/2022	Winter Storm	Bradford; County Wide; State-wide	An arctic front moved across Vermont on the morning of February 3rd, bringing light rain that changed to snow. The front continued in the region through February 4th, with heavy snow, freezing rain, and sleet falling throughout the region. Total snowfalls ranged from 10-14 inches, with some areas seeing ice and power outages. 13” was recorded in Corinth.
12/18/2021-12/19/2021	Winter Storm	Bradford; County Wide;	A weak low pressure system brought 5-8” of snowfall across the state. 7” was recorded in Corinth. Property damages for Orange County were estimated at \$10,000.

		State-wide	
03/23/2020 – 03/24/2020	Winter Storm	Bradford; County Wide; State-wide	A winter storm system moved into Vermont from the Midwest, bringing 7-10 inches of snow and isolated power outages. 9.1” reported in nearby Corinth. \$5,000 estimated in damages for Orange County.
12/16/2020 – 12/17/2020	Winter Storm	Bradford; County Wide;	A Nor’easter moved up the Atlantic Coast and through Southern Vermont. Snowfall rates ranged from 2-4+ inches per hour. Snowfall ranged from 6-17 inches in much of Orange County, with 17 inches reported in Union Village. 6” was reported in nearby Corinth. There were \$70,000 in estimated damages throughout the region.
03/22/2019	Winter Storm	Bradford; County Wide;	A wet snowstorm brought 7-14” of heavy snow to Orange County. Thousands of power outages were reported throughout the State. 7.9” reported in nearby Corinth. Wind gusts of 15-25 MPH were also reported. \$15,000 in reported damage across Orange County.
01/20/2019	Winter Storm	Bradford; County Wide;	A long-lived winter storm brought heavy snow in accumulations of 10”-18”, with 15” falling in nearby Chelsea. 12.3” fell in Corinth. The region also experienced extremely cold temperatures Saturday through Monday, with overnight lows at 10-20 below zero. Estimated damages for Orange County were \$15,000.
11/26/2018- 11/28/2018	Winter Storm	Bradford; County Wide; State-wide	A winter storm moved across Vermont from the Midwest, bringing heavy wet snow to many areas of the State. More than 40,000 customers reported power outages across the State, affecting 100,000 customers. \$100,000 in estimated property damage for Orange County.
03/13/2018- 03/15/2018	Winter Storm	Bradford; County Wide; State-wide	A nor’easter swept through New England. Snow fall in Orange County ranged from 10-27 inches, with 18” falling in nearby Chelsea. 9.1” was recorded in Corinth. \$20,000 in recorded damages across Orange County.
02/07/2018	Winter Storm	Bradford; County Wide;	Low pressure systems moved across central and southern Vermont, bringing light snowfall. Accumulations for Orange County ranged from 6-11 inches. 9.8” was measured in nearby Corinth. Snowfall rates reached 1 to 2 inches per hour in some places. \$10,000 in estimated damages across Orange County.
03/14/2017- 03/15/2017	Winter Storm	Bradford; County Wide; State- wide	A nor’easter moved up the Atlantic coast, bringing heavy snowfalls, 45 inches per hour in some places, as well as blizzard conditions. Snowfall across Vermont ranged from 12”-36”. Snowfall in nearby Corinth was 16”. Many schools, businesses, and offices were closed as a result of this storm.
1/7/2015- 1/8/2015	Extreme Cold	Bradford; County Wide; State- wide	An arctic cold front pushed across Vermont with plummeting temperatures and brisk strong winds of 15-30 mph caused dangerously cold wind chills of 25-40 degrees below zero during the evening of January 7 and morning of January 8. Temperatures in the morning of January 8 were 15-25 degrees below zero on the morning of January 8 in Orange County. The neighboring Town of Newbury registered 22 degrees below zero.
2/1/2015- 2/28/2015	Cold/ Wind Chill	County- State-wide	A persistent deep cold trough settled across the northeast United States for the month of February, which registered the coldest month on Vermont record since December 1989 or January 1994. Many towns recorded 15 to 20 days below zero in the month, and several days with dangerously cold wind chills of 30 below zero or colder.
Period from 12/09/2014— 12/12/2014 (DR-4207 VT)	Snow/ Winter Storm	Bradford; County-; region-wide	A powerful prolonged heavy, wet snow event from December 9th through December 11 th . Snowfall totals ranged from a few inches to almost 2’ near Warren, VT. The snow to liquid ratios ranged from 5-7” of snow to 1” of rain, which lead to the snow sticking to trees and power lines. Approximately 6 inches of snow and 1.89 inches of ice fell in Bradford. 3 Green Mountain Power customers were affected for 20 hours.

Period from 03/12/2014—03/13/2014	Snow Storm	County-; region-wide	A major snowstorm with near blizzard conditions at times impacted portions of northern New York on March 12th and lingered into the morning hours of March 13 th . Numerous motor vehicle accidents, school and business closures resulted due to the storm on both March 12th and 13th. Snowfall totals across Orange county were generally 15 to 20+ inches. Significant power outages occurred in Bradford. On 3/14 147 GMP customers lost power for 1.5 hours and 413 GMP customers lost power for 1.2 hours/ Nearby Corinth received 16.2 inches of snow and 1.46 inches of ice.
Period from 02/13/2014—02/14/2014	Winter Storm	County-; region-wide	A Winter storm, responsible for record ice and snow across the southeast United States on February 12th, moved and redeveloped off the southeast United states coastline on February 13th. Snowfall across Orange county was 12 to 18 inches. Bradford received 17.6 inches of snow and 1.32 inches of ice. Significant power outages did not occur in Bradford during this winter storm.
02/05/2014	Snow Storm	County-; region-wide	Snowfall was at its peak during both the morning and afternoon/evening commutes causing hazardous travel. Eight to twelve inches of snow fell across Orange county. Bradford received 11.5 inches of snow and .7 inches of ice. Significant power outages did not occur in Bradford.
Period from 12/29/2014—12/30/2014	Winter Storm	County-; region-wide	Snow mixed with rain developed across southern Vermont during the late afternoon and changed to snow during the evening hours of December 29 th . A wet, heavy 5 to 10 inches of snow fell across Orange county. 7.8 inches of snow and .72 inches of ice fell in Bradford. Significant power outages did not occur in Bradford..
Period from 12/14/2013—12/15/2013	Snow Storm	County-; region-wide	This was the first widespread snowfall of the 2013-14 winter season. The typical impacts associated with this storm were the numerous vehicle accidents, especially being the first storm of the season. Bradford received A widespread 10 to 15 inches of snow fell across Orange county, and Bradford received 10 inches. No power outages occurred in Bradford.
12/29/2013-12/30/2013	Winter Storm	County; region wide; Bradford	Low pressure across the southeast United States moved rapidly northeast from 12/29 through 12/30 causing snow mixed with rain to develop across eastern Vermont. Mixed snow and rain transitioned to snow during the evening hours of 12/29 and ended in the morning of 12/30. A heavy and wet 5 to 10 inches of snow fell across Orange County and Bradford. Widespread outages occurred in Bradford. On 12/29 186 GMP customers lost power for 2.13 hours and on 12/30 185 GMP customers lost power for 2.32 hours.
12/29/2012	Winter Storm	County; Region-wide	Snow overspread Vermont from south to north between 8pm and midnight of December 26 th and fell heavily at times with a snowfall rate of 1-2 inches per hour throughout the day before diminishing during the evening hours. Snowfall accumulations of 12 to 18 inches were common across Vermont. Bradford and the Upper Connecticut River Valley experienced 6 to 10 inches of snow.9 GMP customers lost power for 1.6 hours.
2/19/2011	Cold Front; Strong Winds	County; region-wide	A strong cold front associated with a powerful storm across Canada moved across Vermont the night of February 18 th into the early morning of February 19 th . Strong west to northwest winds of 20 to 30 mph and gusts of 40-50 mph caused numerous power outages. Power outage data was unavailable for this event. Specific temperature and duration data was unavailable for this event.
12/1/2010	Ice Storm	Bradford	Sleet and frozen rain precipitation caused significant power outages in Bradford. 1.5 inches of sleep/frozen rain precipitation occurred. Power outage data was unavailable for this event.
Period from 11/27/2009-11/28/2009	Winter Storm	County; region-wide	A strong area of low pressure combined with a cold upper atmospheric low moved across Vermont causing snow and strong gusty winds. Snowfall occurred heavily on the eastern slope of the Green Mountains and wind gusts occurred in excess of 40 mph. Bradford did not experience heavy precipitation. Power outage data was unavailable for this event.

Period from 2/22/2009-2/23/2009	Winter Storm	County; region-wide	Light snow overspread Vermont during the morning of February 22 nd and became moderate to heavy across much of central and eastern Vermont during the evening hours to early morning on 2/23. Snowfall totals ranged from 10 to 18 inches in central and eastern Vermont. The nearby Town of Corinth received 13 inches of snow. Power outage data was unavailable for this event.
Period from 02/26/2008—02/28/2008	Snow Storm	County-wide; statewide	Snow overspread over Vermont during the morning of February 26 th and continued through the afternoon hours of the 27 th before tapering to scattered snow showers in the evening. Storm totals ranged from 3 to 6 inches in the St. Lawrence River Valley, 5 to 10 inches across northern New York and 6 to 12 inches across Vermont with the heaviest along those favored northwest slopes of the northern Green Mountains as well as some higher elevations in south central Vermont. 10 inches were reported in the neighboring town of Corinth. Bradford did not experience significant power outages.
02/01/2008	“Mixed” Winter Storm	County-wide; statewide	This storm system transported a great deal of moisture and milder air above a surface that had a cold, dry airmass established across the region. This resulted in a significant wintery mix of snow, sleet, and freezing rain across north central and northeast Vermont. Snow began late morning February 125 in Vermont and changed to sleet and freezing rain during the afternoon and continued into the night. The precipitation turned back to snow shower during the night and continued into the morning of February 2 nd . Snowfall reports were generally 2 to 5 inches with localized amounts up to 7 inches. In addition, one quarter to one half of ice accumulation (accretion) occurred as well. Finally, strong south to southeast winds around 3000 feet and above transferred to a few hilltops along the western slopes and produced wind gusts in excess of 50 mph. Numerous reports of motor vehicle accidents throughout the region. Bradford received 3.5 inches of new snow and about 1.2 inches of ice/sleet. Significant power outages did not occur in Bradford..
12/31/2007	Snow Storm	County-wide; statewide	Snow began to overspread New York and Vermont around Midnight Monday (31st) with snowfall rates rapidly increasing to near an inch per hour at times, but this was a quick-hit storm with steady accumulating snowfall ending across much of Vermont and northern New York by mid-morning. The storm contributed to Burlington’s 4 th snowiest December. 6 inches were reported in neighboring Town of Corinth. Power outage data was unavailable for this event.
Period from 12/16/2007—12/17/2007	Snow Storm with Freezing Rain	County-wide; statewide	Snowfall totals from this pre-winter storm ranged from 6 to 12 inches in southern Vermont, where a prolonged period of sleet and/or freezing rain occurred, to a rather uniform 12 to 18 inches across the rest of Vermont and northern New York. 9.1 inches of snow and 1.07 inches of rain/sleet were reported in Bradford. Significant power outages did not occur in Bradford.
Period from 04/15/2007—04/16/2007	Winter/Snow Storm	County-wide; statewide	A powerful Nor’easter drifted east of New England and caused a mixture of snow and rain over Vermont. The storm started a mixture in the morning on the 15 th and changed over to snow in the afternoon, continuing into mid-morning on the 16 th . Snowfall totals were generally 4 to 7 inches in the valleys with locally up to a foot along the east-facing slopes of the higher elevations of the Green mountains. This was a heavy, wet snow that caused numerous power outages, as well as extremely slick and treacherous roads that resulted in numerous vehicle accidents. 7.5 inches of snow and .73 of rain/sleet occurred in Bradford. Power outage data was unavailable for this event.
Period from 04/04/2007—04/05/2007	Snow Storm	County-wide; statewide	Rain mixed with and then changed to sleet and snow across Vermont during the afternoon of the 4th and continued through midday on the 5th. Combined snow and sleet accumulations ranged from 4 to 12 inches with the higher amounts in the higher elevations. This caused some hazardous travel as well as some scattered power outages due to fallen tree limbs and branches. Significant power outages did not occur in Bradford. 7.58 inches of precipitation were reported in nearby Chelsea.

03/17/2007	Snow Storm	County-wide; statewide	Heavy snow started in southern Vermont by late evening and reached the rest of the region by Midnight Saturday (17th) with snowfall rates of 1 to 2 inches per hour at times. 10 inches of snow were reported in Bradford. Significant power outages did not occur in Bradford.
02/14/2007	Snow Storm	County-wide; statewide	Low pressure developed over the central Appalachians and pushed north into Vermont at around midnight on the 14 th . Snow fell through the night into the morning and was very heavy at times, and continued into the afternoon and evening. Snowfall rates as heavy as 2 to 4 inches per hour and brisk winds of 15 to 25 mph caused whiteout conditions, blowing and drifting snows, and impassible roads. Snowfall totals ranged from 15 to 25 inches in the Connecticut River valley. 19 inches were reported in neighboring Chelsea. Power outage data was unavailable for this event.
12/15/2003	Snow Storm	County-wide; statewide	Snow developed Sunday afternoon, December 14th, and became heavy Sunday night into Monday morning, December 15th. 10 inches were reported in nearby Chelsea. Power outage data was not available for this event.
01/03/2003	Snow Storm	County-; state-wide	A storm system over Virginia Friday morning (1/3/03) moved to coastal New Jersey Friday evening and then to near Cape Cod Saturday morning (1/4/03). Snow spread across the area late Friday afternoon, and became heavy at times late Friday night into Saturday morning. 8.2 inches were reported on 1/4 and another 3.3 inches were reported on 1/5 in nearby Chelsea. Power outage data was not available for this event.

The Town of Bradford is no stranger to winter weather and the hazards that it brings. Depending on the event, though especially with heavy, wet snow or ice, and sometimes in combination with high winds, electricity may be knocked out for a few hours or days. The utility companies currently serving the Town of Bradford, Green Mountain Power and Washington Electric Coop, have followed a regular tree-trimming schedule. Bradford town officials believe this is satisfactory to mitigate damage and the power outages caused by downed trees and tree limbs during a heavy, wet snow or ice event. In the event of an extended power outage, the Town would open its emergency shelters. More often, those without power would seek accommodations with friends or relatives. Bradford does not experience significant power outages due to the diligent tree trimming of utility corridors and fast response time by maintenance units.

Another complication of falling utility poles is the potential loss of the telephone line. If the landlines are impacted, the possibility presents itself that there is no reliable means of communication in the affected parts of Town as cell reception can be spotty. If the power is out, an internet connection is unlikely to be available.

Heavy, wet snow or large quantities of snow may also leave structures vulnerable to roof collapse. Roof collapse occurs when the structural components of a roof can no longer hold the weight of snow. Flat roofs are most vulnerable to collapse because they do not drain well and the snow on the roof soaks up water like a sponge, increasing the weight that the roof must bear. More common, it seems, is the collapse of barns commonly used for livestock sheltering and other agricultural purposes. Unfortunately, livestock in the barn are often killed, and equipment stored in the barn may be damaged or ruined. It is difficult to determine whether a residential structure or a barn would be rebuilt after a roof collapse because the decision to rebuild would likely depend on the extent of damage. The collapse of a barn roof is likely to be a total loss, and the collapse of a house roof may be a 50% loss.

In general, winter weather is most hazardous to travelers. Icy and snow-covered roads present multiple

examples of dangerous driving conditions and situations. In Bradford, the mountainous terrain, steep slopes, and remoteness of some roads further complicate travel. The Town relies on Travel Advisories issued by the State of Vermont Department of Emergency Management Homeland Security and the National Weather Service to alert residents of dangerous travel weather. Despite this, it is difficult to prohibit people from driving during winter weather events. As a result, emergency services personnel must always be prepared to provide assistance to stranded drivers or to those who have been in an accident.

Climate change will also likely play a role in the future impacts of this hazard. A warming climate will likely lead to more mixed winter precipitation, and possibly fewer extreme cold events. Mixed precipitation, or heavier, wetter snow, could result in more downed trees, power lines, road closures, and traffic accidents. The probability of winter flooding events may also increase. Proactive action to improve road safety and reduce the likelihood of road and infrastructure damage will need to account for these potential changes.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Extreme Cold/Snow / Ice Storm	Town-wide	The entire Town is vulnerable, including road infrastructure, town and privately owned buildings, and utility infrastructure.	Snowfall has varied from a few inches to over a foot or more. Heavy snow and wind downed trees and power lines. Snow/ice contributed to hazardous driving. Maximum extent for each hazard includes the following: Extreme cold -50 degrees (Bloomfield, Vermont), Minimum temperature is regularly in the negative twenties in nearby Corinth. No local data is available. Snowfall: The superstorm of 1993 dropped approximately 22 inches of snow in the Bradford area. Ice Storm: The ice storm of 1998 brought ¾ inch of ice and widespread power outages throughout Vermont. No local data is available.	Ice storm of 1998. ¾ inch of ice and road closures. Downed power lines led to power outages of up to 10 days in some areas. 700,000 acres of forest damaged. Estimated \$80,000 in damages for Orange County.	Highly likely

4. Structural Fire

Vermont has one of the highest per capita death rates from fire in the nation. This is, in fact, the deadliest form of disaster throughout the state. According to the 2021 Report of the State Fire Marshal, there were 1,460 total incidents throughout the State, with 51.5% of fire incidents due to structure fire. There were

8 fatalities as a result of fire in 2021, and total fire damage was over \$19 million dollars.

The elderly and young children are most vulnerable and at greatest risk of fire death. Between 2011 and 2021 there were three child fatalities and 36 senior fatalities. Across the State, nearly 45% of fire-related fatalities in the last 10 years were seniors (66+), and 26% of fatalities were between 51 and 65 years. In Bradford, approximately 22% of the population is over the age of 65, so a large percentage of residents are in a higher risk category for vulnerability to structural fire.

Structure fires may occur at any point, and are typically initiated within a single fuel object. Smoke produced by the burning object forms a smoke plume and rises, creating a layer of smoke while also transporting heat to the smoke layer. Fire then spreads quickly by radiation from the flames, or from the smoke layer. Once other objects are engulfed, more smoke plumes are formed and heat radiates to other objects. Fire burns and moves across different materials depending on the material’s composition, orientation, surface-to-mass ratio, and air supply in the structure/room.

The Town of Bradford is quite rural in nature, and it consists of primarily single-family residences that are spread out across Town. Some growth is structured around main roads, such as Route 5, Route 25, and Route 25B; however much of it is also relatively difficult to access in a quick and timely manner by fire departments. A review of the fires listed in the “History of Occurrences” chart below demonstrates the potential for structures located in the rural Town of Bradford to be completely or severely destroyed by fire.

The following occurrences were reported by the Committee or obtained from local sources. It is reasonable to assume that more structural fires have occurred in the period of time between the entries listed below, and that such fires have caused varying extents of property damage.

History of Occurrences:

Date	Event	Location	Extent and Impacts
1/9/2017	Structural Fire	307 South Main St	Bradford Fire Department responded for report of smoke in building and discovered fire in boiler room, Fire extinguished and minor damage occurred.
2/23/2016	Structural Fire of a multifamily dwelling	38 Bank St	Fire reported as a grease fire and patient was brought to the hospital for treatment of burns.
5/22/2015	Structural fire of family dwellings	172 South Main St	Bradford Fire Department responded to structure fire and extinguished fire.
4/18/2015	Structural Fire	Tarbox Rd	Fire Department responded and extinguished fire.
2/18/2015	Structural Fire	74 Cross Rd	Structure fire resulted in trapped animals in building. Fire department extinguished fire and secured the building.
4/13/2014	Structural Fire of Barn	22 Appleton Dr	Structural fire of barn resulted in extensive damage, 75-100% damage, due to dysfunctional smoke detector. Electric fence determined to be source of fire. Property damage was \$100,000 and content lost to fire were valued at \$50,000,.
4/8/2014	Structural Fire	Main St	\$4,000 in damage resulted from a small fire outside of a grocery store.

1/20/2014	Structural Fire	2565 Goshen Rd	\$100,000 in damage resulted from a chimney fire.
4/30/2012	Debris Fire	Bradford	A debris fire caused the burning of .12 acres
4/21/2012	Unregulated Fire	Bradford	Children burned railroad ties and caused the burning of .5 acres.
1/26/2011	Structural Fire	4229 Waits River Rd	A structural fire of a family dwelling unit led to the extensive damages. \$250,000 in damages occurred to the property, and \$100,000 in damages occurred to the contents of the building.
9/3/2010	Debris Fire	Bradford	A debris fire caused the burning of .45 acres.
9/20/2009	Fireworks	Bradford	Unregulated fireworks caused the burning of 3 acres
4/15/2006	Permitted Burn	Bradford	A permitted burn exceeded established burn permit and caused the burning of .25 acres.
4/12/2006	Rubbish Barrel	Bradford	A rubbish barrel caused the burning of .13 acres.

As noted, recognized fire protection problems for the community include the following: development in areas distant from the village center of the Town, development on class 3 and 4 roads, distance from water sources (rivers, hydrants and/or fire ponds), inaccessibility to fires that may spread from the forest, and inadequate snow removal (for building access).

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Structural Fire	Town-wide	All housing, municipal buildings, retail/ commercial sites. Older structures are at higher risk. Lower income residents may also be at higher risk as safety upgrades may be too costly.	Depends on the location and severity of the fire. Extent can be limited to a portion of a structure, or it can spread across multiple structures, especially in areas where development is concentrated such as downtown Bradford.	Varies depending on the location and extent of the fire.	Occasionally

5. Severe Summer Weather, Hurricanes, and Tropical Storms

Severe weather consists of thunderstorms, lightning, hail, and intense winds. Often it consists of multiple events that combine to create hazardous conditions that pose a threat to communities in the State of Vermont and the Town of Bradford. Severe weather can be incredibly unpredictable. More common than hurricanes or tropical storms are severe thunderstorms (usually in the summer), which can cause flooding as noted above, and are associated with lightning, high winds, hail and tornadoes.

Hailstorms have occurred in Vermont, usually during the summer months. While local in nature, these storms are especially significant to area farmers, who can lose entire fields of crops in a single hailstorm. Large hail is also capable of property damage. 801 hail events were recorded between 1950 and 2023 in the state, making hail an annual occurrence in some part of the state. Most of these events had hail measuring .75 inches, but many had hail at least 1.5 inches in size. The largest hail during the period was

3.3-inch hail that fell in Chittenden County in 2009, causing damage to crops, vehicles, lawn furniture, siding, and windows. Total damage was estimated at \$50,000. Tennis ball-sized hail was reported in the town of Chittenden during a storm in the summer of 2001. Thunderstorms can generate high winds, such as hit the region on July 6, 1999, downing hundreds of large trees in a few minutes.

In Bradford, severe weather is quite common, typically in the late spring and summer months when the region experiences extreme heat and high temperatures. Severe thunderstorms tend to bring other hazards such as high winds, hail, lightning, and flooding, and these hazards are often experienced in combinations which create many unique weather and emergency management situations. Over the years, Bradford has been hit with high winds that have downed and uprooted numerous trees, and knocked out electricity to residents in the Town. Town specific wind data could not be found, but the “Remarks” section of NCDC Database helps to illuminate the impact strong winds can have on Bradford. Sizeable hail has also accompanied storms moving through the Town and region.

While hurricanes (storms with sustained winds greater than 74 mph) and tropical storms rarely reach as far inland as Vermont, they can be as or more destructive than a more commonly occurring severe weather event. Typically, they will manifest themselves in Vermont as tropical storms. In either case, the high winds, heavy rains, and large affected areas from hurricanes or tropical storms can make these rare events major disasters. The most infamous example of this was the disastrous hurricane of 1938. On September 21, 1938 a very fast moving hurricane hit Vermont in the early evening, but was moving so fast that wind damage was more severe than damage from rain in places. However, there was severe flooding, as over 4 inches of rain accompanied the storm and followed upon the heels of preceding storms that had saturated the ground and raised river levels. Buildings were lost, power lines were downed, and many trees were felled. Tropical Storm Floyd in September 1999 caused flooding and wind damage in parts of Vermont, as well as one fatality, and resulted in a federal disaster declaration.

The most recent flood that devastated Vermont, Orange County, and Bradford was the result of Tropical Storm Irene, which occurred on August 28, 2011. Record flooding was reported across the state and was responsible for several deaths, and millions of dollars of home, road and infrastructure damage. Due to the strong winds, 50,000 were without power initially, and many did not have power restored for over a week. Despite the damage wrought, the flooding caused by Tropical Storm Irene is considered to be the second greatest natural disaster in 20th and 21st century Vermont, second only to the Flood of 1927.

The following list indicates the history of occurrence with regard to this hazard in Orange County (given that small population of Bradford, town-specific data is limited); an asterisk “*” denotes the few instances in which town-specific data is available, and federal disaster numbers are listed when appropriate. In an attempt to capture the individual hazards that may arise, and the different circumstances caused by the hazards in concert, the separate hazards are documented in the table below.

History of Occurrences:

Severe Weather Date	Event					Location	Extent
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
07/21/2022*	✓		✓	✓		Bradford; State-wide	Scattered thunderstorms developed across the State, bringing some strong winds and hail to some places. Bradford reported quarter-sized hail. No damage estimates were available.
08/04/2020	✓			✓		Bradford; State-wide	Tropical Storm Isaias moved across Vermont, bringing periods of rain and high winds to much of the State. Wind speeds for Orange County measured at 40-45 mph and caused scattered tree damage. There was little impact associated with the rainfall.
07/01/2023	✓	✓		✓		Bradford; County-wide	Rain showers and thunderstorms brought flooding and high winds to much of central Vermont. Many roads in Orange County were damaged. Wind speeds in some places measured over 50 mph. Property damage estimated at nearly \$8 million across the State.
05/17/2017 - 05/18/2017	✓		✓	✓		Bradford; County-wide	Record-setting temperatures of over 90 degrees over two days led to intense thunderstorms, high winds, and hail across the State. Dime-sized hail was reported in Orange County. Wind speeds reached over 50 mph in some places. Hail size was reported at .75 inches. More than 15,000 customers lost power throughout Vermont.
7/18/2016	✓	✓	✓	✓		Bradford; County-wide	Several rounds of thunderstorm developed ahead of a cold front and intensified when they reached Vermont. There were reports of wind damage to trees and utility lines. 1.5 inch in diameter hailstones were exhibited. Rainfall accumulation was not severe. Significant power outages did not occur in Bradford.

6/2/2013 – 6/3/2013*	✓		✓	✓		Bradford; County- wide	A very warm and humid air mass was located across Vermont. A strong mid-atmospheric disturbance, ahead of a cold front, moved across portions of Vermont and triggered widespread thunderstorms with pockets of damaging winds and large hail. Event caused tree damage and widespread power outage. At its peak, roughly 20k customers lost power. Bradford received .61 inches of rain in 24 hours. 119 total GMP lost power on 6/2 from durations lasting from 6 hours to 12 hours. On 6/3 23 GMP customers lost power for 2 hours.
6/25/2013- 7/11/2013* (DR-4140 VT)	✓	✓	✓	✓		County- wide	Severe storms over a nearly one month period. Rains caused flooding in the region, winds downed trees, power outages were reported. On 6/24, 194 GMP customers lost power for 2 hours. Another outage occurred on 6/28 when 56 GMP customers lost power
							for .7 hours Overall during the disaster period, Bradford received 7.94 inches of rain.
9/11/2013*	✓			✓	✓	Bradford, County- wide	A weak area of low pressure embedded in an unseasonably warm and unstable air mass resulted in thunderstorms that moved across Vermont. Thunderstorms and high winds caused downed trees and utility lines. Bradford received 1.86 inches of rain in 96 hours. Widespread power outages occurred in Bradford. On 9/11, 120 GMP customers lost power for 9.4 hours, 45 customers lost power for 27.5 hours, 83 customers lost power for 11.8 hours, and 1 customer lost power for 15 hours. On 9/12, 3 GMP customers lost power for 11 hours and 1 GMP customer lost power for 8.4 hours.

7/4/2012*	✓			✓	✓	Bradford, County-wide	A moderately strong upper level disturbance ahead of a surface cold front moved through Vermont on July 4. Storm caused widespread wind damage and frequent lighting. Several trees were downed along Route 5. Hailstones estimated at 1.5 inches in diameter fell. Bradford received .3 inches of rain in 24 hours. 52 GMP customers lost power for 2.43 to 4.7 hours.
8/28/2011 (DR-4022 VT) Tropical Storm Irene	✓	✓		✓		Bradford; County-wide; Vermont	Tropical Storm Irene prompted widespread, devastating flooding throughout the region. Frequent wind gusts of 35 to 50 mph, especially in higher terrains, along with saturated soils caused widespread downed and uprooted trees. Bradford received 6.79 inches of rain in 48 hours. Bradford had \$3,420.00 in damages. Only minimal power outages occurred in Bradford with isolated incidents affecting singular GMP customers for short durations.
06/09/2011	✓		✓	✓		County-wide	Scattered thunderstorms and a few isolated reports of damaging winds and large hail were reported. Power outage data was unavailable for this event.
05/26/2011- 05/27/2011 (DR-4001 VT)	✓	✓		✓		County-wide	Region struck by severe storms and flooding. Minimal damage occurred in Bradford. Bradford received .3 inches of rain in 24 hours. Power outage data was unavailable for this event.
07/21/2010	✓		✓	✓		Bradford, County-wide	Thunderstorms hit the area along with high winds, developing into supercells that caused widespread damage to trees, power poles and structures. Golf ball-sized hail fell in Bradford. Thunderstorm winds damaged trees and utility poles. No significant precipitation and power outages occurred in Bradford.
5/31/2009	✓		✓	✓		County-wide	40-55mph wind gusts and hail caused fallen trees and power outages in the region. Winds caused fallen trees, downed power lines, and property damage. Power outage data was unavailable for this event. Bradford received 21.21 inches of rain in 24 hours.

7/21/2008-8/12/2008 (DR-1790 VT)*	✓		✓	✓		County-wide	Thunderstorms with heavy rainfall in a moist atmosphere moved through central and southern Vermont during the afternoon and evening hours. A few thunderstorms produced hail that ranged from .5 to .25 inches in diameter. Bradford received 2.6 inches of rain in 24 hours with an additional 1.22 inches of rain in the previous 24 hours. No significant power outages occurred.
9/12/2008	✓	✓					Bradford reported \$15,808.21 in damages. Detailed storm history was unavailable.
07/09/2007-07/11/2007 (DR-1715 VT)	✓		✓	✓	✓	Bradford; County-wide	An area of low pressure moved across Canada and south to Vermont causing thunderstorms, hail, winds, and lightning. Bradford experienced 1.65 inches of rain in 24 hours, but significant power outages did not occur.
8/30/2007	✓		✓	✓		Bradford; County-wide	A cold front moved through a warm and unstable airmass across southern and eastern Vermont. A few widely scattered thunderstorms moved across the region with nickel sized hail in neighboring Town of Newbury.
6/7/2007	✓		✓	✓			A backdoor cold front and mid-level disturbance moved into a moderately unstable airmass during the afternoon, which moved into Vermont. Some
							severe thunderstorms produced damaging winds. Winds in Bradford caused the total collapse of a tin bar and downed trees on many roads. Some severe storms produced large hail .75 inches in diameter. Bradford received .9 inches of precipitation. Outage?
04/15/2007-04/21/2007 (DR-1698 VT)	✓	✓		✓		County-wide	Severe storms and flooding impacted Orange and surrounding counties. 7.5 inches of wet heavy snow mixed with warming temperatures led to flooding. Power outage data was unavailable for this event.

7/18/2006	✓			✓		County-wide	A strong mid-level atmospheric disturbance moved into a marginally unstable airmass across Vermont to cause severe thunderstorms. The thunderstorm knocked down trees along Interstate 91 in neighboring Newbury. Power outage data was unavailable for this event. Specific precipitation data was unavailable for this event.
8/2/2006	✓			✓	✓	County-wide	A mid-atmospheric disturbance moved into a very warm, humid and unstable airmass across Vermont during the afternoon of the 2nd, which lead to the development of scattered thunderstorms. Some of these thunderstorms were locally severe and produced damaging winds that knocked down trees, powerlines and a tree on a mobile home along Route 5 in neighboring Newbury. Power outage data was unavailable for this event..
07/21/2003-08/18/2003 (DR-1488 VT)	✓	✓		✓		County-wide	Severe storms and flooding impacted Orange and surrounding counties. Specific precipitation and outage data was unavailable for this event. Bradford reported \$5,710.12 in damages.
07/14/2000-07/18/2000 (DR-1336 VT)	✓	✓		✓		County-wide	Severe storms and flooding impacted Orange and surrounding counties. Specific precipitation and outage data was unavailable for this event.
9/16/1999-9/21/1999 (DR-1307 VT)	✓	✓		✓		County-wide	Tropical Storm Floyd's rains and winds caused road and culvert washouts. Specific precipitation and outage data was unavailable for this event.

7/6/1973 (DR-397 VT)		✓		✓		County-wide	One of the largest flood events of the 20 th century in VT. Landslides reported in the region.
11/3/1927	✓	✓				County-wide	"Great Flood of 1927." Worst recorded flood in VT. The White River crested at a record of 29.30 feet.

The Town of Bradford is very prone to strong winds, particularly microburst events that sweep through the region. Power outages are the most common occurrence in the wake of such wind events, usually occurring as a result of tree limbs falling on local power lines.

The other main hazard caused by severe weather throughout the Town is flooding. The most recent major flooding event to occur in the region was in the summer of 2013. Severe storms brought heavy rain and strong winds over a three-week period in late June and early to mid-July. The flooding was widespread and severe enough for a federal Disaster Declaration, DR-4140 VT, to be issued for Orange and other counties in Vermont. The Town of Bradford was impacted by this event, and sustained power outages and heavy rainfall with total precipitation at nearly 8 inches.

There are 850 acres of mapped floodplain in the Town of Bradford, 81 of which are floodway, the deepest fast-flowing area in a flood. 4% of the land area of the Town is the floodplain. There are 10 residences, 8 commercial buildings, 4 government buildings, and 2 industrial properties in the Special Flood Hazard Area, which would equal \$6,483,224 if all properties were severely damaged/destroyed in a severe flooding event. Vermont Route 25, Vermont Route 25B, Rowell Brook Road, and Old Creamery Roads, Road are regularly or sometimes (depending on weather event and track of weather event) impacted by flooding. There is one non-residential repetitive loss structure in the Town of Bradford on FEMA's NFIP list.

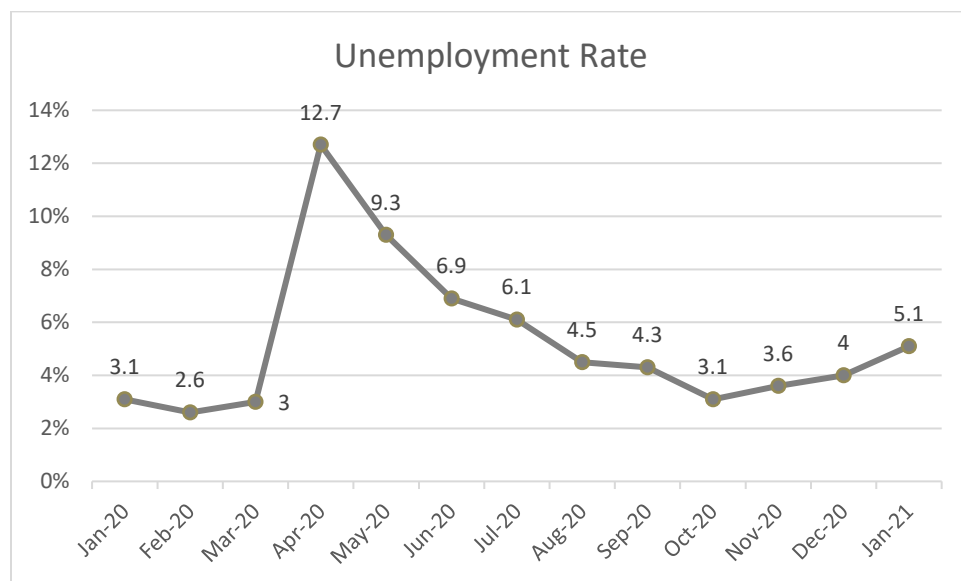
Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Severe Summer Weather	Town wide for wind, hail, high winds, lightning, extreme heat and thunderstorm impacts. The entire Town is vulnerable to flooding but "hot spots" include Vermont 25, Route 5 bridge, Rowell Brook Road, and Old Creamery Road.	Town and private buildings and utilities; culverts, bridges, road infrastructure are vulnerable to severe weather. There are 24 total properties that are located within the special flood hazard areas. Residents living in areas prone to flooding are at greater risk to flooding during storm events.	<p>Thunderstorm / Severe Storm: During Tropical Storm Irene, 5-6" of rainfall in Bradford. 194 customers lost power.</p> <p>Flooding: 5-6" of rainfall led to flooding during TS Irene.</p> <p>Hail: Hail ranging from the size of golf balls to dimes has fallen in Bradford. Hail can damage structures, vehicles, and other infrastructure.</p> <p>High winds: During severe storms, winds of 40-50 mph can occur. Strong winds can down trees and damage power lines, homes, and other structures.</p> <p>Lightning: Lightning can damage structures and down trees. Lightning can be life threatening for those outside during severe storms.</p>	\$49,074.88 in damage for total Bradford according to FEMA's Public Assistance database (captures at least 70% of total damage.)	Highly likely

6. Infectious Disease Outbreak

Infectious disease outbreaks are not a new hazard, but they have gained increased prominence in Bradford and throughout the State as a result of the impacts associated with the COVID-19 pandemic. To put this hazard into perspective, the United States has not seen an infectious disease outbreak of this scale since the Spanish Flu outbreak of 1918. Our recent experience with COVID-19 has demonstrated that the impacts of this hazard are felt primarily by individuals, vulnerable populations, the medical system, and in the economy.

Infectious disease impacts society in a number of ways. Often, the primary impact is felt by individuals. People become sick and must take time off of work. Often, infectious disease can lead to a high death toll. Economically, businesses could shut down temporarily for long periods, leading to reduced services for residents, or to businesses closing their doors. Employees may be laid off and lose critical income, while some employers may find it difficult to maintain productivity. Finally, medical services may be unable to handle a large influx of patients, leading to long wait times and reduced hospital capacity for those who need critical care.

Vermont stopped reporting Covid-19 numbers in September of 2022. However, at that time there had been over 152,000 confirmed cases and 929 deaths in the State since the start of the pandemic. During the first months of the Covid-19 pandemic, unemployment increased significantly, as can be seen in the figure below. While the unemployment rate did eventually return to normal levels, the disruption to businesses and tax revenue had significant impacts on the local economy.



2020-2021 Unemployment Rate in Orange County, VT. Source: Bureau of Labor Statistics

Covid-19 has shown that when major pandemics occur, the medical system in place is often inadequate to handle the surge of caseloads and hospitalizations. Vulnerable populations, such as nursing homes and prisons, were some of the most at-risk due to close living quarters. The elderly were at much higher risk of extreme illness from Covid-19 than other demographic groups.

The following table includes a list of past pandemics as identified by the Center for Disease Control and Prevention.

History of Occurrences

Year of Outbreak	Pandemic
2019	Covid-19 (Coronavirus)
2009	(H1N1)pdm09 (Swine Flu)
1968	H3N2 Virus (Hong Kong Flu)
1957-1958	H2N2 Virus (Asian Flu)
1918	H1N1 (Spanish Flu)

As the climate changes, the risk for infectious disease is expected to increase. According to the Centers for Disease Control and Prevention (CDC)⁷, many infectious diseases are likely to become more prevalent and spread more readily than they have in the past. In our region, milder winters will likely lead to higher occurrence of Lyme Disease. Mosquito-borne illnesses will become more transmissible as well. Furthermore, a higher occurrence of infectious disease outbreaks could have significant negative impacts on the economy and the medical system.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Infectious Disease Outbreak	Town-wide	Populations that are currently high risk for pandemics include nursing homes, elderly housing, school populations, individuals 60 and over, and individuals with pre-existing health conditions.	This hazard would impact the lives of all residents. The duration of this hazard could span long periods of time. The Covid-19 Pandemic spanned three years.	Significant societal disruption. Social isolation could lead to quality of life impacts. Residents may become sick or die. The health system can become overburdened. Local stores, businesses, and other enterprises may close temporarily or permanently. The cost of Covid-19 nationally is estimated to be between \$12 and \$16 trillion.	Highly likely

7. Extreme Heat

The definition of a heat event varies depending upon the typical weather patterns of the local environment and the vulnerabilities of the population. The Burlington Weather Forecast Office of the National Weather Services, which covers the Town of Strafford, has established the following thresholds:

- Excessive Heat Warning: Daytime heat indices² equal to or greater than 105°F for two or more hours
- Heat Advisory: Daytime heat indices between 95°F and 104°F for two or more hours.
- Heat Wave: Three or more days of temperatures equal to or higher than 90°F

The Vermont Department of Health defines a “hot day” as one during which the maximum temperature is 87°F or hotter. Climate change is increasing both the average annual temperature in Vermont and the number of hot days per year. The state’s climate models predict that the number of days per year with a statewide average temperature at or above 87°F, which averaged about 7 between 2000 and 2016, will increase to 15 to 20 by mid-century and 20 to 34 by the end of the century.

High summer temperatures can greatly increase the risk of heat related illnesses for residents, especially

⁷ <https://www.cdc.gov/nceid/what-we-do/climate-change-and-infectious-diseases/index.html>

children and older adults. Vermonters are at particularly high risk when temperatures climb above 87 degrees. Extreme heat can tax utilities and local infrastructure, lead to power outages, and impact the economy. Between 1895 and 2015, the average annual temperature in Vermont has increased 2.6 degrees Fahrenheit, with the average annual temperature expected to continue to rise due to climate change, and the most significant temperature changes are expected in the winter months. Furthermore, higher temperatures can lead to an increase in vector-borne diseases such as Lyme and West Nile Virus, and to more frequent instances of bacterial blooms in water bodies. Finally, extreme heat can also lead to more intense thunderstorms, resulting in power outages, downed trees, and damage to roads and other infrastructure.

Town-specific data is not available for the health impact of heat events. Limited county-level data are reported by the Vermont Department of Health. Between 2009-2019, Orange County has averaged a rate of 14.5 heat-related emergency department visits per 100,000, lower than the average of 15.7 per 100,000 across all counties.

The following list indicates the history of heat events reported for Orange County in the NCEI Database. The database typically only reports events for which heat indices meet or exceed the regional advisory thresholds (see above), but interestingly, a March 2012 event is also reported due to the records it broke and the widespread economic damage it caused. Town-specific data was not available for any heat events.

Date	Event	Location	Extent
07/20/2022 – 07/25/2022	Heat Event	Orange County	A heat wave hit Vermont and much of the country in mid-July, 2022. Heat indices for Union Village, ranged from 90-95°F for six consecutive days. No available data on the size of the land area that was impacted.
06/28/2021	Heat Event	Orange County	Heat indices in Union Village ranged from 91-93°F between June 28th and July 1st. No available data on the size of the land area that was impacted.
6/19/2020-6/25/2020	Heat Event	Orange County	Heat indices in Union Village ranged from 91-94°F between June 19th and June 25th. No available data on the size of the land area that was impacted.
6/30/2018-7/6/2018	Heat Event	Orange County	A dangerous heat wave led to hospitalizations and at least four deaths throughout the State. No heat-related deaths were reported in Orange County. Maximum temperatures remained in the high eighties to over ninety degrees for at least five days. Heat indices ranged from 95-110 degrees over the same time period.
03/17/2012 – 03/24/2012	Heat Event	Orange County	Maximum temperatures reported at Union Village Dam in East Thetford ranged from 81°F to 83°F from March 21st to the 23rd. No available data on the size of the land area that was impacted. This event broke record temperatures and cut short the sugaring season. Damages to the maple sugaring industry in Orange County were estimated at \$1 million.
7/21/2011 – 7/24/2011	Heat Event	Orange County	Heat indices ranged from 100 to 108°F along the Connecticut River Valley on July 21st. Between July 21st and 24th, maximum temperatures ranged from 91 to 96°F at Union Village Dam in East Thetford. No available data on the size of the land area that was impacted.
8/1/2006 – 8/2/2006	Heat Event	Orange County	On the afternoon of August 2nd, heat indices in central and southern Vermont ranged from 100 to 105 °F. A maximum temperature of 97°F was reported in Union Village in East Thetford. No available data on the size of the land area that was impacted.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Extreme Heat	Town-wide	Structures without air conditioning would be most directly impacted. In the event of power outages, all structures would be affected. The elderly and very young are at risk. Extreme heat could pose a risk to fire response.	The highest nearby temperature recorded was in Thetford, VT, when temperatures reached 98 degrees in 2002. Heat indices up to 108 degrees have been reported in Orange County (2011).	Heat events can damage infrastructure, endanger or kill people, and can cause severe crop damage. 30 Orange County residents visited the Emergency Room due to heat-related illness between 2013-2019. A record-breaking warm spell in March 2012 caused approximately \$1 million in damages to the maple sugar harvest in Orange County.	Highly likely

VI. Mitigation

A. Mitigation Goals

- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of ice jams.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the hazard of hazardous material spill(s).
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of flash flooding, flooding and fluvial erosion
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of extreme cold/snow/ice storms.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of structural fire.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of extreme heat.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of infectious disease.

B. Excerpted Town Plan Goals & Recommendations Supporting Local Hazard Mitigation

- Monitor a Capital Budget and Program to plan for anticipated infrastructure maintenance and improvement (page 26).
- Well-equipped and well-trained emergency services personnel (police, fire, and EMS) should serve all Bradford residents. (page 35).
- Explore whether the Fast Squad should officially become part of the town government (page 35).
- Ensure all emergency response personnel are trained in the NIMS system (page 35).
- It is the policy of the town to review, monitor, and carefully control and land use activities that may potentially threaten groundwater quality to prevent undue loss of groundwater quality (page 54).

- It is the policy of the Town to prohibit high-risk uses within the municipal water source (wellhead protection area). (page 54).
- To enhance and maintain use of flood hazard areas and floodways as open space, passive recreation, or agricultural land that do not have adverse impact on flood retention or habitat (page 64).
- To maintain large tracts of non-fragmented upland forest to slow, absorb, and clean rainwater and storm water runoff before it reaches land and streams below (page 66).
- To encourage limited activities in riparian buffers to reduce risk of flooding and fluvial erosion (page 66).
- It is the policy of the Town that preferred uses for flood hazard areas shall be open spaces, green belts, and non-commercial recreation or agriculture (page 66).
- It is the policy of the Town that land development (including filling or removal of earth or rock) should be strongly discouraged within the 100-year floodplain or the special flood hazard areas which would result in net loss of flood storage, increased or diverted flood levels, or increased risk to adjacent areas, citizens, and businesses (page 66).
- It is the policy of the Town to extend the limits of the flood hazard area in the Zoning Bylaw to areas identified as at risk to flood erosion (page 66).
- It is the policy of the Town that new buildings within Bradford's mapped floodways shall be prohibited (except development exempted by state law such as agriculture) (page 66).
- To work with TRORC and Vermont Emergency Management to ensure that their current flood hazard area requirements meet national standards (page 67).
- To take steps to correct or replace undersized water passageways or culverts that are at risk of flooding or limit fish and amphibian passage (page 67).
- To take steps to reinforce stream banks adjacent to roadways at risk of significant erosion from seasonal flooding (page 67).
- Ensure road crews take care when ditch cleaning to minimize the spread of invasive species such as Japanese Knotweed, Wild Chervil, Wild Parsnip and Purple Loosestrife (page 55).
- It is the policy of the Town to employ strict erosion control plans when development is considered in areas more than 10% slope (page 58).
- It is the policy of the Town that new Town emergency services, wastewater treatment plants, power substations, and municipal buildings shall not be built in the Special Flood Hazard Areas unless flood-proofed or elevated to at least 2 feet above the base flood elevation and designed to withstand erosion risk (page 67).
- It is the policy of the Town to discourage commercial, industrial, and residential uses within ANR's mapped river corridor areas outside of Bradford's Town Center. (CBD, LP, VC and RSD). (page 66).
- To work with Vtrans and the Regional Planning Commission on advocating for and improving the flood capabilities of state or Town-owned transportation infrastructure (page 67).
- To continue working to develop mitigation plans, and emergency preparedness and recovery procedures from flooding (page 67).
- To identify and prioritize in concert with the ANR River Management Section and the Regional Planning Commission for mitigation actions such as elevation/relocation or purchase and demolition existing homes at serious risk of flood damage (page 67).
- To add areas not designated in either FEMA's maps or in VT ANR's maps, but which are flooded during a weather event, to local flood regulations (page 67).

- To work to incorporate watershed-level planning with assistance from the Regional Commission to evaluate natural and constructed flood storage options upstream of existing areas of concentrated development that are at risk of flooding (page 67).
- To work with ANR, the Regional Planning Commission and landowners to lessen flood risk by restoring natural channel functions where appropriate (page 67).
- To adopt road and bridge standards to the 50 or 100 year storm level for identified critical transportation routes (page 67).
- To periodically review and update as needed the Bradford Flood Hazard Bylaw (page 67).

The Bradford Municipal Plan was updated and adopted on 10/12/2023, and has an 8 year lifespan. The Town of Bradford, Vermont 2017 Local Hazard Mitigation Plan, the previous version of this Plan, provided guidance in the development of the Bradford Municipal Plan, including directing goals, policies, and recommendations towards mitigating the effects of future hazards on health and property in the Town.

C. Hazard Mitigation Strategies: Programs, Projects & Activities

Vermont’s Division of Emergency Management & Homeland Security encourages a collaborative approach to achieving mitigation at the local level through partnerships with Vermont Agency of Natural Resources, Vtrans, Vermont Agency of Commerce and Community Development, Regional Planning Commissions, FEMA Region 1 and others. That said, these agencies and organizations can work together to provide assistance and resources to towns interested in pursuing hazard mitigation projects.

With each mitigation strategy, general details about the following are provided: local leadership, possible resources, implementation tools, and prioritization. The prioritization category is based upon the economic impact of the action, Bradford’s need to address the issue, the cost of implementing the strategy, and the availability of potential funding. The cost of the strategy was evaluated in relation to its benefit as outlined in the STAPLEE guidelines (includes economic, political, environmental, technical, social, administrative, and legal criteria). A range of mitigation strategies was vetted by the committee, and those that were determined to be feasible are included in the table below.

Strategies given a “High” prioritization indicate they are either critical or potential funding is readily available, and should have a timeframe of implementation of less than two years. A “Medium” prioritization indicates that a strategy is less critical or the potential funding is not readily available, and has a timeframe for implementation of more than two years but less than four. A “Low” prioritization indicates that the timeframe for implementation of the action, given the action’s cost, availability of funding, and the community’s need to address the issue, is more than four years.

Estimated costs are also accounted for in mitigation strategy considerations. Potential costs are given a range, and are presented as “high”, “medium”, or “low” in the mitigation strategies table. The cost range is the following:

- Low = less than \$50,000
- Moderate = \$50,000-\$100,000
- High = more than \$100,000

The Town of Bradford understands that, in order to apply for FEMA funding for mitigation projects, a

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project must meet more formal FEMA benefit cost criteria. A project seeking FEMA funds would undergo a full benefit-cost assessment in the FEMA-approved format. The Town must have a FEMA- approved Local Hazard Mitigation Plan as well.

The following strategies will be incorporated into the Town of Bradford’s long-term land use and development planning documents. In addition, the Town will review and incorporate elements of this Local Hazard Mitigation Plan into updates for the municipal plan, zoning regulations, and flood hazard bylaws. The incorporation of the goals and strategies listed in the Local Hazard Mitigation Plan into the municipal plan, zoning regulations and flood hazard/river corridor bylaws will also be considered after declared or local disasters. The Town shall also consider reviewing any future TRORC planning documents for ideas on future mitigation projects and hazard areas.

Hazard Mitigation Actions	Benefit	Cost	Local Leadership	Prioritization (Mitigation Plan Status)	Possible Resources*	Time Frame
All Hazards						
<i>Promote the active use of the Code Red communication system, called iPAWS or Integrated Public Alert and Warning System. (Mitigation)</i>	<i>This action will assist in alerting residents to hazards when they occur.</i>	Low	Emergency Management Director	High	Local resources	Spring, 2024 – Fall, 2024
Structural Fire						
<i>Encourage businesses located in the two main blocks in Bradford Village to utilize tax benefits from Bradford Village designation to install sprinkler systems. (Mitigation)</i>	<i>This action will reduce the loss of life and infrastructure in the event of a block fire. Reduces future costs associated with structure fire.</i>	Low	Selectboard, Planning Commission, Emergency Management Director	Medium	Local resources; private investment; HMGP Grant Program	Spring, 2025 – Fall, 2025
<i>Remove wooden stairway in- between Colatina Exit and Bliss Village Store. (Mitigation)</i>	<i>Removal of this portion of existing structure will diminish the extent of potential conflagrations and will reduce the loss of life and infrastructure from block fires.</i>	Low	Selectboard, Emergency Management Director	High	Local resources; HMGP Grant Program	Fall, 2024 – Spring, 2025
Flash Flood/Flood/Fluvial Erosion/Severe Summer Weather/Tropical Storm						

Hazard Mitigation Actions	Benefit	Cost	Local Leadership	Prioritization (Mitigation Plan Status)	Possible Resources*	Time Frame
<i>Review the structural integrity of the retaining wall on North Pleasant Street and plan for any upgrades or modifications if necessary.</i>	Repair and mitigation of this structure will prevent damage to buildings and infrastructure if the retaining wall were to fail.	High	Selectboard	High	Hazard Mitigation Grant Funding, VEM, TRORC	Summer, 2024 – Fall 2024
<i>Develop a schedule and capital budgeting program to continue to replace undersized culverts. (Mitigation)</i>	<i>Upgraded culverts appropriately handle the hydraulic capacity of streams and therefore protect town infrastructure from flooding.</i>	Low	Selectboard/ Road Foreman	High	TRORC; local resources	Culverts are prioritized for replacement on an ongoing basis.
<i>Consider adopting river corridor regulations, (Mitigation)</i>	<i>This action will incorporate VT ANR’s river corridor maps, helping residents and planners know what land is necessary for riparian functions and to prevent the threat to current and future development.</i>	Low	Selectboard/ Planning Commission	Low	ANR; MPG; local resources	Summer, 2026 – Fall, 2026
<i>Review the Special Flood Hazard Area regulations to consider incorporating higher standards and minimize development in flood zones.</i>	Adopting higher flood regulation standards will better protect future development from flood risk.	Low	Planning Commission	Medium	VT DEC, TRORC, Local Resources	Fall, 2024 – Spring, 2025
<i>Support projects to protect or restore riparian areas, including riparian plantings. (Mitigation)</i>	Incorporating riparian plantings and floodplain restoration projects	Low	Selectboard/ Planning	Medium	Upper Valley Land Trust; Upper Valley	Spring, 2027 – Fall, 2027

Hazard Mitigation Actions	Benefit	Cost	Local Leadership	Prioritization (Mitigation Plan Status)	Possible Resources*	Time Frame
	in strategic areas can provide areas for flood storage, helping to alleviate peak flood flows and reduce the loss of property during a flood.		Commission		Trout Unlimited; local resources	
<i>Keep up-to-date with Vermont Road and Bridge Standards. (Mitigation)</i>	<i>This action will help Bradford design structures that mitigate flood damage to Town Infrastructure.</i>	Low	Road foreman/ Selectboard	High	Local resources	Update at town level when updated by the State.
<i>Upgrade Bridge #11 (58.5'Lx6'W), an undersized steel bridge on South Road.</i>	<i>Upsizing bridges make infrastructure more resilient and improve capacity during flood and storm events.</i>	High	Road foreman/ Selectboard	High	Hazard Mitigation Grant Program; other state or federal grant opportunities	Spring, 2025 – Fall, 2025
<i>Upgrade Bridge #7 (50'Lx7'W), an undersized metal bridge on Town Highway 6.</i>	<i>Upsizing bridges make infrastructure more resilient and improve capacity during flood and storm events.</i>	High	Road foreman/ Selectboard	High	Hazard Mitigation Grant Program; other state or federal grant opportunities	Spring, 2027 – Fall 2027
Extreme Cold/Snow/Ice Storm						
<i>Clear and maintain town road rights-of-way. (Mitigation)</i>	Ensuring town roads are maintained and free of obstructions reduces damage from storm events and improves safety.	Moderate	Highway Department/ Selectboard	High	Local resources	Occurs annually, every winter.
<i>Encourage utilities that serve Bradford to maintain utility corridors. (Mitigation)</i>	Routine maintenance of utility corridors helps prevent damage to utilities and town infrastructure, and minimizes utility outages during storm	Low	Emergency Management Director	High	Utility Providers; local resources	Ongoing

Hazard Mitigation Actions	Benefit	Cost	Local Leadership	Prioritization (Mitigation Plan Status)	Possible Resources*	Time Frame
	events.					
Infectious Disease Outbreak						
<i>Consider incorporating resilience measures into the town website that address actions to be taken during an infectious disease outbreak.</i>	These measures can help prevent loss of life and better prepare for future infectious disease outbreaks.	Low	Selectboard, Town Health Officer	Medium	State Department of Health, local resources.	Spring, 2025 – Fall 2025
<i>Resume meetings of Bradford Resilience Committee if there is potential for a major health hazard in Bradford.</i>	The Bradford Resilience Committee can provide policy guidance and strategies for the town to implement that will mitigate the impacts of a public health crisis.	Low	Emergency Management Director	Medium	Local businesses, local schools, town officials, local organizations	Resume as needed.
Hazardous Material Spill						
<i>Develop a plan to incentivize local businesses to file Tier II with the State.</i>	This action will encourage compliance and better respond to hazardous spill incidents.	Low	Emergency Management Director	Medium	Local resources	Annually
Extreme Heat						
<i>Increase tree plantings around buildings and parking lots and along town streets in village areas.</i>	This action will help reduce temperatures in parts of town with high pedestrian traffic and high impervious surface area. Reduced temperatures can lower the risk of heat-related illness.	Low	Road Foreman and Conservation Commission	Low	Local resources	Spring, 2027 – Fall, 2027
<i>Publicize information brochures available on the town website and listserv to inform residents of the risks of high heat and strategies</i>	Public knowledge around the risks of high heat events can	Low	Health Officer, Fire Department	Medium	Local resources, VEM	Information publicized as needed

Hazard Mitigation Actions	Benefit	Cost	Local Leadership	Prioritization (Mitigation Plan Status)	Possible Resources*	Time Frame
<i>and resources available during high heat events.</i>	better prepare residents and mitigate health impacts.					prior to high heat events

Ongoing Actions to Support Mitigation and Preparedness Actions	Local Leadership	Prioritization (Mitigation Plan Status)**	Possible Resources*	Time Frame
All Hazards				
<i>Ensure that Bradford's Local Emergency Management Plan (LEMP) is kept up-to-date and identifies vulnerable areas and references this Plan. (Preparedness)</i>	Emergency Management Director/ Selectboard	High	Vermont Division of Emergency Management and Homeland Security (VT DEMHS); TRORC; local resources	Yearly
<i>Alert residents to upcoming hazards, bad weather, and potentially treacherous travel conditions by posting the VTrans Live Update Road Condition webpage on the Town Website. These resources will be used to give residents important information about upcoming hazards and potentially treacherous travel conditions. This town-wide notification system will reduce the loss of life during a hazard. (Preparedness)</i>	Emergency Management Director / Selectboard, Fire Department	High	Vermont Division of Emergency Management and Homeland Security (VT DEMHS); TRORC; local resources	Publicize as needed prior to hazardous events
<i>Continue to consistently document infrastructure damage after weather events. (Preparedness)</i>	Road Foreman/ Town Clerk	Medium	TRORC; local resources; National Weather Service; VTrans	Ongoing

Ongoing Actions to Support Mitigation and Preparedness Actions	Local Leadership	Prioritization (Mitigation Plan Status)**	Possible Resources*	Time Frame
<i>Have an emergency management display on election day and town meeting to provide educational outreach to residents on emergency management. (Preparedness)</i>	Emergency Management Director / Bradford Resilience Committee	Medium	Local resources	Annually
<i>Continue to submit Emergency management, public safety commission, highway, fire department, fast squad, and police chief reports in the annual Town Report. (Preparedness)</i>	Selectboard	High	Local resources	Ongoing
<i>Request that VEM provide a training in ICS for town employees. Making ICS training available for many town employees better prepares the Town to respond following emergency incidents.</i>	Emergency Management Director	Medium	VEM, Local Resources	Spring of 2025
<i>Maintain highway and fire mutual aid agreements. (Preparedness)</i>	Highway/Fire Department	High	Local resources and with assistance from TRORC	Yearly
<i>Distribute Vermont Division of Emergency Management & Homeland Security: Family Emergency Preparedness booklet at Town Meeting Day and Election Day. (Preparedness)</i>	Selectboard/ Emergency Management Director	High	Local resources	Ongoing and occurs yearly
<i>Require Bradford employees to become Incident Command System (ICS) 100 and 200 certified. (Preparedness).</i>	Emergency Management Director	High	Local Resources	Ongoing
<i>Ensure Red Cross Shelters, United Congregational Church Bradford Elementary School and Evangelical Church, are stocked with cots, blankets, and MRE (Meals Ready to Eat) (Preparedness)</i>	Emergency Management Director	High	Vermont Division of Emergency Management and Homeland Security (VT DEMHS); VT Alert; local resources	Yearly

Ongoing Actions to Support Mitigation and Preparedness Actions	Local Leadership	Prioritization (Mitigation Plan Status)**	Possible Resources*	Time Frame
<i>Continuously stock gear to help contain small spills when they occur (booms, absorbent materials, etc.). (Preparedness)</i>	Bradford Fire Department	High	Bradford Fire Department resources	Yearly, Stocked as needed.
<i>Maintain existing dry hydrants, by checking, servicing, flushing, and opening them annually. Proper maintenance of hydrants will reduce the loss of life and infrastructure from structure fires. (Preparedness)</i>	Fire Chief/Fire Department	High	Local Resources	Ongoing and occurs yearly.
<i>Enlist statewide fire education trailer for use at Bradford Elementary School and at community events, which will help residents identify fire hazards in their homes. (Preparedness)</i>	Fire Chief/Fire Department	Medium	Local Resources, Vermont Division of Public Safety: Division of Fire Safety	Ongoing
<i>Distribute fire prevention fliers at the school to protect young residents from loss of life during fires. (Preparedness)</i>	Fire Chief/Fire Department	High	Local resources	Ongoing.
Hazardous Material Spill				
<i>Ensure that all emergency response and management personnel continue to receive HAZMAT Awareness training at a minimum. (Preparedness)</i>	Bradford Fire Department	High	Bradford Fire Department resources	Yearly
Flash Flood/Flood/Fluvial Erosion				
<i>Plan for, budget, and maintain roads for safe winter travel. (Preparedness)</i>	Selectboard	High	Local resources	Ongoing and occurs yearly.
<i>Continue efforts throughout Town to maintain and improve ditching in rights-of- way of Town maintained roads. (Mitigation).</i>	Road Foreman	High	Local Resources; Better Roads Grant Program	Ongoing
Invasive Species				
<i>Develop a mitigation program for the Emerald Ash Borer to identify at-risk or infected trees and to safely dispose of them to reduce</i>	Selectboard / Tree	Medium	local resources	Summer, 2025

Ongoing Actions to Support Mitigation and Preparedness Actions	Local Leadership	Prioritization (Mitigation Plan Status)**	Possible Resources*	Time Frame
<i>the spread of this invasive species. (Mitigation)</i>	Warden			
Extreme Cold/Snow/Ice Storm				
<i>Update and maintain existing list of populations that are vulnerable to extreme cold and other hazards. Call and visit vulnerable residents, if necessary, in the event that a hazard occurs. By maintaining this list, the health of vulnerable populations will be protected. (Preparedness)</i>	Selectboard, Emergency Management Director	Medium	Local resources	Ongoing and occurs yearly.
<i>Distribute safe winter driving informational materials to residents by means of Bradford listserv. Safe winter driving mitigates the loss to human health. (Preparedness)</i>	Selectboard, Town Clerk	Low (Action #10 of 11 in 2010 Plan).	Local Resources	Occurs yearly.

*Depending on the mitigation action, local resources may include the following: personnel/staff time; volunteer time; budget line items, donations, cash from capital campaigns, among others.

Appendices

Appendix A: Hazard Ranking Methodology

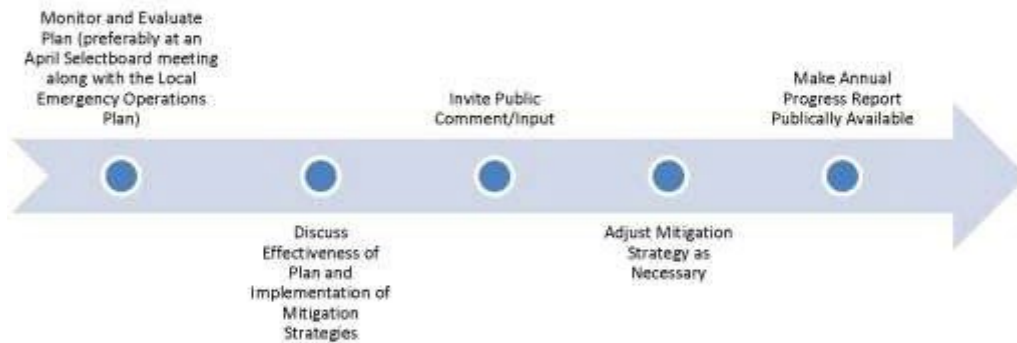
Score	Frequency of Occurrence: Probability of a plausibly significant event.	Potential Impact: Severity and extent of damage and disruption to population, property, environment, and the economy.
1	Unlikely: Less than 1% probability of occurrence per year.	Negligible: Isolated occurrences of minor property and environmental damage, potential for minor injuries, minor economic disruption.
2	Occasionally: 1% through 10% probability of occurrence per year, or at least one chance in next 100 years	Minor: isolated occurrences of moderate to severe property and environmental damage, potential for injuries, minor economic disruption.
3	Likely: between 10% to 75% probability per year, at least 1 chance in next 10 years.	Moderate: severe property and environmental damage on a community scale, injuries or fatalities, short-term economic impact
4	Highly Likely: 75% or greater probability in a year	Major: severe property and environmental damage on a community or regional scale, multiple injuries or fatalities, significant economic impact

Appendix B: Five-Year Review and Maintenance Plan

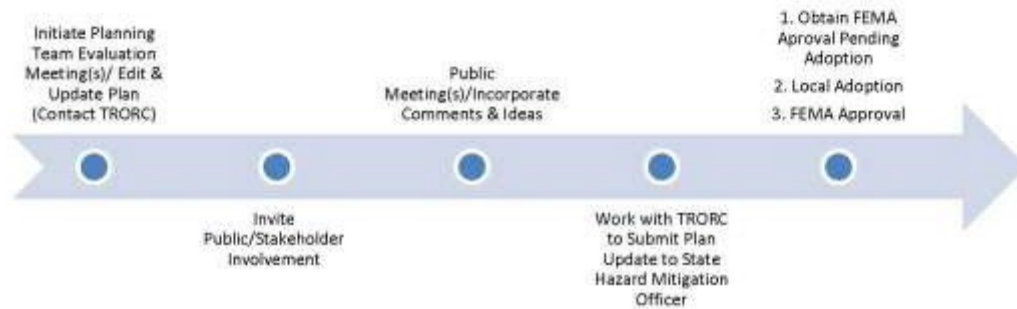
Five-Year Local Hazard Mitigation Plan Review/Maintenance



After Plan Adoption—Annually Implement & Evaluate



Fifth Year, and After a Major or Federally Declared Disaster Directly Impacting the Town Evaluate & Revise



Appendix C: Summary of Survey Responses

1. There are many new families in Town. Ensure new and current residents know the emergency services and agencies available to assist during disaster events.
2. Raise awareness for residents on the emergency locations/cooling centers for heat during power outages.
3. If telephone lines are down, is there a cellular number available for residents to call during emergency situations?
4. Change in focus during the pandemic. Local response and local spending.
5. Climate migration is a significant issue, accommodating an influx of new residents safely will need to be addressed.
6. Climate Change will likely impact the floodplains more and more, greater concern for erosion.
7. Mud season created an accessibility challenge for residents on Old Post Road.
8. Publicize meetings (JO and Bridge Weekly).
9. An increase in older residents and decrease in younger residents will change vulnerability to hazards. Population more spread out over a larger area may make it more challenging to respond.
10. Greater awareness for hazards of malicious intent (i.e. foreign threats, terror groups, bad actors)
11. Show which projects or actions have been accomplished from the previous plan.

Project Type	Structure and Infrastructure Projects	Natural Systems Protection	Local Plans and Regulations	Education and Awareness Programs
Prioritization Total	4	2	1	5

Assets

- Downtown/Main Street
- Sidewalks
- Opportunities to connect, local events, building relationships
- Local parks and the Parks & Recreation Department work
- Town Services; Fire Dept. Water/Sewer, Police Dept, Fast Squad
- Veterans Home
- Margaret Pratt
- The Teen Center
- Space on Main
- Bradford Public Library
- The Bradford Cemeteries
- Bradford Academy Building
- Blue Spruce

Infrastructure Priorities

- The drain on Rte 5 near 57 N. Main St is constantly clogged
- The ditch along 127 N Main is filling with silt
- Water from High Street circumvents the storm drain
- Mist from the Dam creates icy conditions on Rte 5 bridge by Grist Mill
- Bridge on South Road from Rte 25
- Ice buildup at the bottom of Plateau Acres in the winter creates a travel hazard.
- Water treatment facility – flood risk given proximity to Waits River
- Culvert on Cobblestone Alley not maintained – resulting in cracked road and water pooling
- Ground water from old Robie House, Rte 25B runs down driveway, causing ice buildup.
- Creamery Road – lack of road lines is a safety issue for drivers. Roadside brush impedes visibility
- Waits River Bridge
- Signage hazard created on KD Welch Service Road
- North Pleasant Street slide potential toward Main Street

Appendix D: Public Meeting Notices



Figure 2 Flier for 7/12 LHMP Meeting



Figure 3 Flyer placed at the Bradford Community Bulletin Board for the 9/18 LHMP Meeting

15. Bradford Hazard Mitigation Plan meeting

From: "Ted Unkles" <unkles@myfairpoint.net>
Date: Thu, 06 Jul 2023 22:10:08 -0400

The Town of Bradford Vermont is currently updating the Town's Local Hazard Mitigation Plan (LHMP). The process encourages stakeholders to provide input, which will help shape the strategies and actions that go into the Plan. We are seeking input from local organizations, residents and others. There are multiple ways to provide feedback. We have published a survey, which can be completed in 5-10 minutes, and is linked here: <https://forms.office.com/g/6DE5cqJt37>. (If that link does not come through on the listserv, you can simply copy and paste the web address.) We also have an upcoming meeting, which is open to the public, and will be held at the Bradford Fire Station, 135 Carson Lane, on Wednesday July 12th at 6:30 PM.

At the meeting, we will be discussing the status of the hazard mitigation actions from the 2017 LHMP, as well as town capabilities for implementation. Please contact me if you want a copy of the 2017 LHMP or if you have any questions. We greatly appreciate any input you may be able to provide.
Ted Unkles

Figure 4 Bradford Listserv Posting, 07/06/23

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11. Updating the Bradford Hazard Mitigation Plan

From: "Ted Unkles" <unkles@myfairpoint.net>
Date: Tue, 01 Aug 2023 22:41:06 -0400

The Town of Bradford Vermont is currently updating the Town's Local Hazard Mitigation Plan (LHMP). The committee revising the plan invites stakeholders to come to the table and provide input, and to help inform the strategies and actions that go into the Plan. We are seeking feedback from local organizations, residents and others who wish to provide input in the process.

We have published a survey, which can be completed in 5-10 minutes, and is linked here: <https://forms.office.com/g/6DE5cqJt37>. The survey is an effective way to participate and will help to inform our work as we draft the plan.

We also have an upcoming meeting, which is open to the public, and will be held at the Bradford Fire Station, 135 Carson Lane, on Wednesday August 9th, at 6:30 PM. At the meeting, we will be discussing hazard mitigation actions for the 2023 Plan, as well as recent development since the last LHMP update (Follow this link to read the 2017 LHMP). Please feel free to reach out to me as well with any questions. We greatly appreciate any input you may be able to provide.

Figure 5 Bradford Listserv posting, 08/01/23

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5. Bradford Hazard Mitigation Plan

From: "Ted Unkles" <unkles@myfairpoint.net>
Date: Wed, 13 Sep 2023 12:00:41 -0400

The Town of Bradford Vermont is updating the Town's Local Hazard Mitigation Plan (LHMP). The planning process allows an opportunity for people in the community to provide input. To encourage broad public engagement, we are seeking input from local organizations, residents and others who may have suggestions on the hazard mitigation plan update.

The committee working on the update will be meeting at the Bradford Fire Station, 135 Carson Lane, on Monday September 18th at 8:00 AM. Anyone who wishes to offer input is welcome. You may review a current draft of the plan at the following URL: <https://tinyurl.com/3ybnbnb>

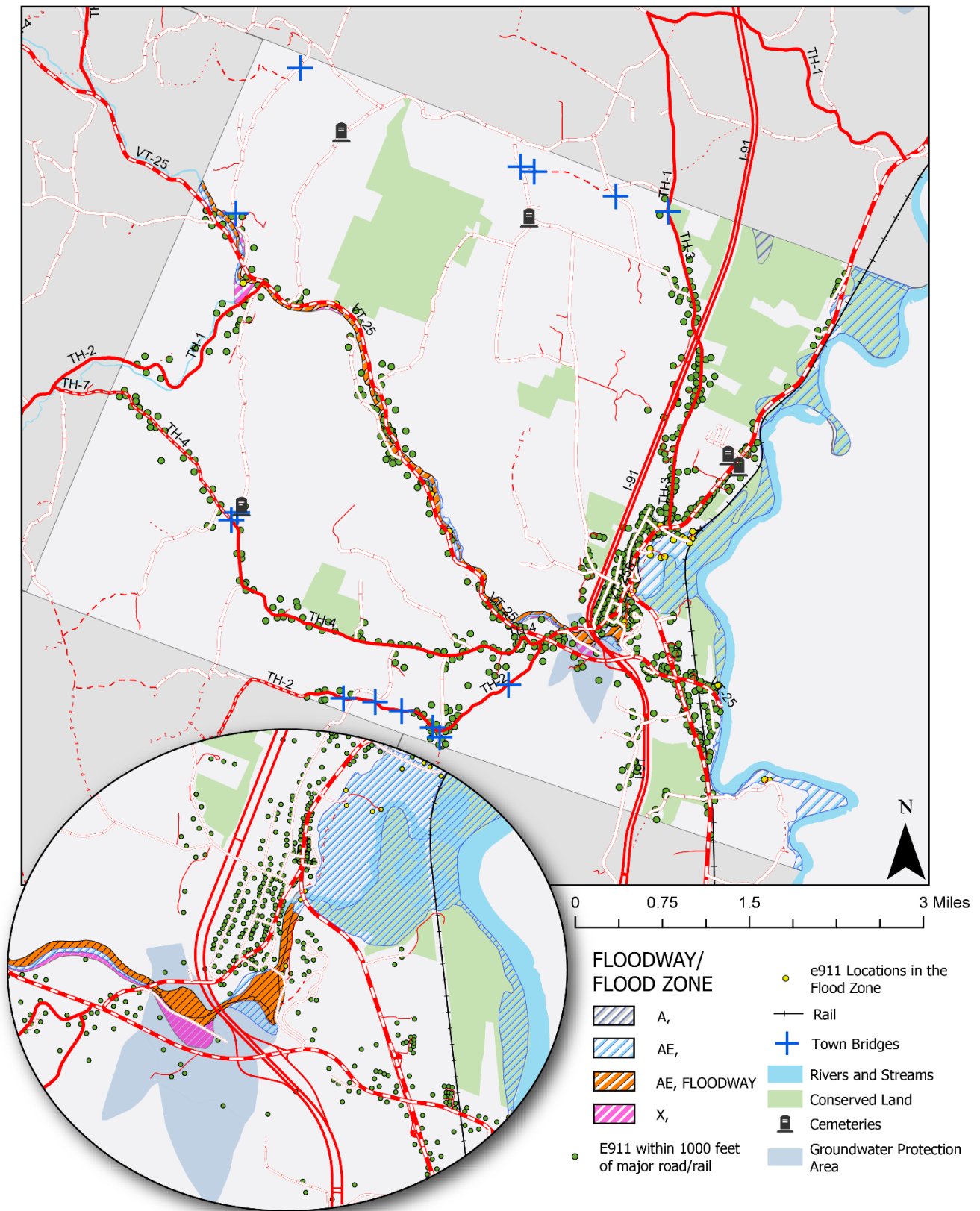
Feel free to reach out to me or to Kyle Katz at the Two Rivers Ottawaquechee Commission with any questions. We appreciate any input you can provide.

Kyle Katz, Two Rivers-Ottawaquechee Regional Commission.

Email: kkatz@trorc.org
Phone: 802-457-3188 ext. 3005

Figure 6 Bradford Listserv Posting, 09/13/2023

Attachment A: Map of Bradford



VCGI, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, Esri, NASA, NGA, USGS, FEMA